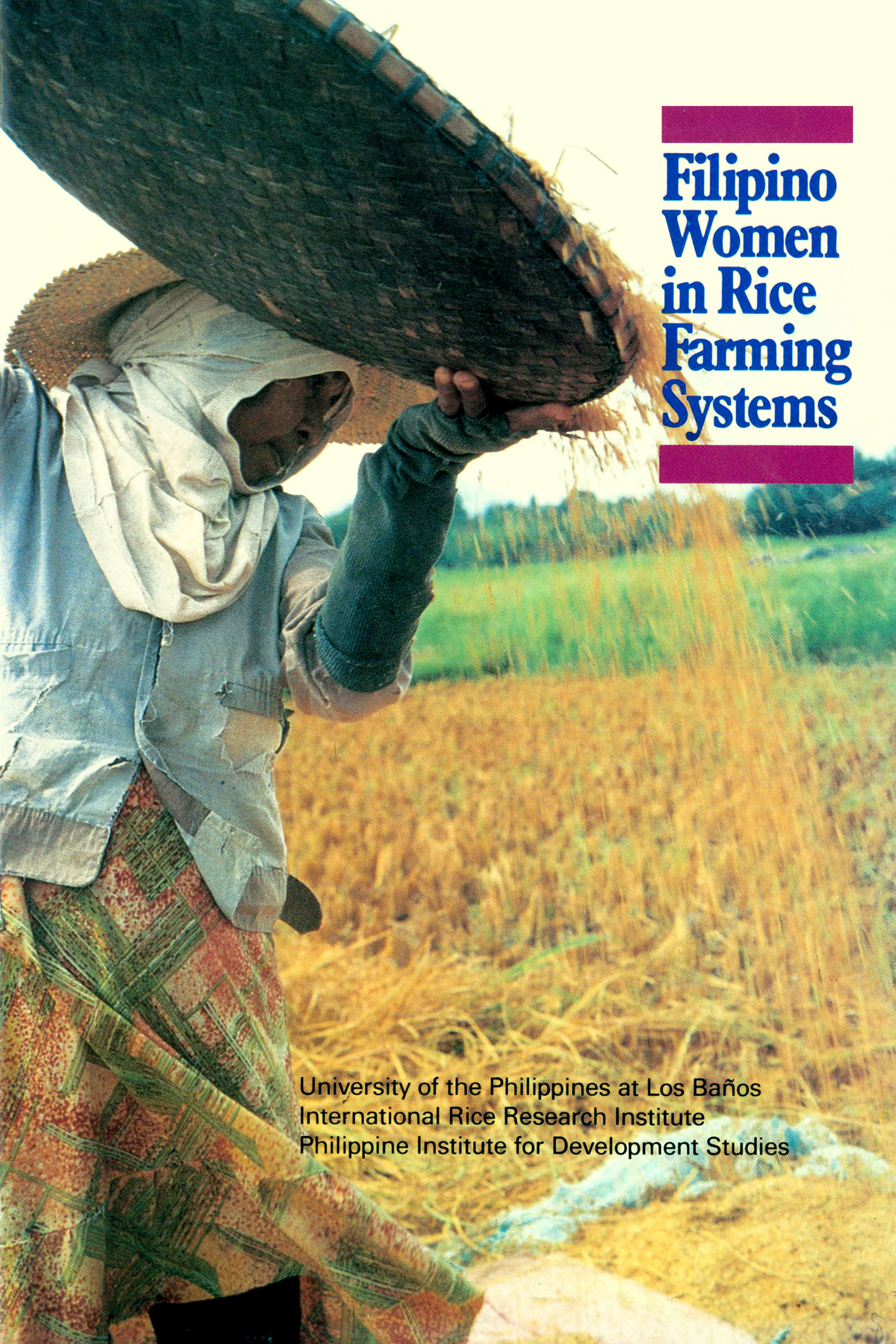

Filipino Women in Rice Farming Systems

University of the Philippines at Los Baños
International Rice Research Institute
Philippine Institute for Development Studies

FILIPINO WOMEN IN RICE FARMING SYSTEMS

This publication is a collaborative effort
of the University of the Philippines at Los Baños,
The International Rice Research Institute,
and The Philippine Institute
for Development Studies.

1988

The publication of selected papers from the Consultative Workshop on Women in Rice Farming Systems in the Philippines was made possible through a grant from the International Rice Research Institute (IRRI). The workshop which was held March 26, 1987 at the Continuing Education Center, UPLB Complex, College, Laguna, Philippines was jointly funded by the Philippine Institute for Development Studies (PIDS) and the Ford Foundation institutional grants to IRRI and the Center for Policy and Development Studies (CPDS), University of the Philippines at Los Baños (UPLB).

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OTHER PAPERS

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FOREWORD

It is widely known that women farmers and labor play a pivotal role in improving the productivity, profitability, stability, and sustainability of rice farming systems. It is therefore a matter for regret that inadequate attention is being paid to involving women actively in technology development and transfer and to designing improved technologies for women-specific occupations. The extension and credit agencies have generally tended to bypass farm women. Compounding this neglect by research and development agencies is the triple burden borne by women because of their household, productive, and reproductive responsibilities.

The poorer the household the more important is an independent access to income for women. Also if women are able to earn more, there is evidence that both the nutrition of children and acceptance of a small family norm improve. It is on the basis of these considerations that several national research programs in Asia and the International Rice Research Institute (IRRI) have joined together to organize a collaborative research and training network for giving explicit attention to the needs of women in rice farming areas. The Center for Policy and Development Studies (CPDS), the Philippine Institute for Development Studies (PIDS), the Ford Foundation, and IRRI jointly organized a Workshop on Women in Rice Farming Systems in the Philippines in March 1987. This publication containing the proceedings of this workshop will indicate the vast scope for purposeful collaboration. I am grateful to Dr. Agnes Rola, Workshop Coordinator, for her work both in organizing the program and the workshop.

M.S. SWAMINATHAN
Director General
International Rice
Research Institute
January 1988

FOREWORD

This volume represents the collective effort of an interdisciplinary group of women scientists who had one common goal, to focus attention on the role of rural women in development. The workshop, which dealt with the sub-topics (1) technology and women in rice farming systems; (2) extension and women in rice farming systems; and (3) wages and female employment, provided the forum where discussion on the papers' merits were participated in by experts who contributed their own insights on the topics at hand. The proceedings, as herein presented, is expected to lay the ground work for a full-blown program where women from the academe, government, private sector and the rural areas could collaborate. This is expected not only to emphasize the positive contribution that rural women could make in the attainment of national growth; but more importantly to call attention to this potential human resource which hitherto has remained untapped.

In recognition of this worthwhile mission, we at UPLB would like to look at the publication of this proceedings as the first step. May it be followed by many more.

RAUL P. DE GUZMAN
Chancellor
University of the
Philippines at Los Banos
January 1988

PREFACE

Considerable interest on the role of women in agricultural and rural development has emerged during the last few years, particularly within the context of developing countries such as the Philippines. Women, as partners in the decision making activities undertaken at the farm household level, have been recognized to contribute substantially in: (1) the allocation of resources between consumption and production, (2) the adoption, application and dissemination of technology, (3) the generation of income for the household, as well as (4) the raising of a family in accordance to the norms of the society it exists. No longer are they perceived as traditional housewives, or the "weaker" sex, who are highly dependent on the husband and whose main activities are mainly focused on managing the household. As a consequence, the development of this new school of thought has encouraged researchers to examine closely women's role, as well as the extent and degree of their participation, in the development process. This book compiles some of the recent studies which were conducted in the Philippines.

This book presents selected papers discussed in the Consultative Workshop on Women in Rice Farming Systems (WIRFS) in the Philippines held at the Continuing Education Center of the University of the Philippines at Los Baños (UPLB) on March 26, 1987. This Consultative Workshop was an offshoot of the activities of the Philippine program, currently coordinated by the Center for Policy and Development Studies (CPDS) which is in line with the efforts of the International Rice Research Institute at the regional level, to institutionalize women's concerns in agricultural research and extension systems in Asia. The WIRFS program aims to develop mechanisms by which women's roles and needs (as participants, users and beneficiaries) will be considered at appropriate stages of technology development and dissemination; to find out whether and to what extent this consideration will increase the efficiency and effectiveness of the agricultural research and extension process; and to examine whether and to what extent this process promotes women's interests and contributes to the positive effects of technical change on their welfare and that of the entire household. IRRI sponsored the 1983 Conference on WIRFS and the Project Design Workshop in April, 1985 to serve as initial start-up activities. For the Philippine program, specific project development activities began about August 1985.

The March 1987 workshop served as a venue for discussing the preliminary findings of on-going projects included in the national program. Other resource persons were invited to present the findings of their past and current studies on rural women and children in farming systems. It has, therefore, paved the way to establish linkages among the participants who came from various sectors of our society. Through this meeting, the participants became aware of the grassroots activities of women, the various methodologies used in action-researches involving women, and the scarcity of published materials on women's concern.

Financial support for the Philippine program was partly provided by the Ford Foundation Institutional Grant to CPDS. I would like to take this opportunity to thank Ford, and the various institutions and individuals responsible for making the workshop a success. The CPDS is also grateful to Dr. Wilfrido D. Cruz, its former Executive Director for providing the necessary support especially during the early stages of the program.

JEROME F. SISON
Executive Director
Center for Policy and
Development Studies
UPLB
January 1988

OVERVIEW

The Women in Rice Farming Systems (WIRFS) program was initiated by the International Rice Research Institute (IRRI) in response to the need to systematically document, synthesize, and quantify the contribution of rural women in the different farming systems. As Dr. Gelia T. Castillo aptly stated in its Perspective Plan for Research, "The WIRFS program introduces a new imperative for social science in agricultural research and extension systems and its role vis-a-vis farming systems has to be defined and acted out and therefore, the institutionalization of women's concerns is the ultimate aim".

The WIRFS program was conceived in answer to an increasing concern that neglect of women-specific issues leads to inefficient technology development and transfer programs in those cases where the users are women, and that new technologies may have negative consequences for women. Hence, it is deemed essential to consider the needs, constraints and potentials of both the male and female users.

As an initial contribution to the region-wide WIRFS program, the Philippine network has lined up several projects aimed at examining the role of women in technology development and in the extension delivery system. The findings of these projects were presented in the consultative workshop.

Workshop activities were divided into three sub-topics: (1) technologv and women in rice farming systems; (2) extension and women in rice farminn systems; and (3) wages and female employment.

Under the first sub-topic, the papers presented include among others, a report of a project in Calamba, Laguna known as "Integrated Pest Management (IPM) Technology Verification and Generation." Aside from its technology component, the project also attempted to describe the role of women in IPM technology development and transfer. The paper on "Women in a Crop-Livestock Farming Systems Project in Sta. Barbara, Pangasinan" gave us insights into ways of increasing the utilization of rice crop by-products and residues as animal feed through crop livestock research in both irrigated and rainfed areas, and the role of women in these activities. The other papers in this sub-topic focused on the technological aspects and at the same time examined the socio-economic component and role of women in various technology development and transfer efforts.

Three of the papers on extension and women in rice farming systems were basically strategies for activities in crop protection extension. The paper writers are part of an interdisciplinary team which includes an entomologist, a rural sociologist, a development communication specialist, a vertebrate biologist and an economist. The other paper of this sub-topic dealt with "The Role of Women in Cooperatives." It aimed to evolve program strategies by which women could more effectively contribute to the growth of a cooperative in particular and to cooperative movements in general. This paper was a result of a study about government and non-government credit cooperatives located in Region IV, Philippines.

Lastly, the paper on "Wages and Female Labor Employment" which was a complementary study within WIRFS examined theoretically and empirically how women's wages are determined; how individuals of the same productivity receive different wages in a competitive economy; the variances in productivities; and how wages and productivities affect female participation.

The articles listed in Other Papers are results of the projects which are part of the Philippine program of WIRFS but were not ready for presentation during the workshop. However, it was felt that inclusion of these papers in this publication would further highlight the types of methodology that are relevant for the study of the women's role in a farm household. Though the projects focus on the role of women, the household is the basic unit of analysis. We are putting the women's roles in a rural household perspective to provide a contrast to their activities vis-a-vis those of the males and other members of the household. This concept is clearly illustrated in the paper by Dr. Jeanne Frances Illo, which is a description of an individual household in a farming system; and to some extent in the paper of Dr. Melanda M. Hoque on the role of women in vegetable production. Both papers are listed in the Other Papers.

Moreover, the unique characteristics of the rural household is influenced by the natural and the socio-economic environment that it is a part of. Households from different agro-ecological zones (i.e. rainfed and irrigated or upland/lowland) will respond differently to certain technologies and extension services. Through the WIRFS program, it is hoped that data can be generated and analyses be made that would allow one to compare and contrast the role of women in the different natural and socio-economic environments.

The paper presentors during the workshop came from various sectors of the country. Though most were from UPLB, the other presentors were Ms. Rufina Ancheta of the Department of Agriculture and Food who represented the government sector; Ms. Thelma Paris and Mr. Leonard0 Lanzona of IRRI; and Dr. Fermina Rivera of Central Luzon State University, Dr. Monina Escalada and Ms. Salome Binongo of the Visayas State College of Agriculture who represented the regional state universities. From among this core of researchers, we hope to expand the network and work with others who are also concerned with uplifting the welfare of rural women in particular, and the rural household, in general. In the long-run, it is envisioned that the WIRFS program in the Philippines will be a full-blown program with the members of the academe, government and non-government organizations, the private sector and the rural women themselves as collaborators.

Funds for project development and workshop expenses were provided by the Department of Agriculture and Food through Dr. Edgardo Quisumbing, the Philippine Institute for Development Studies (PIDS) and the Ford Foundation Institutional grants to CPDS and IRRI. In behalf of the other members of the project, I would like to thank these institutions for their generous financial support. I would also like to acknowledge the grant of the Mission Administered Fund (MAF) of the Canadian Embassy through Mr. Greg Strong given to the project on Philippine Women in Cooperatives. Likewise, my special thanks to Dr. Teresa H. Stuart for editing the papers for publication, and Dr. Anna Miren Gonzales-Intal for initiating activities to get the project off the ground. The able assistance of colleagues at CPDS cannot be discounted. Ms. Agnes E. Recto provided the much needed administrative support; Ms. Julieta V. Tan was responsible for word processing the drafts in its various phases; Mr. Romeo Perlas also contributed to the preparation

of the publication materials; and the rest of the CPDS staff for their moral support. Finally, I would like to express my sincere gratitude to Dr. Gelia T. Castillo of UPLB and Bart Duff of IRRI for their encouragement and for their various forms of support to the Philippine component of WIRFS.

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OPENING REMARKS

Dr. Gelia T. Castillo*

Because of its relevance to this workshop, I would like to share with you some general comments made on nine review papers presented in a recent meeting in New York on Women, Technology and Development,** in my paper entitled "Some Notes on the Review of Reviews on Issues Related to Gender, Technology, and Development in the Third World".

From the perspective of technology development, and utilization which could make a difference for women, we have extracted the following points from the review papers for comment in this review of reviews:

A. On the Feminist Political Economy Approach[1/]

1. The paper on Understanding Technology Transfer, Community and Gender in Africa asserted that:

   "The great achievement of feminism in the past 15 years has been the moral and scientific commitment to the truth that women are half of humanity, and that gender relations are as fundamental a shaping force in society as economic relations or political economy that is gender-neutral, as those who are willing to look and discover. In development discourse, women are no longer invisible . . . even if they do not yet get equal time."

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** Workshop sponsored by the Rockefeller Foundation and the International Development Research Centre, on February 26-27, 1987, New York, U.S.A.

But apparently improved "visibility" has not gone much beyond "development discourse" because the following excerpts from the paper suggest something else:

1.1 "A major task facing this study is to show the way in which the combined insights of women-in-development (WID) research and feminist political economy might become the basis of future research on the technology transfer process. A boundary problem exists, not only between areas of scholarship which do not adequately interact, but between policy networks, which frequently have been unable to take mutual advantage of each other's insights . . . the inability of the food policy network to draw resources from the women's studies network is a case in point."

1.2 Quoting from Pari Mohammadi of the Economic and Social Commission for Asia and the Pacific, the paper says:

"In every respect, attempts to sensitize planners and reorient national planning processes to increase women's participation have not yielded significant results. Whereas, training women for participation in local-level decision-making and planning has had surprisingly quick and strong impact."

1.3 In the section on "Technology and Development: The Continuing Invisibility of Gender" more frustrations are expressed:

a) "In spite of the outpouring of information analysis on gender and development in the past 10 years, and the formal commitment to women-in-development initiatives, sizeable portions of mainstream academia, as well as loci of research and action, remain impervious to the challenge to their unexamined assumptions. The intransigence is all the more striking in the light of the cross fertilization of ideas and flexibility of approach discussed above. The phenomenon must be explained by the continued adherence of scholars and practitioners to a conservative framework of thought regarding women and gender issues . . . .

b) Compartmentalization of the ‘women problem’ is the chief means by which gender isues are excluded from socio-economic study and planning . . .

c) The World Bank has contributed to the ghettoization of the gender issue. While the organization has identified the problem of the invisibility of women in development, its major policy documents on Africa perpetuate that invisibility in the arena of major economic policy initiatives . . .

d) The Kenya Development Plan 1984-88, while it discussed briefly the employment problems of women and called for special policy measures to tackle them, suggested no concrete guidelines for such policy. Furthermore, the relation of gender issues to problems of development in health, nutrition and agriculture was not even raised . . .

e) In its Lagos Plan of Action for the Economic Development of Africa 1980-2000 . . . in the vision of self-reliant development, once again women remained largely invisible . . .

f) The "stubborn obliviousness" to the overwhelming evidence regarding the importance of gender relations and the vital economic role of women in African society is not the only reason for women's invisibility in the realm of technology and development. By the nature of the specialized fields that bear on development policy, there is a structural separation between research areas in different areas involving technology transfer . . .

g) I have dealt at length with the boundary problem, whereby the analysis of gender is either ghettoized or not integrated into technical subiects, because this is probably the most serious Problem facing both further fruitful research on development, and the generation of adequate development policy (underscoring supplied).

1.4 Regarding women-in-development offices in aid agencies, the paper makes a "reasonable generalization that women in development offices often stand in some degree of isolation from the rest of the institution: once again, women and gender issues being considered as an "aside".

What is most revealing to us is Staudt's study of aid and women which shows that "only 4.3 percent of regional bureau funding for USAID projects in Africa went to projects that were either specifically directed at women or had a component including women, while only 4 of 45 agricultural projects designated women as beneficiaries."

Although ILO has been singled out for taking a less ambivalent position on gender and development, it will be useful to find out the extent to which their work has had an impact beyond development discourse.

1.5 The most telling statement of all centers on the "conscientization of men." As the paper states:

"Sexist bias at all levels of policy making was one of the major findings in the review . . . Western feminists have agonized for years in academia and in aid agencies, about how to make their male colleagues read their articles, attend their workshops, and integrate the substantial analyses and findings of feminist research into their own work. We have found no solution as yet, although there have been advances on some fronts."

Comments on the above and other issues raised in the paper:

1) Based on the observations made in the paper itself, the great achievement of feminism is probably the feminist movement but it has yet to touch technology and development in any significant way.

2) With respect to the boundary problem, we should ask to what extent feminists have been willing to cross the boundary to start where the technical subjects (usually male dominated) are, instead of expecting the latter to come where the feminists are.

   It would be instructive to point out that in most technology generating establishments, the social sciences, in many instances, are at the margins. Even economists who are regarded as the most useful of all, have to justify their existence periodically and it is not often that they are welcomed in a lead role. In the 25 year old International Rice Research Institute, for example, no non-economic social scientist has survived. As far as we know, it is only at the International Potato Center where the anthropologist is on core budget and social science is an integral part of almost every research thrust. So the problem is broader than a failure to recognize the importance of the sex-gender system.

3) The most important lesson we have learned from a year's experience in integrating women's concerns in farming systems research is that <u>advocates</u> or <u>recruited co-believers</u> should be there where FSR is taking place. We cannot simply preach on the important role of women in technology development and extension and leave the matter of doing something about it to somebody else. Speeches, articles, books are necessary for awareness and even for sensitization but they are insufficient for changing the current situation. Conferences are not substitutes for field projects which actually integrate women concerns in FSR.

   The second most important lesson is that it is easier to generate ideas and even project proposals than it is to find funds to support the ideas and the projects.

Donor agencies do not always "put their money where their mouth is" but somehow we never seem to run out of conferences and workshops.

4) Sexist bias does not always come from males. Some of the significant resistance to the gender issue comes from females in responsible positions. This has been our experience too.

5) After more than a decade of awareness, sensitization and the creation of WID offices, Women's Desks etc. in development agencies, perhaps we should reassess the situation. If we want women issues integrated, setting up separate WID offices is probably counterproductive at this point because they provide a convenient token evidence that women have already been taken cared of.

Feminists need to find allies (male or female) in the sectoral or technical subject matter units of technology and development agencies and begin the task of "selling" and actually <u>doing</u> feminist political economy approach if in fact, this is the approach that is indicated.

On the conceptual side, an interesting idea comes from Soedjatmoko of the United Nations University. In their Second Medium Term Perspective for 1988-1993 they have identified 5 problem areas:

- Global life support systems
- The global economy
- Alternative rural-urban configurations
- Security and development
- Global learning

Within the 5 problem areas, specific, researchable topics that respond to the most urgent concerns must be located by UNU. Certain <u>perspectives</u> must be kept in mind in dealing with each problem through the lens of these perspectives that throws the most relevant topics into sharp relief and makes them identifiable. The perspectives that seem suitable to guide the UNU in its approaches to main areas of research are those of governance; science and technology; household, gender, and age; and culture and values.

Household, gender, and age has been included as a perspective rather than as an area of concentration because they felt that this is a cluster of issues that should not be studied in isolation in a separate project or group of projects, but should pervade the way we look at all the major issues on the UNU agenda.

6) Regarding the issues on technology as neutral; appropriate technology; income generation; women as welfare subjects and intensification of women's labor, the following remarks could be made:

a) Unless we are able to illustrate by real-life examples how a feminist political economy approach makes a difference in procedures and outcomes for women, it will be difficult to convince particularly those who do not want to be convinced. This is the task ahead.

b) From our exposure to development programs, income-generating activities and social service projects appear to be the more attractive features that stimulate women to participate. Perhaps we are missing what is sinister in income-generation and welfare because the fact of the matter is that many women want more income-earning opportunities and so many of them have not yet had a chance to participate, let alone benefit from social services.

c) The literature is equally replete with complaints about women being displaced from work because of new technologies. Here, the issue of which women and where is important. One woman's drudgery may be another woman's livelihood.

d) What will be more constructive if we can develop easily understood concepts and processes which will enable program planners and implementors with active assistance from advocates to sort out many of these issues in practice. For as the paper points out, women are not a homogeneous lot.

e) The "bearer of bad news role", which has been played by social scientists in general and feminists in particular, is a role which has been probably been overplayed to date. It's about time we come up with feasible alternatives to the "bad news" we have so effectively brought. The alternative routes are neither easy nor self-evident and it will take a great deal of work to make them implementable. But work we must because nobody else is going to do it for us.

7) If we want to institutionalize women concerns in technology and development agencies and processes, it is important not just to focus on technology adoption, maintenance, and operational control (p.3) but to start from problem identification, definition, and technology development or start from the front end, rather than the tail end of the process. Obviously this is going to be difficult but to earn credibility among non-believers, we must be able to demonstrate that our way is "better". We cannot continue saying that what they are doing is wrong unless we can point out how to do it "right" or at least "less wrong". The message is getting monotonous.

8) Some gems of wisdom from the Bangladesh Rural Advancement Committee (BRAC) seem apropos to this workshop:

- The BRAC strategy is "to organize and develop appropriate village and local level institutions in order to effectively involve the masses of rural population in mobilizing the community's resources for their own development and to provide services to those whose needs are being ignored. In their work with rural women and the landless, BRAC concluded that:

- Organization of disadvantaged groups is only a beginning. After that, one has to explore viable economic alternatives for them. Rural women's demand for social and economic alternatives is greater than the supply. These women (subsistence and below subsistence) face a strong financial motivation. Non-economic incentives such as prestige and social contact come later through the joint economic ventures. But to identify and design viable economic projects which would ensure a reasonable return to each member is extremely difficult. But this identification and design is crucial to all else. Much can be done to involve women in health, family planning, education and other social development efforts both as beneficiaries and as staff. However, it is economic development activities which urge most strongly for and to the rural poor women.

> In the conscientization process, the dialogues are methods of recognizing problems and motivating them to seek solutions actively. But in the search for solutions, there is no escape from productivity increasing technology. Agricultural solutions from new rice seeds, irrigation, poultry, kitchen gardening, goat rearing, paddy husking, sweet potato cultivation etc. were, in the end, the source of the solutions, and so were the technologies in family planning, scabies eradication, weaving, silkworm culture, fisheries, horticulture, oral rehydration etc.

We must therefore be reminded that although the ideology is very much social in its call for organizational and institutional development, the operational measures to deal with the problems of the rural poor are as much technological.

Similar lessons were expressed by a political activist engaged in community organization. Karina Constantino-David says of their experiences in the community of Pantoc, Sariaya, Quezon Province:

"Community organization, as developed in the West and practised in the Third World, has its own clear-cut methods for stimulating popular participation in social change; but in practice, it often runs into contradictions: how to arouse awareness without creating new dependence, to lead or not to lead, to manipulate or to facilitate, to break restrictive laws or to respect them . . . . Without a clear alternative vision of society, the efforts of community organizers can easily come to nothing . . . .

The average community is confronted by the problem of economic welfare. Most of the time the people expect an organizer to improve their economic conditions. On the individual level, the problems of death, illness, malnutrition and sanitation cannot be dismissed by the organizer even while he realizes that organizing a community means raising levels of consciousness, confronting basic structural problems and not merely improving physical conditions. Economic projects most of the time serve to inspire the people towards the benefits of collective action and self-reliance.

It is only through praxis that political consciousness can be strengthened and it is only when people are convinced that change is in fact taking place that they will listen and learn the abstract concepts that must be actualized in experience. Unfortunately the poor are unused to the practice of conceptualizing and abstracting. The mental frame of generations of hand-to-mouth existence is one that is rooted to what a person can immediately see and hear."

9) Toward the end, the paper mentioned that the study has: "substantively demonstrated the value of women's grassroots organizations and their power to influence village developments."

In what way did the feminist political economy approach contribute to the value of women's grassroots organizations? Wouldn't they have been valuable anyway even independent of the analysis?

The "Human Action Model", which has been developed at the Environment Research Center of the Institute of Technology in Bandung, Indonesia and which is proposed for a future project in the context of African village groups, looks like a promising one but again, it is not self-evident as to how the model relates to the feminist political economy approach. In Asia, there are many different versions of this selfreproducing scheme being implemented in various degrees.

The case of women's self-help groups has been cited as the exemplification of the feminist political economy approach. The experience of the women of Mitero Village in the past and present was used to develop theoretical tools for an understanding of sex-gender systems. It is not clear, however, how this kind of understanding has been applied in the interest of more relevant technology development. It appears that it is much easier to say that not taking the sex-gender system into account leads to negative results or non-results than to demonstrate how taking it into account has made a positive difference for women.

10) The major task of the monograph which is directed at "how and why technology transfer fails and what might be done to make it succeed" did not come through very well for me. But then, I am not the most qualified judge for a feminist political economy approach. The next paper could very well address the issue of how Western feminism of whatever type- liberal, radical, traditional or socialist has contributed to women-in-development in developing countries. This is not a rhetorical question but a sincere one since the paper ended with a promise that:

"We should consider it our moral responsibility, however, to make a priority of identifying and supporting those research efforts in Africa that are tackling the conceptual problems of development, and that are engaging in useful, development - oriented feminist political economy.

B. On Women as Agents of Technological Change[2/]

1. The incomplete paper which we read seems to have focused more on women as "Victims" of new technology and less on women as agents of technological change.

2. One problem with relying on conventional literature sources is the inevitable result that materials which are foreign-authored or done by Western-based nationals

overwhelmingly predominate. The native-produced literature are usually in "fugitive" form and therefore are missed completely. Furthermore these conventional sources acquire considerable authoritativeness through repeated citations, thus marginalizing local productions. When time and effort is invested, it is possible to ferret out fugitive materials and make much sense out of them despite the lack of polish and sophistication in many of the papers. In Beyond Manila, All in a Grain of Rice and How Participatory is Participatory Development, foreign-authored materials were a distinct minority of literature cited.

In Indonesia the works done by the Sojogyos are very substantial even without including those written in Indonesian. They deserve to be reviewed particularly with respect to the subject matter of this paper.

3. With regard to women's status and education, the data we have (1970-71) on school enrolment shows the following:

	Percent	Female
Public schools	48.6	
Primary		47.9
Intermediate		49.9
Secondary		49.9

	Percent	Female
Private schools	51.7	
Kindergarten		49.1
Primary		61.9
Intermediate		50.9
Secondary		49.9
Collegiate		55.5
Graduate course		65.2

Public Vocational schools	37.2	
Agriculture		40.0
Fishery		47.7
Trade		33.5

The enrolment figures for 1970-71 show there were more females (51.0%) than males in medical schools. The University of the Philippines has had more females than males even in Agriculture and Forestry for several years now.

There must be some explanation for the different trend in the findings cited in the paper.

4. The women-in-development and feminist literature is schizophrenic with respect to labor-saving and labor intensive technologies. There must be a way out of this schizophrenia by specifying conditions under which different groups of women labor. The ideal, of course, is for women to "work less, earn more and keep it."

5. This paper suffers from the usual weakness of attributing all of the changes (mostly bad) in rural institutions to the new technology. The difference between Java and the other islands must not be lost on us.

6. Studies in both countries have shown that women are very much involved in decisions pertinent to farm-related activities even in the more technical ones. The question is: "Are the wives sufficiently knowledgeable as to be able to contribute effectively to these decisions?"

   The Philippines, in many ways, is a strange country with respect to women in agriculture. Despite the fact that our women are not socially segregated, agricultural programs have <u>seldom deliberately</u> included them as major participants in agricultural extension, cooperatives development, credit, Samahang Nayon and other farmers' organizations including irrigation associations and village-level development activities particularly those which involve leadership functions. However, in family planning, nutrition, health care, food preservation, handicrafts, PTAs, women are regarded as the main targets and men are minimally involved. As a consequence, women bear the burden not only of child-bearing and child-rearing but also of family planning. Female, rather than male-oriented methods tend to dominate. Women suffer all the side-effects or ill-effects and on top of that, are required to ask husband's consent for her to accept such methods.

In the case of women concerns in agricultural research, the attitude is reflected in questions like: "Do we need that?" accompanied by an amused smile; and "What are the issues, anyway, about women in agriculture?" The usual implication is that women already play an important part. Another response is: "Oh! we have no problems about female participation. They participate!" But when asked, for example, as to how many female farmer cooperators there are in the Regional Integrated Agricultural Research System cropping pattern trials for 1983-85 in one particular region, there were only 4 females out of 66 farmer cooperators.

In other words, the fact that women are very visible in the Philippines, and that almost half of our agricultural extension workers are women does not always mean that women's concerns are necessarily taken into account in terms of technology development, etc. We need studies to determine whether, in fact, women extension workers work with rural women in <u>agricultural</u> matters or whether women clients are included only in homemaking affairs.

7. The opening statement of the paper says that: "The choice of an appropriate technology is an important decision at the level of national policy-making because it can determine who works and who does not, how income will be distributed among demographic or geographic groups, and what commodities or services will be produced."

It would be useful if the review had included examples of how certain technology policies at the national level had affected women to illustrate their point.

C. On Women's Work and Child Care[3/]

1. This paper has identified the issues; reviewed the evidence surrounding each issue; examined alternative child care strategies; provided examples of child care programs; and outlined some of the research questions and gaps. It is well done; eminently readable even by a non-specialist; and very useful. Even without the authors' and the organizers' permission and despite the "Please do not quote" admonition, we have made a dozen copies to share with a group of NGO and GO women who are currently undertaking a study of child care support systems. The Department of Labor and Department of Social Services and Development are extremely interested in the output of this project. Even with limited support from the Canadian Embassy, there are about 12 organizations participating in the study. Their eyes lighted up when we passed around copies of the paper.

We will try to get their informal reactions to the paper in our next meeting. But we hope the paper writers and organizers will not object to what we have done.

2. The one reservation about the paper is the myths it has dismissed such as: myth of mother as housewife; myth of the mother as sole caretaker; and myth of an altruistic family core. There is a danger that in doing so, other myths will be created through "alternative truths" which have not been sufficiently researched. For example, is the practice of mothers caring for their children themselves really an exception rather than a norm?

D. On the Household Production Approach[4/]

1. Not being an economist, there is no claim to having understood either the theory of induced innovation or the household production model. However, there are some points raised in the paper which are of interest:

   a) "The utility functions represent the joint preferences of all household members. The nature of those joint preferences has been the subject of remarkably little research."
   b) "Bargaining models begin with the assumption that there are gains to be had from household formation, and that they are apportioned between household members according to their relative bargaining power. Bargaining power, in turn, depends on the welfare level an individual could achieve in the event of household dissolution."
   c) "Observations in the literature on the link between earned income and the household expenditure pattern emphasize that household members do not pool their incomes. It is not entirely clear what "pooling" of incomes actually means. Nonpooling seems to refer to the concept of earmarking in which certain income streams are reserved for certain categories of expenditure."
   d) ". . . . there appears to be little research on household production processes. We do not know, for example, whether male and female labor are perfectly substitutable in household production process nor are we able to tell how technical change would affect commodity demand across individuals in the household . . . . Information on person - specific consumption patterns is limited."
   e) "In summary, the information collected by the Living Standards Measurement Study is not sufficiently disaggregated by gender to enable one to calculate production functions for own account activities or total earning across gender. Substantial modifications would have to be made to the questionnaire before it could be used to

collect the gender specific information needed to carry out the analysis to address the gender and technology issues that have not been adequately researched to date."

2. Based on the above observations, we venture the naive suggestion that perhaps before we calculate production functions, it might be worthwhile trying to understand the household production processes; the concept of pooling or non-pooling of incomes; individual consumption patterns etc., through detailed descriptive studies which capture the processes involved, before measuring the quantities. As one very experienced field research supervisor in agricultural economics remarked when asked about some intriguing institutional arrangements casually mentioned in their report: "As soon as we get the numbers, we already say good-bye to the respondent, hence we miss out on the processes." A partnership with the anthropologists could yield valuable insights.

E. On the Role of NGOs in Community-Level Brokering of Technology [5/]

1. India and Bangladesh are both rich in NGOs which are concerned with rural development but by their very nature, NGOs are "doers"' and rarely are they engaged in research and writing. And yet, it is thanks to them that many poor women have an opportunity to be part of "women-in-development."

In our year's work with the Women in Rice Farming System's program which involved travel to six countries (India, Bangladesh, Nepal, Indonesia, Thailand and the Philippines), we have the following observation:

There are many action programs which have a direct bearing on women-in-development in both government and non-government agencies. Unfortunately in the women-in-development conferences, both local and international, the "doers" are seldom invited. If they are, they do not play starring roles because they usually are not the prominent paper writers and book authors. Their talents lie in "doing," not in writing. As one of them remarked when urged to do more to document their activities since they are very articulate people and so that richer analysis could be carried out: "There is a big distance between the lips and the pencil!"

2. In order to redress this imbalance and to project more the work of those who are directly engaged in reaching poor women, we need more social scientists who are sympathetic to action projects to interact more with those who are doing the action. Furthermore, what is needed is more technical, social and economic analysis to accompany the "actions" and not just to do the post mortem. In the research on action which is being proposed, the process and dynamics of getting things done require as much analysis as benchmark and impact in order to derive lessons, improve performance, share and transfer experiences for wider application.

More intensive involvement of social scientists (in a research role) in these action-type activities will give them more realistic down-to-earth insights into what "brokering technology" means. Perhaps this kind of exposure will influence social scientists to work in partnership with agricultural, health, nutrition, family planning, and extension specialists to help make the process and the product "right" instead of often playing a self-righteous or "bearer of bad news role."

3. The paper selectively reviewed the literature on two closely related issues: <u>program implementation and diffusion of innovations.</u> With respect to the latter, although Agarwal's review of the Rogers, Hayami and Ruttan's and the HYV diffusion schools is useful, we would like to think that the "community-level brokering of technology by NGOs" will be slightly different and therefore there should be merit in studying the diffusion process stimulated by such

organizations. The knowledge gap along this line is suggested by the following statements:

a) "Very few NGO project descriptions adequately elucidate strategies employed for promoting ostensibly low-priority programs such as health, education, and nutrition where return on investment is non-monetary and realized over a long period of time."
b) "Much of what NGOs do is simply mediating that maze on behalf of client groups but quite significantly, this is a poorly researched phenomenon. We know, for example, that many NGOs assist their clients in obtaining bank loans but we know little regarding the nature of such interactions."

4. The paper makes the following statements from Phillips:

> "A key lesson learned from family planning projects, according to Phillips, is that 'programs which are oriented to the needs of individuals served work better than programmes which are oriented to the technical problems in the provision of specific methods'. This finding, we suggest, would broadly apply to client-oriented versus technology-oriented systems. To paraphrase Phillips, the problem is not one of providing technology, but one of delivering a package of high quality services that can be readily adapted to specific individual needs."

To suggest that the situation is one of <u>client-oriented versus technology-oriented systems</u> is to miss the point. As a matter of fact one of the most significant failures of family planning programs is the failure of technology to meet client needs. We cannot divorce the two for as cited earlier, technology is a very important, often indispensable ingredient of many so-called client-oriented systems.

To illustrate this point, S.R. Schuler, E.N. McIntosh, M.C. Goldstein, and B.R. Pande, "Barriers to Effective Family Planning in Nepal." Studies in Family Planning, Vol. 6, No. 5, Sept./Oct. 1985, pp. 268-269 mentioned the following barriers to effective use of family planning services in the urban areas:

a) A significant proportion of the family planning information provided by the clinics is either incorrect or inadequate.

b) The manner in which this information is presented is apt to drive clients away.

c) The quality of the services is positively related to the socio-economic status of the client. Unsophisticated lower-class clients are likely to receive scantier, less accurate information, and less courteous treatment than middle class clients. Clients who lack the requisite social status and skills to elicit useful information from the staff in family planning clinics are apt to leave without sufficient information to make an appropriate decision or with inadequate understanding of the method they adopt and they are unlikely to return for follow-up. Their negative perceptions of family planning and family clinics probably become disseminated among their friends and neighbors.

d) In some areas, upgrading of technical knowledge may be called for, but the more complicated problem is how to improve the interaction and exchange of information between family planning staff and clients.

5. Incidentally, many studies on technology adoption suggest that farmers do not adopt packages of practices but they pick and choose elements or components which will fit their own system. Whatever they adopt, they also adapt but diffusion of innovation studies rarely study the adaptation process. They usually stop with adoption and consequently, the technology developers also tend to "rest on their laurels" at this point.

6. We regard the 5 key issues of the "sociology of supply" organizing framework as grossly inadequate because it does not include how technology needs are identified, defined, refined, packaged, tested, monitored, modified, communicated, etc.

7. We have a great deal of sympathy for the view that:

> ". . .it is neither community participation nor the work of unpaid village volunteers that accounts for project success. Rather it was 'dedicated professionals' who made the projects work."

The Ramon Magsaysay Award Foundation is a rich source of documents on successful NGOs. There is no doubt that the role of high quality professionals is indeed very salient. An excellent illustration of this is the Bharatiya Agro-Industries Foundation (BAIF) under the leadership of Dr. Manibhai Desai (himself an RM Awardee) which has adopted a strategy based on Gandhian values: resource-based; labor intensive; result-oriented; time-bound; and inexpensive. It blends social leadership with technical competence and managerial professionalism which enables a far-reaching direct transfer of technology right at the grassroots level. BAIF's focus on the rural poor draws considerable strength from the application of science and technology.

In other words, NGOs which make a difference are characterized by professionalism with a heart in the right place.

F. On Time Costs and Time Savings to Women of the Child Survival Revolution [6/]

1. The observation that in some instances, cash and waiting time had counterintuitive positive effects on use of immunization, suggests that we should look into what time means for the women themselves. Sometimes our concept of development is so serious that we forget even poor women want to "have fun." Sometimes "fun" could be found during the waiting time and cash spent

on a new technology might mean a bit more status among equals.

2. For us one attractive feature of the GOBI technologies is the introduction of women (and hopefully also men and children) to new concepts such as nutrition, disease, prevention, growth and health. They offer opportunities for seeing new horizons and alternative ways of dealing with old problems. One of the greatest rewards which come from associating with action programs is the joy of seeing women (otherwise living humdrum lives) so excited about having learned something new. As one woman put it: "We also need to open our minds".

   While time is important, knowledge and attitudes of mothers are probably significant determiners of what they will spend their time on. We suspect that willingness to allocate time for new learnings differentiates women who are able to "make it" to a slightly better life from those who remain where they are. We have many anecdotal observations which seem to indicate that mothers who are already very busy also tend to be the same mothers who will find the time to attend meetings, classes etc. At any rate, we need to put this observation to a more systematic test.

3. We cite here some studies which show that women are interested in new opportunities to learn:

   a) Rebancos' report on women's participation in upland development activities indicate that 73 percent of 132 women members think they can gain more knowledge than by doing household work. (The association deliberately recruited not only men but also women). Women believe they are able to learn more about agricultural production when they participated in the project. They likewise attach a great deal of value to new experience/knowledge in the use of new technology. (Carmelita Rebancos, Women's Participation in Selected Upland Barangays in

Buhi, Camarines Sur, M.S. thesis, U.P. at Los Baños, November 1984).

b) Abdul Quddus, Solaiman, and Rezaul Karim (Rural Women in Households: Situation in Bangladesh, Bangladesh Academy for Rural Development, KOTBARI, Comilla, 1983) report the following from their study:

"Women in Bangladesh say that work loads are highest during paddy harvesting periods in April, May, November and December but during the months of January, February, March, June, July, August, September, October, work load is relatively lower. When asked about availability of time for participation in training and income-generating activities, 72% out of 127 said they have some time after daily household duties. Average time available was 2.85 hours. Out of 92 women who mentioned having time to participate, 58 said participation will be approved by family heads."

Obviously, time availability is seasonal too.

Finally the most encouraging piece of evidence on women's desire to learn and earn is provided by this letter from an agricultural economics professor to a national agricultural research system director:

"I wish to bring to your kind notice that on the 1st of October, 1985, I visited village X and found that no high yield varieties were grown in the village. Further it seemed to be a totally monocropped area. With the result, the members of the farm households had ample free time and consequently had low incomes.

Many of the women whom I had an opportunity to meet said that by 9:00 a.m. they finished their household chores and would like to do something so as to supplement their incomes but needed relevant training and guidance. When I talked to the Block Development Officer he said that due to caste problem, it was not easy to organize training programs, as different castes had different inhibitions for learning of a particular skill; with the result, the relevant group for a particular training programme was likely to be very small. I talked to the farm women and after discussing the issue with them, told them to organize themselves first. They said that they would not believe in any such inhibitions and would much like to avail the opportunities of learning, provided the trainings did not impose any financial burden on them. We, therefore, told them to organize themselves and send us the list of women participants who would be willing to learn and practice a particular skill. They seemed very enthusiastic and within one week of my return they have sent me the list of the farm women of village Kutki Nivado, who are willing to participate in such training programmes."

Someone can argue that this enthusiasm to spend time learning would be relevant only to income-earning opportunities but not necessarily for GOBI technologies. There are studies, however, which suggest that there seems to be a more general underlying positive attitude toward innovations. Those who accept new rice technology also seem to favor family planning.

G. On Technology and Women's Health in Developing Countries[7/]

1. The paper reports that computer-aided searches yielded little once the search was qualified by women. Another search which began with work (technology) qualified by developing countries, women and health yielded only a few useful articles. "The more substantial descriptive literature was found in an ‘underground’ of research in women, outside the established mainstream of scholarly literature."

2. These discoveries serve to underscore our earlier points about the need to get hold of "fugitive" literature and the need to do research in cooperation with more action-oriented type of agencies involved with technology and development. As a matter of fact, the section on Recommendations: Research to be Done, seem to focus on research for planning; monitoring and evaluation.

3. We were wondering why none of the papers referred to international research projects like the World Fertility Survey, the Contraceptive Prevalence Survey and the Demographic and Health Surveys Project. The latter is conducting 35 surveys in 31 countries.

4. From the Population Reports (Series M No. 8, Sept. Oct. 1985), Fertility and Family Planning Surveys: An Update, the following findings might be relevant to this review:

   a) Women are much more likely to know about modern methods than about traditional methods. Most women who have heard of contraception know at least one modern method - oral contraceptives, voluntary sterilization, IUDs, condoms, injectable contraceptives, or vaginal methods such as diaphragms and spermicides.
   b) Only in 4 African countries - Benin, Ivory Coast, Senegal and Zaire - did a substantial percentage of women know only about traditional methods - douche, withdrawal, rhythm, abstinence and other folk methods.
   c) In an analysis of 19 WFS countries, Martin Vaessen found that women were much more likely to name modern methods spontaneously than to name traditional methods. They usually acknowledged traditional methods only after they were asked specifically about them.

Indeed we need to know not only about the indigenous methods, their safety, and effectiveness but also whether they are still being practiced. Even the traditional has to be understood in the light of the present so that it is not a mere "romantization" of the past. In many ways, this view of health technologies is analogous to the recent trends in farming systems research which seeks to understand the existing system and its component practices before introducing new ones. In effect, primary health care should do that.

H. On Gatekeepers and Resources:[8/]

1. This paper has provided us most useful insights into how communities and different groups of people come to play the "brokering" role but the second part of the task which concerns how community organizations influence the introduction and sustained use of technologies is not as well treated. This is doubtless a reflection of what is not available in the literature. Social scientists tend to stop at the point where they should start perhaps because of a circumscribed research role. For example, in the Project to Improve Rural Irrigation, suppose, brokers, through the evaluation report were to find ways of including women in irrigators' committees, what difference would it make to access to irrigation water? Using everything we now know about women in different situations, it seems that the next step will be to find the answer to this question.

2. Overloading functions to already overburdened newly defined "developers" is not an uncommon predilection. A review of such experiences should help in putting this issue to rest.

3. There is a gestation period to all development projects. Sometimes a project is judged to be a success because it has not had a chance to fail and sometimes it is judged to be a failure because it has not had a chance to succeed. Is it possible that where we think women were disadvantaged with respect to a particular project, at a certain point in its history, if we revisit the project after a period of time, what institutional and cultural adjustments are we likely to find? For

example, for a long time there was quite a furor about the displacement of handpounding by rice hullers in Indonesia. So far, has anybody ever returned to find out what those women handpounders are currently doing?

I. On Women's Roles in Household Farming Systems[9/]

1. It is surprising that the paper did not dwell on farming systems research as it relates or does not relate to household farming systems. Does the farming systems perspective help at all in the identification, introduction and sustained use of new agricultural technologies?

2. As in the previous paper, this omission is a product of the lacunae in the literature. Although there is no shortage of guidelines on how to integrate women concerns in farming systems research, real-life applications of such guidelines are still rare.

J. On the Two Great Lacunae in these Reviews

1. There was no mention of the very special problem of teenage pregnancies. Ruth Roemer, (Legislation on Contraception and Abortion for Adolescents, <u>Studies in Family Planning</u>, Vol. 16, No. 5, Sept-Oct. 1985 p. 243) argues that:

"Laws restricting adolescents access to contraceptives services are important because of the large numbers of births among young women 15-19 and the lifetime consequences of these births. Young women in this age group account for between 1.4 per cent (Rep. of Korea) and 22.9 per cent (Cuba) of all births with a worldwide total of about 13 million births annually. In the U.S. in 1982, births to teen-agers accounted for 14% of all births and 26% of first births with nearly 525,000 teenage births occurring in that year."

In the Philippines, Zelda G. Zablan (Towards an Analysis of Fertility Exposure, Demography at the Crossroads UP Population Institute, 1986) found that

15.4 per cent of first births were premaritally conceived. This figure may be considered to be a conservative estimate since the figures were based on ever-married women only. Twenty-two per cent of first live births came from 15-19 years olds. It is highly probable that pregnancy has precipitated the marriage. Another study by Corazon M. Raymundo, (Adolescent Fertility in the Regions, Philippine Population Jour. Vol. 1, No. 4, Dec. 1985, p. 9) reported that 34% of more than 4900 respondents from different regions of the country approve of premarital sex.

Some African countries also report on adolescent fertility on the rise.

2. There was no reference made to the problems of elderly women, a fact of increasing life expectancy which is very evident in developed countries but which is also beginning to dawn upon us. For example, Lita J. Domingo and Imelda Z. Feranil (A Study on the Role of the Filipino Elderly in Population Matters, Demographic Research and Development Foundation, Inc., December 1985) found that among their 1320 elderly respondents (rural and urban) the following specific problems were regarded as very serious:

(a)	not having enough money to live on	86.4%
(b)	poor health	80%
(c)	fear of crime	70.4%
(d)	not enough job opportunities	70%
(e)	not enough medical care	73.2%
(f)	not enough education	65%
(g)	not feeling needed/ wanted	60%
(h)	loneliness	52%
(i)	poor housing	51%
(j)	not enough to do to keep busy	42%
(k)	not enough friends	43%
(l)	not enough clothing	36%

About 77% said "Home for the Aged" is a good idea but only 33% have a desire to live in a Home even if it is in the province. Their reasons for considering "Homes as a good idea" are: beneficial for those who have no one to care for them (74%); health will be better taken cared of (17%); and spare family from burden of caring for elderly (13%).

When married women of reproductive age (MWRA) were asked if they approve of "Home for the Aged", 82% said Yes but only 47% approve of it for their own elderly and only 44% have a desire to live in such a home when they themselves grow old. The response of adolescents to the same questions was similar to that of the MWRA.

The results of this study were quite "shocking" to many of us who have said with pride that our elderly are well taken cared of by our families and that "Home for the Aged" is inhuman. We have to face up to this reality now.

A CONCLUDING NOTE

BY WAY OF A GENERAL ASSESSMENT OF THE RESEARCH REVIEWS ON GENDER, TECHNOLOGY AND DEVELOPMENT, PERHAPS IT IS NO GREAT EXAGERRATION TO SAY THAT:

THERE IS A LOT OF GENDER, NOT MUCH TECHNOLOGY AND LITTLE DEVELOPMENT.

WHAT DO WE DO ABOUT THIS? CAN WE APPLY WHAT WE KNOW ABOUT GENDER TO THE TECHNOLOGY DEVELOPMENT AND BROKERING PROCESS SO THAT OTHER WOMEN BESIDES US CAN BENEFIT FROM THIS EXERCISE?

NOTES

The papers reviewed for the International Development Research Centre-Rockefeller Foundation Workshop on Issues Concerning Gender, Technology and Development held in New York, February 26-27, 1987 include the following:

1. Patricia Stamp, Understanding, Technology Transfer, Community, and Gender in Africa.

2. Elizabeth King, Women as Agents of Technological Change in Indonesia and the Philippines.

3. Robert Myers and Cynthia Indriso, Women's Work and Child Care.

4. Christine Jones, Gender, Technology and Development: The Household Production Approach.

5. Arunashree P. Rao, The Role of Non-Governmental Organizations in Community-Level Brokering of Technology in India and Bangladesh: A Literature Review.

6. Joanne Leslie, Time Costs and Time Savings to Women of the Child Survival Resolution.

7. C.P. MacCormack, Technology and Women's Health in Developing Countries.

8. Kay B. Warren and Susan C. Bourque, Gatekeepers and Resources: Gender and Change in Latin American Countries.

9. Shubh K. Kumar, Women's Roles in Household Farming Systems: Introduction and Sustained Use of New Agricultural Technologies.

Some general impressions and observations from trips to India, Nepal, Bangladesh, Thailand, Indonesia, and the Philippines

Dr. Gelia T. Castillo

Since this Workshop wants to identify future research areas, we would like to share these excerpts from our report on the Women-in-Rice Farming Systems Program:

Based on our formal and informal discussions, field visits, and review of materials provided us, we have the following observations:

1. The male leaders in the national agricultural research systems we met do not seem to suffer from the usual "gender-issue-resistance syndrome" which is not uncommon in other research systems, even international ones. As a matter of fact, they appear to be "far ahead" or more "liberal" at least in their articulated views and program direction commitments than what we had anticipated. Contrary to expectations based on cultural stereotypes, we found activities in Bangladesh most exciting and encouraging with respect to women in agriculture and women in farming systems in particular.

2. Practically all the studies on women in agriculture that we have seen were done by social scientists. At this point, we cannot say that there is a dearth of studies on the role of women in agriculture and perhaps a dozen additional studies on the general subject will have marginal additions to what is already known. The earlier studies were extremely valuable for they provided the empirical base for defining the women issue in agriculture and for sensitizing the world to the important role women play which has been undervalued

and unperceived. In many instances, it is probably fair to say that women at work in agriculture are "physically visible," but "conceptually or culturally invisible" even to those who actually see them. Fortunately, the visibility is improving and therefore the research that we do must go beyond being "sensitizing". Research must be operationally significant i.e., it must indicate to someone who is responsible for policy, program development and implementation a more precise definition of the problem so that it will lend itself to feasible solutions.

We are not saying that research on the role of women in agriculture is no longer needed. What we are suggesting is that such studies must be designed with greater substantive specificity (agro-ecological circumstances; more detailed descriptions of the farming systems, including its different components, agricultural practices, etc., land ownership patterns; seasonality dimensions; technologies available and applied, etc.) so that the results will be operationally useful for technology development, training, extension and agricultural program formulation.

It is very rare, for example that women-in-agriculture studies describe the "particularities" of existing agricultural practices so that agricultural scientists can have a sufficiently reasonable context within which to define their research objectives and design suitable technology.

Even in the currently fashionable time allocation studies Bina Agarwal argues that:

"A sound empirical base for assessing the time contribution of rural women in the agrarian economy is needed." For this, a detailed analysis of their work by activity would be essential, to capture the seasonal, operation-wise, crop-specific variations in the work, as well as to make a more appropriate distinction between domestic and non-domestic work. Such an analysis would also be necessary for identifying and measuring the likely impact (time saving or using, income generating or reducing) of technological change and agricultural modernization programs on rural women's work. In this context, the possible differential effect of technological innovations on women belonging to different socio-economic classes needs to be kept in mind, and information obtained by class divisions: certain innovations may reduce the work burden of women in high income-earning capacity of the poorest women . . .

Seeking data on the time-allocation patterns of rural women, on a national basis, is perhaps not a practical proposition. However, detailed region-specific, micro-level research focusing on these aspects could help to provide more appropriate definitions for wider-based data gathering." (Bina Agarwal, "Work Participation of Rural Women in the Third World: Some Data and Conceptual Biases" August 1984).

To this, we would like to add the need to include not only crop but also livestock, fishing, bee-keeping, etc. activities and the backyard, kitchen-garden, homestead type of production as distinct from the outside field production. But knowing how much time is devoted to these activities is not sufficiently directive for agricultural research and extension purposes. The specific technologies applied (seeds, equipment, cultivation practices, such as land preparation, fertilization, pest and disease control, etc.) and women's participation in these specifics must be indicated. Furthermore, female labor is human labor possessed with intellectual, manual and managerial skills. Rarely do we find studies which try to determine what women know (their level of technical knowledge) about the agricultural technologies they are applying. We likewise need to assess their skills and experience (technical, manual or manipulative, and managerial). Why is it that for population studies which certainly focus on women, KAP (knowledge, attitudes, practice) questions are standard ingredients but in women in agriculture, we have yet to see systematic attempts along this line? Such information is crucial for defining extension and training objectives and for determining program content and approaches. In an agricultural system that is more science-based and more farming system than single-commodity-oriented, the knowledge, skills and management capabilities required will be a bit different. Even traditional farming has to be better understood in the light of changing resource base (land, water, soil fertility, etc.) and technology options in order to improve the goodness of fit between what exists and what is possible and feasible.

Obviously such studies cannot be adequately designed by social scientists alone. They must have some input from agricultural scientists. In our discussions, we <u>felt that social</u>

scientists tended to be a bit more resistant to collaborate with agriculturists than vice-versa. (We hope we are wrong in this assessment.) So what happens is: social scientists do their research on the consequences of new technology (usually bad !!!) while agricultural scientists pursue technology development with not much help but a great deal of criticism from social scientists.

The current FSR vogue requires teamwork between social and biological scientists. The BARI and BAU projects look very promising on this score. The FSR in Thailand has some encouraging start. Nepal has potentials for moving in this direction especially if livestock can be integrated in the FSR sites; the role of female agricultural assistants enhanced; farm women more deliberately involved; and some social scientists persuaded to join in. All of the above seem to be at the "entrance door" ready to come in with the appropriate push.

3. Agricultural universities with their corresponding Directorates of Research and Extension Education and some with Colleges of Home Economics are institutionally well-established in each state in India; are in place in many provinces of the Philippines; have been established in three regions of Thailand; and are beginning to be developed in Indonesia outside of Java. Bangladesh has BAU at Mymensingh. What was quite a discovery for me as a newcomer to India is the extent to which the "Indianized" US Land Grant University model with its trilogy of functions seems to have taken root and bore fruit to a degree which the Philippines has not quite adopted despite its strong American colonial links. But the reason for mentioning agricultural universities is not really to dwell on the land grant system per se but to remind ourselves that if we are serious in pursuing the major objective of the Women in Rice Farming Systems Research/Action Research Program which is: the institutionalization of women's concerns in national agricultural research and extension systems, agricultural universities along with autonomous or Ministry-related Research Institutes and Departments of Agricultural Extension are going to be key actors. The more closely the women-in-agriculture social scientists work with these

institutions, the better are the chances that something concrete will materialize.

To illustrate what we mean, it is worth noting here that the Indian Association for the Advancement of Science in a recent document on Women in Agriculture in India has highlighted the following:

"In recognition of the role of women in agriculture, they were for the first time, included as a target group in the farmers' training and education scheme of the Department of Agriculture. The scheme was started during the 4th Plan period in 100 HYV programme districts and included women initially with the idea of promoting consumer acceptance of newly released HYV of cereals and millets, as well as to acquaint them with the importance of the HYV programmed in improving the nutritional and economic status of the families.

The other programmes which recognized the economic role of women in agriculture and allied fields of activities are the Krishi Vigyan Kendras of the ICAR and establishment of Home Science Colleges with Agricultural Universities. The scheme of Krishi Vigyan Kendras was introduced in the year 1975-76 with objective of bridging the gap between the knowledge of farmers and farm women and technology available."

What we are not aware of are studies of such schemes which will tell us how they have functioned and what impact they have had on women and the household. We will certainly need to look into this.

The East India Project will be a model to watch in many respects.

4. Our enthusiasm for greater projection of the role of Colleges of Home Science in Women in Farming Systems was not uniformly received with equal enthusiasm.

There were those who think that this will only reinforce the homemaking role while others feel that these colleges are too middle-class and urban household-oriented in their programs. In Bangladesh, a study of women extension workers mentioned that one constraint they faced was: "the training oriented them mostly in field crop extension services but their target audience expected from them more about home life improvement services". It is not clear however as to which socio-economic class these women clientele belong to.

Based on our visits to 2 Home Science Colleges in India and based on the program description of the Bangladesh Department of Agricultural Extension's Programme for Women, it seems that their extension programs go much beyond the traditional middle-class home-making concerns. For example, in Bangladesh, the work of female block supervisors include the following seven broad areas:

a) Homestead level vegetable and fruit cultivation.
b) Family nutrition, hygiene and sanitation.
c) Pisciculture.
d) Food processing and storage techniques.
e) Homestead level income-generating activities.
f) Population education.

In Haryana and Pantnagar, our impression is that their definition of home science includes a large agriculture component where women are involved.

Since household management tasks have to be accomplished by someone (not necessarily only by women), we suggest that in the training programs for male farmers, household-oriented knowledge and skills traditionally defined as women's domain should gradually be made part of their agricultural training. In other words, there is no reason why nutrition, population education, hygiene and sanitation should not be introduced to the men of the household in the same way that we argue for the importance of women learning more about modern agricultural technology whether or not they are physically involved in farming. Farm and household decisions are not independent of each other and usually both males and females are involved in decision-making.

5. When social scientists call for "special focus in policy on the employment and income requirements for women who are the main or sole income earners; and for a special consideration of the gender implications of any income and employment impact of technological change", which specific institutions, agencies or programs are being addressed? If it is nature of the technology which is being referred to, agricultural research institutions (national and

international) including agricultural colleges and universities seem to be the institutions being alluded to. If it is women's lack of access to technology and credit which is the problem, perhaps agricultural extension and other related agricultural development programs are being referred to. Unless and until the policymakers, agencies and programs being called upon are more clearly specified, the responsibility for doing something about the problem will not be assumed by anyone. Therefore, if we want concrete actions to be taken, it would be more appropriate to work with those who are in a position to act in behalf of women in agriculture. We must now move beyond "sensitizing" policymakers and those responsible for setting agricultural research agendas. In working with them to formulate these policies and put the "right" items in the research agenda, there is a need for more definitive analysis and empirical evidences to guide action. In a joint undertaking we might discover that technology and development and extension is a much more complex and infinitely more difficult process than when viewed from a somewhat "adversary" distance.

An excellent illustration of the type of analysis and research on action which we would like to see more of is Martha Alter Chen's: A Quiet Revolution: Women in Transition in Bangladesh. This book describes "the efforts of the Bangladesh Rural Advancement Committee (BRAC) to reach poor village women with projects designed to increase their material and social resources". Her purpose in writing the book was "to give the reader an insider's view of what it takes to develop such a program and what it means to participate in that program".

The argument for greater specificity which we put forth earlier is very well demonstrated in her Chapter VIII entitled: From Experience to Policy.

"Although most women everywhere work at a disadvantage, the particular situation of women differs between classes, villages and countries. I would argue strongly for a situation-by-situation analysis of women's roles and constraints before programs are designed or plans formulated.

I would suggest the following variables be assessed in each particular situation:

- Is the hierarchy by sex or by class more predominant?
- Is the economy labor-surplus or labor-scarce?
- Is the economy land-surplus or land-scarce?
- What is the dynamic of household size and composition over time?
- What are the traditional tasks and skills of women?
- Which tasks of women are essentially income-conserving?
- Which tasks of women are potentially income-producing?
- Which tasks of women carry high status?
- Which tasks of women carry low or negative status?
- How many women are managing the day-to-day needs of their households?
- How much access do women have to rural labor markets, credit, inputs, technical assistance and extension services?
- Why do I argue that one needs to understand the specific mix of these variables in each situation? Consider the following policy implications from such an analysis: in societies where the class hierarchy is not pronounced, the constraints and needs of women may not differ significantly by class and gender issues may assume priority over class issues.
- In societies where the class hierarchy is pronounced, the constraints and needs of women will most likely differ by class and class issues may take priority over gender issues.
- In economies where labor is scarce, the introduction of labor-saving devices may make sense.
- For tasks which women perform primarily to conserve and which are routinely burdensome and time-consuming, the introduction of labor-saving devices may make sense (particularly if

women's labor and time can be released to some productive end).

- In economies where there is a surplus of labor, the introduction of capital-intensive devices may have very negative effects (particularly on women who perform the "invisible" labor most often displaced).
- In societies where class hierarchy is pronounced, it is important to recognize the differences between women of different classes.
- In societies where all women do not necessarily face the same degree or type of problems, it is important to decide which women one wants to benefit in what ways.
- In situations where the differences between women are pronounced, it is better to organize women into economically homogenous cooperative groups (to forestall latent conflicts).
- In situations of significant change (either planned or unplanned), it is important to monitor the impact of change on women's traditional work, on women's access to wage labor, and on women's access to public goods and services."

6. <u>We were asked many times why our program was focusing</u> only on rice farming systems. Our reply is that rice farming systems is a strategic starting point since rice is a dominant staple crop in Asia but the term "farming system" which follows the word "rice" covers a wide territory: from wheat, to corn, to oil seeds to potatoes to agroforestry, to livestock, to fish, to forage, etc.

Participatory verification and technology generation of location specific IPM technology in Calamba, Laguna: A pilot project

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INTRODUCTION

Background Information and Project Objectives

Integrated Pest Management (IPM) as a strategy for pest control is a systematic integration of chemical, biological, cultural and other control measures, and emphasizes economic thresholds and the use of selective insecticides. It is an effort to bring together a set of control strategies and tactics, or in the words of its proponents, "all of the right type, all of the right amount, all in the right sequence, all when the stage of the plant, weather and pest are right to achieve significant control" for the least cost (Pimentel, 1981).

Since the ideal IPM concept is complex, adaptations are necessary when introduced in the field. In the Philippines, for instance, IPM is construed as the judicious application of

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insecticides based on some population density or action level. Whereas the current practice is to apply pesticides without regard to the presence of pest as in the prophylactic or preventive spraying and calendar spraying, the threshold-based spraying considers the pest incidence in the area before taking action.

Hence, one of the salient points of IPM is its location specificity. While national thresholds were given as initial guidelines, it is incumbent upon the concerned agencies of the government in specific regions to generate and establish appropriate threshold levels. In addition. the social aspect of adoption is equally important as the technology itself.

The research cum demonstration project that is currently being done hopes to create the necessary IPM awareness from the farmers' end. At the same time, the project aims to generate location specific thresholds with the active participation of farmers and their wives. The socio-economic component, on the other hand, aims to evaluate the economic costs and returns of the IPM practice vis-a-vis farmers' practice. Also being documented are data on farmers' knowledge, attitudes and practices (KAP) towards IPM, and their perceptions on the impact of pesticide use on the environment and public health.

The method used in IPM technology diffusion is participatory. The farmer-cooperator manages his farm which is divided into two: one-half using the traditional or original farmer's practice and the other half using the IPM method of controlling pests. Decisions on when and what control measures will be applied in the IPM plot were made in close coordination with the project staff.

Description of the Study Site and Profile of the Cooperators

The study was conducted in three adjoining villages of Calamba, Laguna, namely, Looc which is about 9 kilometers away from the Calamba town proper, San Juan and San Jose which are about half a kilometer from Calamba. Calamba itself is considered a more progressive town than any typical one in the Philippines. Its proximity to U.P. Los Banos (about 30 kilometers away) gives the advantage of providing employment for most of its residents. The study sites, however, seem not to have been affected by such nearness to a technology-generating center. For instance, the knowledge level of farmers for modern rice production does not indicate a trickle down effect of knowledge generated at IRRI. Most residents in the villages are rice and vegetable farmers, with only a small percentage working as full time rice farmers. Roads leading to the villages are cemented and large concrete houses are quite common.

The distribution of farmer cooperators from the three villages is as follows: Looc, 68%; San Juan, 18%; and San Jose, 14%. Most of the respondents in San Jose have other jobs besides farming. The mean household size is 7.5. Sixty-eight percent of the respondents have gone to elementary school (Grades I-VI) while 14% have gone to college and 18% have been to high school. Farm size is relatively small with an average of 1.5 hectares. Fifty-five percent of the farmer-cooperators are tenants following the 50-50 sharing arrangement.

METHODOLOGY

Technology Verification and Generation Trial

Two treatments were compared in the technology verification trial: (1) Farmers' practice and (2) Integrated Pest Management (IPM) Strategy. The farmer's field was divided into two equal parts: one for the farmer's practice and the other for the IPM technology. Though the farmer managed the whole field, all operations in the IPM plot were closely supervised by the full time staff detailed in the area. Actual pests and natural enemy counts were made on the IPM plots at weekly intervals. Application of appropriate insecticides was made only when the economic threshold level is reached. All pertinent activities in both farmers' and IPM plots, including the time spent for monitoring the field, were duly recorded by the project staff.

Technology generation trial was supervised in the IPM plots of two farmer cooperators. The IPM plot was divided into three subplots where the following treatments were employed: (a) control (no pesticide application); (b) ETL treatment (pesticide application on per need basis); and (c) above ETL treatment (pesticide application when pest population exceeded previously established thresholds).

In both trials, the farmers were assured that any yield differences unfavorable to them (i.e., when the IPM plot yields lower than farmers' plot) will be appropriately reimbursed.

Yield data (expressed in kg/ha) was computed from harvest of 4 quadrants measuring 5 x 4 meters after making the necessary moisture content adjustments.

Socio-economic Component

A benchmark survey was made to determine the KAP of farmer cooperators regarding their pest control practices. It also aimed to establish baseline data for economic costs and returns of these farmers. The benchmark survey was followed by a post production socio-economic survey to determine specifically the differences in the costs and returns in farmers' fields and IPM plots.

Due to the apparent influence of the IPM technology awareness of the farmer-cooperators to their actual farming activities, another group of farmers who were farmer-noncooperators from Barangay Uwisan were tapped to provide for control. This group of respondents were thought to provide the actual farmers' practices in the community unaffected by the IPM strategy.

RESULTS AND DISCUSSIONS

Technology Verification Trial

In general, the wet season cropping was not attacked by an alarming population of insect pests or serious disease incidence (Table 1). Except for those who planted late in the season (cooperators from Uwisan) who got serious tungro infection at the pre-panicle initiation, all farmer-cooperators had very low pest incidence.

Pest population was highest during active vegetative growth (30 to 60 days after transplanting) and declined as the plant matured. Natural enemies were present throughout the duration of the crop and their population fluctuation was not very drastic with the trend showing a very slight decrease as the plant reached maturity (Table 2).

Seedling maggots appeared to be the most common concern in the community. In general, all farmers sprayed against this pest. In addition, the threshold level of two eggs per hill was reached in most IPM fields but in areas where early deliberate control cannot be made due to bad weather, the damaged plants appeared to have recovered after the second application of fertilizer. This observation indicates the importance of really establishing the economic status of seedling maggots as a major insect pest in the Calamba area. In addition, efforts should be made to determine whether the initial threshold of two eggs per hill is applicable in the locality.

Yield data for the IPM and farmers' practice are presented in Table 3. Highest yield was obtained in IPM plots with mean yield of 148 cavans (approximately 6.7 tons per hectare). Forty-three percent of the cooperators had mean yields in IPM plots higher than farmers' plot, 24 percent had equal yield between IPM plots and farmers' plots; and 33 percent got higher yields in the farmers' plots than in IPM plots.

It should be added that two important aspects of the production technology must also be addressed. These are:

a) fertilizer use - because in most cases, farmers applied nitrogen at very high levels; and

b) herbicide use - because farmers usually apply below recommended rates and yet were getting satisfactory control.

These are considered important in order to generate a truly appropriate technology for IPM.

Technology Generation Trial

Two technology generation trials were set-up: one on the assessment of the economic threshold levels (Caldoso's field) and the other one on the assessment of the pest status of the whorl maggots (Muya's field). In general, assessment of the appropriate economic threshold level was hampered by low pest population during the wet season (Table 4). Only whorl maggots exceeded the threshold, hence pesticide treatment was made once against the aforementioned pest. On the other hand, in Mr. Muya's field, other pests such as green leafhoppers, defoliators, stemborers and leaffolders were observed but incidence was not so high as to reach the threshold. Nonetheless, the pests were still controlled to avoid possible yield reduction.

Yield in both trials seems to indicate that whorl maggots can cause as much as 284 kilograms yield loss (Muya's field) and when other pests are present (even below threshold level) a one ton yield loss was already possible (Caldoso's field). These observations should be critically studied further since they appear to be in conflict with most of the results obtained in the technology verification trials involving more sites and bigger plots. It is therefore strongly recommended that more detailed and systematic generation trials be made to have a better assessment of location specific problems.

Socio-economic Component

Table 5 shows the economic parameters comparing the management efficiency of the IPM and farmers' plots. By all indications, it appeared that IPM-managed plots were consistently faring better than farmers' practices. The IPM-managed plots had the lowest pest control cost (P4,883 per hectare); highest yield per hectare (148 cavans per hectare or approximately 6.7 tons); highest mean returns as well as mean profits (P12,272 and P7,389 per hectare, respectively); and highest return on investment (ROI) at 2.57 per hectare.

In addition, farmer-cooperators fared better than the farmer-noncooperators. The mean yield in farmer-cooperator plots (using his own judicious practices) was comparatively higher than that of the noncooperators. While mean variable cost of farmer-cooperators was higher than the noncooperators, the mean profit of farmer-cooperators was higher (P7,869/ha) than that of the noncooperators (P6,621 /ha).

Finally, while the ROI's for both groups were not significantly different (2.38 for cooperators and 2.34 for noncooperators) the high and low figures in the variables being analyzed further showed that IPM managed plots had been more profitable than the ones used by both farmer-cooperators and noncooperators.

In an effort to cost the monitoring time, this study estimated the monitoring time per hectare of the various IPM fields (Table 6). The average time spent per person per hectare was 51.26 minutes (with SD of + 14.23 minutes). Assuming that monitoring is regularly made on a weekly basis, a total of 615.12 minutes or 10.25 hours are needed for the whole cropping season. Assuming that we pay P12.50 per hour for field scouts, (the RA rate) then we will spend P128.12 a day for monitoring alone. This figure should be compared with the cost of pesticide application in a calendared spray treatment and see whether we are better off in using IPM. This, of course, is only the monetary benefit; other intangible benefits such as less pollution, less residues and less risks to public health must not be understated if total benefit from IPM is thoroughly considered.

In addition, IPM technology evaluation should also consider the impact of its adoption on environment and public health. In order to do this, a baseline information on farmer's perceptions regarding effects of pesticides on environment and public health were gathered. Tables 7 and 8 show the farmers' physical and biological perceptions on the effects of pesticides in the environment and public health in general. The observations included changes in color of paddy water following prolonged pesticide usage to biological indicators as frogs and other biotic population. The respondents also indicated their having suffered from various illnesses related to pesticide intoxication such as dizziness, vomiting, headaches and chest pains while spraying. These inconveniences prompted most of them to hire labor for spraying activities.

Finally, a very interesting observation was the apparent learning or possibly technology adoption in the shortest time frame. Before the IPM project, our benchmark survey showed that farmer-cooperators sprayed an average of 2.07 times; on the other hand, actual farmer-cooperators spraying for the wet season of 1986 averaged only 1.54 times while average IPM spraying was 1.33. This may give us a more valid reason to state that farmers' pest control practice was really influenced by the IPM method as introduced by the project staff. The IPM method will also be introduced to the wives via an extension component of this project. The wives are responsible for the purchase of chemicals in rice production.

IMPRESSIONS AND RECOMMENDATIONS

General observations on the conduct of the study and response of the farmers

The proximity of the study site to UPLB makes it possible for the senior staff to closely monitor field activities. The weekly field visits and monthly seminar-meetings were a truly rewarding experience for both the farmer-cooperators and the project staff. These interactions have always been informal and project legitimization was facilitated by hiring a research assistant and teacher enumerators from the site itself.

Indicators of acceptance of the project by the farmers are the following: (1) there was a consistent good attendance during meetings; (2) the farmers were always around whenever we schedule field visits or home visits with them; (3) the farmers displayed the motivation to learn the various aspects of the IPM technology especially the identification of natural enemies; (4) the farmers showed their willingness to share their farming experiences especially those related to pest control; and (5) some cooperators did not accept the reimbursement for the yield difference (when farmers' plot outyielded IPM plot) but insisted that money be used for defraying other project expenses such as snacks of the full time staff helping them in actual monitoring process. In addition, various forms of gratitude were expressed in contrast to the initial resistance we felt during the first two weeks of the project implementation.

Problems and Challenges

The first cropping season was a real challenge to all of us. The initial resistance of the farmers were based on previous experience from various government agencies whom they claimed to meddle with their farming and then leave them prematurely or in confused situations. After the first cropping season and based on the response of the farmers for the dry season cropping, we were confident that the objective of creating the necessary awareness for IPM was accomplished. While the "wait and see" attitude is still there, a core group of 3 to 5 highly motivated cooperators surfaced. We intend to further motivate these farmers into continuing their adoption of the IPM technology.

The IPM awareness also extended to various crops which farmer-cooperators planted. Their increasing awareness on the hazards of pesticide misuse prompted us to answer their call for assistance in developing an IPM package for vegetable crops which they raise to augment their income from rice farming. For the dry season of 1987, a trial on vegetable IPM appeared to be the major concern of the women and children of the farm household.

On the technology aspect itself, we feel the strong need to conduct more systematic verification/generation trials for the following components of the technology: (1) recommended herbicide rates vis-a-vis farmers' rate; (2) fertilizer rates vis-a-vis the recommended rates; (3) establishing the economic status of the whorl maggot pest; and (4) development of appropriate threshold for maggots since the current threshold appears too low in most fields evaluated.

Finally, as the project was set in motion, we had to deal with a limitation which most of the farmers had. Their poor eyesight, which was due to old age, made it difficult for them to count minute pests and natural enemies. Thus, we decided to train young people from the community whom we thought could provide the expertise in this respect. Quite unexpectedly, the project turned a limitation into an employment opportunity for the youth sector in the community.

But where does the project proceed from here? We have been challenged to continue after witnessing the enthusiasm of the farmer-cooperators and interest of other noncooperators to join the project. It frustrated us somehow that we could not accommodate all of those who wanted to join. At this point, the project staff is soliciting for more project funds to enable us to continue working in the community and to provide more technical expertise in response to the interest that has been generated in the area. We believe that in order to create a more lasting impact, project activities must be pursued for at least two more seasons.

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Table 1. Mean monthly insect pest count per hill in IPM plot.[1]

	Farmer Cooperator	June	July	August	September	October
1.	Banados, Miguel	–	38.9	47.0	12.8	0
2.	Caldoso, Rolando	0.5	41.9	34.0	14.3	0
3.	Capunitan, Catalino	0.4	41.3	42.0	18.1	0
4.	Capunitan, Delfin	–	–	22.5	20.0	7.2
5.	Capunitan, Emilio	30.8	33.8	26.5	–	–
6.	Gecale, Maurino	0.73	38.7	39.2	30	0
7.	Gotengco, Abundio	–	0.5	48.4	29.3	12.6
8.	Guerrero, Toribio	–	–	25.7	20.6	17.1
9.	Lapaz, Pantalion	–	1.5	61.2	30.6	15.2
10.	Mabait, Condrado	0.45	45.0	40.4	18.6	–
11.	Manzanero, Mereng[2] M		–	43.2	1.4	–
12.	Matanguihan, Eugenio	0.63	41.7	39.8	27.0	–
13.	Matanguihan, Jose	0.68	41.0	38.8	18.6	–
14.	Maunahan, Teodoro	–	–	31.1	19.8	7.10
15.	Montano, Arsenio	35.2	46.8	24.6	13.7	–
16.	Muya, Alejandro	28.95	5.8	20.0	11.8	–
17.	Muya, Juan	–	–	20.8	22.1	8.65
18.	Neri, Leonardo	3.55	55.0	43.3	12.9	–
19.	Ocdamia, Ireneo	0.68	34.2	23.5	19.1	–
20.	Ocdamia, Vicente	0.70	38.1	25.5	16.6	–
21.	Pizarra, Reynaldo	1.30	2.28	24.5	18.1	–
22.	Villazun, Ignacio	–	–	23.8	36.1	15.0
	Mean	7.89	33.4	33.9	19.6	11.8

[1]Insect pests include seedling maggots, defoliators, caseworm, leaffolder, brown and green hoppers and stemborers.

[2]Ms. Manzanero's field was submerged in water starting the later part of September until the end of the cropping season.

Table 2. Mean monthly natural enemies count per hill in IPM plot.[1]

	Farmer Cooperator	June	July	August	September	October
1.	Banados, Miguel	-	2.64	1.8	1.35	-
2.	Caldoso, Rolando	3.85	3.97	2.63	2.0	-
3.	Capunitan, Catalino	2.45	3.13	2.61	2.08	-
4.	Capunitan, Delfin	-	-	2.77	2.75	2.54
5.	Capunitan, Emilio	2.38	2.77	2.21	-	-
6.	Gecale, Maurino	3.23	2.91	2.24	1.81	-
7.	Gotengco, Abundio	2.55	2.5	2.28	2.05	-
8.	Guerrero, Toribio	-	-	1.89	1.87	1.76
9.	Lapaz, Pantalion	2.48	2.39	2.51	1.81	-
10.	Mabait, Condrado	3.3	3.2	2.85	2.31	-
11.	Manzanero, Mereng	-	2.36	2.7	-	-
12.	Matanguihan, Eugenio	3.16	3.26	2.81	2.54	-
13.	Matanguihan, Jose	3.58	2.69	2.68	2.54	-
14.	Maunahan, Teodoro	-	-	2.07	2.23	1.79
15.	Montano, Arsenio	3.74	3.04	2.46	2.21	-
16.	Muya, Alejandro	-	2.88	3.01	2.61	1.93
17.	Muya, Juan	-	-	2.43	2.4	2.23
18.	Neri, Leonardo	2.95	2.83	2.72	2.35	-
19.	Ocdamia, Ireneo	3.65	2.6	2.35	2.03	-
20.	Ocdamia, Vicente	2.58	2.5	2.17	1.96	-
21.	Pizarra, Reynaldo	2.81	2.66	2.53	2.31	-
22.	Villazur, Ignacio	-	-	1.8	2.01	1.39
	Mean	3.05	2.84	2.43	2.16	1.94

[1] Natural enemies include spiders, hymenopterous and dipterus parasites and predators, beetles and hemipteran predators.

Table 3. Yield and frequency of pesticide application in IPM vs. farmers' plot (wet season, 1986 Calamba, Laguna).

Farmer Cooperator	Yield in Cavans per Hectare		Frequency of Insecticides Application	
	Farmer's Plot	IPM	Farmer's Plot	IPM
1. Banados, Miguel	108	107	0	0
2. Caldoso, Rolando	58	71	1	1
3. Capunitan, Catalino	101	106	1	0
4. Capunitan, Delfin*	97	97	0	0
5. Capunitan, Emilio	118	119	0	0
6. Gecale, Maurino	129	129	1	0
7. Gotengco, Abundio	129	128	1	0
8. Guerrero, Toribio	116	114	1	0
9. Lapaz, Pantalion*	128	126	3	1
10. Mabait, Condrado*	115	113	3	0
11. Manzanero, Mereng*	-	-	0	0
12. Matanguihan, Eugenio	137	137	5	2
13. Matanguihan, Jose	139	140	2	2
14. Maunahan, Teodoro	83	82	1	0
15. Montano, Arsenio	121	121	1	0
16. Muya, Alejandro*	123	129	2	1
17. Muya, Juan*	59	59	0	0
18. Neri, Leonardo	107	106	1	1
19. Ocdamia, Ireneo	127	148	4	1
20. Ocdamia, Vicente*	89	90	1	0
21. Pizarra, Reynaldo	139	140	3	2
22. Villazur, Ignacio	107	119	0	0

* Maggot damage was ignored or in some cases was not treated due to bad weather condition during the scheduled time of spraying.

Table 4. Yield (kg/ha) and monthly insect population counts in the technology generation pest (R. Caldoso, wet season 1986, Calamba, Laguna).

	Treatment	Yield[1]	June	July	August	September
1.	Control (No treatment)	2937	0.5	41.93	34.14	14.25
2.	ETL (Control with ETL is reached)	3937	0.4	41.27	32.93	14.00
3.	Higher than ETL (Control when ETL is exceeded)	3212	0.5	38.96	29.72	10.76

[1] Field submerged in water one month before harvest hence yield was subsequently affected.

Table 5. Total cost of pest control, total profit, yield per hectare and return on investment per hectare, IPM and Farmer's plots (wet season 1986, Calamba, Laguna).

	Total Cost of Pest Control (in pesos)		Yield per ha. (in cavans of 50 kg.)		Total Profits		Return on Investments	
Case #	IPM	Farmers	IPM	Farmers	IPM	Farmers	IPM	Farmers
1	200	200	78.2	78.2	5,634	5,634	2.36	2.36
2	600	600	105.8	103.96	7,821	8,081.5	2.14	2.18
3	265	365	82.8	82.8	5,009	4,909	1.94	1.90
4	220	466	49.68	49.68	2,898.76	2,652.76	1.81	1.69
5	435	435	0	0	−3,625	−3,625	0	0
6	699	1,064	126.04	126.04	11,402	10,517	2.52	2.25
7	734	610	127.88	128.8	12,781.4	12,775.4	3.36	3.41
8	181.67	295	114.08	115.92	9,394.33	9,177.7	2.84	2.81
9	372	364	113.16	118.68	11,837.1	10,671	3.76	3.27
10	140	140	54.28	54.28	3,671.02	3,371.02	1.99	1.84
11	327.5	682.5	64.4	66.24	4,066.5	3,461.5	1.96	1.75
12	472.6	963	116.84	128.8	11,362.8	9,312.4	3.09	2.57
13	355	530	81.88	82.8	5,545.6	5,116.6	2.06	1.92
14	674	790.7	127.88	128.8	7,214.4	6,657.7	1.66	1.58
15	115	285	111.32	111.32	12,097.7	11,877.7	4.24	4.05
16	323	600	53.36	65.32	3,667.43	1,737.43	2.07	1.43
17	525.65	447.39	98.44	97.52	8,287.25	8,480.51	3.12	3.22
18	135	495	118.68	118.68	10,212.3	9,567.3	3.37	2.93
19	205	380	92.92	97.52	8,429.5	7,369.6	2.96	2.55
20	296.67	296.67	82.8	89.24	7,870.28	6,856.93	3.09	2.24
21	205	205	108.56	109.48	6,931.5	6,461.5	2.39	2.21
22	264	264	99.36	98.44	10,090.45	10,065.3	3.82	3.69

Table 6. Estimated monitoring time in IPM plots, in minutes per hectare per person (wet season 1986, Calamba, Laguna).

	Name	Area Monitored[a]	Time of monitoring/ person (min)	Min./ha.[b]
1.	Banados, Miguel	0.85 (8)	48	56
2.	Caldoso, Rolando	0.85 (9)	54	63
3.	Capunitan, Catalino	0.5 (3)	22	44
4.	Capunitan, Delfin	0.75 (6)	42	56
5.	Capunitan, Emelio	0.5 (5)	30	60
6.	Gecale, Maurino	0.5 (6)	36	72
7.	Gotengco, Abundio	1.25 (5)	36	28
8.	Guerrero, Toribio	0.5 (5)	30	56
9.	Lapaz, Pantalion	2.0 (16)	96	48
10.	Mabait, Condrado	0.5 (2)	14	28
11.	Manzanero, Mereng	0.4 (4)	24	60
12.	Matanguihan, Eugenio	0.5 (5)	30	60
13.	Matanguihan, Jose	0.25 (3)	18	77
14.	Maunahan, Teodoro	0.5 (6)	42	56
15.	Montano, Arsenio	0.5 (6)	36	72
16.	Muya, Alejandro	1.25 (7)	42	34
17.	Muya, Juan	1.0 (6)	36	36
18.	Neri, Leonardo	1.15 (8)	56	49
19.	Ocdamia, Ireneo	0.25 (1)	6	24
20.	Ocdamia, Vicente	0.5 (3)	22	44
21.	Pizarra, Reynaldo	0.5 (4)	24	48
22.	Villazur, Ignacio	0.5 (6)	42	56

[a]Number in parenthesis reflects the number of "pilapil"monitored in IPM plot.

[b]Mean monitoring time per hectare was computed at 51.26 minutes with a standard deviation of +14.23 minutes.

Women in rice farming systems: A preliminary report of an action research program in Sta. Barbara, Pangasinan

Thelma R. Paris*

INTRODUCTION

As early as 1979, a few IRRI studies deliberately gathered data on the role of women in rice production (Duff, 1979; Res, 1979). However, it was only in 1983 when IRRI gave explicit attention to evaluating the role of women by convening a conference involving biological scientists, social scientists and policy makers. The goals of the meeting were to consider:

a) women's roles in rice farming;
b) whether women have benefitted from past introduction of new rice technology; and
c) how they might benefit from emerging technologies.

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Concern for women as recipients and users of technology was evident not only in IRRI but also in other international centers under the CGIAR system. In March 1985, an inter-center seminar on women and agricultural technology was held in Bellagio, Italy to examine the incorporation of a technology user's perspective, specifically the role of women in the research programs of the International Agricultural Research Centers (IARCs).

There is now increasing concern that neglect of women-specific issues leads to inefficient technology development and transfer programs in those cases where the users are women, and that new technologies may have negative consequences on women (Dey, 1985). Available evidence shows that many studies have underestimated the impact of new technologies on women in general and particularly women wage laborers (Agarwal, 1983, Unnevehr and Stanford, 1983). To develop greater awareness of women's roles in agriculture and their special needs as technology users and beneficiaries, it was agreed that international and national agricultural research centers should develop long-term strategies to involve women, and where possible, in all phases of research and technology development work.

Following the Bellagio meeting, a project design workshop on women in rice farmings systems was held at IRRI in April 1985. It was proposed that IRRI organize a collaborative effort to undertake research/action projects in five general program areas:

a) women and technology development;
b) women and extension;
c) impact of technologies on women and the household;
d) complementary studies; and
e) sensitization

The ultimate aim of this collaborative work is to institutionalize women's concerns within agricultural research and extension programs on rice farming systems. Hopefully this will be achieved by means of the following:

a) incorporating rural women's concerns into on-going programs both in IRRI's outreach programs and at IRRI itself;
b) for IRRI to stimulate WIRFS research in the national agricultural research centers (NARCs) and in non-specialist universities and national development research institutions; and
c) establishing a network to promote a concern for WIRFS issues at a national policy level, and provide appropriate data for development planning purposes. One strategy is to develop the collaborative work in WIRFS under the Asian Rice Farming Systems Network (ARFSN).

This paper deals with the on-going activities under the program area of <u>women and technology development.</u> The objective of this program is to demonstrate that specific concern for women, in both the technology development and dissemination phases of farming systems research, increases the effectiveness of agricultural research and extension and produces positive effects from technical change on women's welfare and the entire household. A strategy for achieving this goal is to integrate women's concerns within a farming systems project using the farming systems approach.

WHY INTEGRATE WOMEN'S CONCERNS IN FSR?

The farming systems approach views the farm as a complete system and focuses on the interdependencies among these components under the household's control and examines how these components interact with physical, biological and socio-economic factors beyond the household's control. This approach involves a description of the local farming systems and identification of its constraints; reviewing existing technologies and techniques to overcome these constraints and selecting, testing and tailoring these technologies to the conditions in which men and women work.

Using the farming systems approach, the household unit is the hub of the rural farm. It is this unit that makes management decisions, provides labor, markets products and performs many other functions within the farm. When new crop and livestock technologies are introduced into the smallholder sector, it is the household composed of men, women and children who must decide whether to adopt the innovation and reallocate resources to support the innovation.

As a part of the household, women play an important role in crop production, seed management, post-harvest, biomass utilization, marketing, care and disposal of crops and livestock including the provision of fuel and fodder needs and as managers of farmer related activities and as a participant in production and consumption decisions. Empirical evidence shows that rural women in Asia contribute significantly not only to the physical production process but also in decision-making and that the labor participation of women farmers vary considerably between countries. With the exception of Bangladesh, women generally supply the bulk of the labor for transplanting, weeding and harvesting, providing between 50-100% of total labor for these operations. A high proportion of total agricultural labor for rice production is hired, with 58%, 45% and 28% of the total hired labor force consisting of women in Andra Pradesh, India, Java, Indonesia and the Philippines, respectively (Unnevehr and Stanford, 1983). In the 1979 IRRI study on "The Consequences of Small Rice Farm Mechanization", the contribution of female labor in non-mechanized rice production system in West Java, South Sulawesi, Central Thailand and the Philippines ranged from 43% to 56% of total labor. On the fully mechanized farms, the female labor contribution ranged from 16% to 58%, with South Sulawesi having the lowest female input (Duff, 1979).

Data from studies in Indonesia, Nepal and the Philippines show that women play an important and often dominant role in farm decision-making. Women's management tasks include the selection and storage of seed, purchase of inputs, hiring and supervision of labor, arranging exchange labor groups, and marketing. In the Philippines and in Thailand, women are also generally custodians of the household cash (White, 1984; Acharya and Bennett, 1981; Ministry of Agriculture, Philippines, 1983).

Despite this empirical evidence, women have not been perceived as farmers and farm laborers and, historically the reference farmers has always been male. Consequently, the traditional target user-beneficiaries of technologies, agricultural information, extension services, training, credit, organization, as well as policies have always been male farmers (Castillo, 1986).

Within a farming systems research project, a mechanism will be developed whereby women's concerns will be considered at the various stages of the technology development process specifically in the design, dissemination and extension phases. The basic elements for achieving this are (Castillo, 1985, Cloud, 1985):

- analysis of women's productive activities within the farming systems including their roles in the household and agricultural production;
- identification of existing, emerging, and future technology options conducive to the expansion of women's productive capacity;
- greater understanding of the factors constraining or supportive of women's more productive participation in farming system such as access to information, organization, productive resources, access to and control over resources;
- application of this understanding throughout the farming systems research process;
- and pilot testing of promising technologies.

It is therefore important to understand at the start of the research process the spheres of influence of household members particularly of women in the household and in agricultural production and decision-making. Sensitivity to the gender specific ramification of a technology provides the basis to enhance the relevance of the technology.

In order to test this approach, it was decided to undertake field level research at an ongoing farming systems research test site in the Philippines. Sta Barbara, Pangasinan was selected in January 1986.

THE PANGASINAN PROJECT

The crop-livestock project in Sta. Barbara, Pangasinan is one of the Asian Rice Farming Systems Network (ARFSN) sites at which the WIRFS program is being integrated. Started in 1984, the project is a collaborative activity between the Institute of Animal Science, University of the Philippines at Los Baños; the Department of Agriculture; and the Rice Farming Systems Department and Department of Agricultural Economics of the International Rice Research Institute (IRRI). The FSR team includes an animal nutritionist, animal breeder, veterinarian, agronomist, economist and a sociologist.

The project's main objective is to improve existing farming systems by integration of suitable crop and animal production technologies. To achieve this objective, several on-farm trials are being conducted at research sites in Malanay (irrigated) and Carusucan (rainfed) in Sta. Barbara, Pangasinan. At the irrigated site, where two HYV crops are grown, component technology trials such as variety, fertilizer rates and green manuring (e.g. <u>Sesbania rostrata</u>) are being conducted.

Growing of forage grasses to increase fodder supply is also being conducted by agronomists from the Department of Agriculture and the IRRI Rice Farming Systems Department. At the rainfed site, which grows only one HYV rice crop, growing a high yielding, early maturing legume crop (mungbean, cowpea) before or after rice has been recommended to provide more food and additional income for the household as well as animal fodder (Godilano, 1986). At both sites, Leucaena feeding and rice bran supplementation with rice straw during the dry season has been recommended by the livestock nutritionists. In the irrigated site, artificial insemination is now being introduced to improve the breed of the carabao in that area.

DESCRIPTION OF THE SITE

Location

The crop-livestock project is located in two villages of Sta. Barbara, Pangasinan, which is 262 kms. north of Manila. Sta. Barbara consists of 29 villages which are accessible by secondary feeder roads. The town is close to major trading centers like Dagupan City and Urdaneta, Pangasinan. The latter is one of the largest livestock auction markets in the country (Cabanilla, 1984). Sta. Barbara was chosen because of nearness to major livestock auction markets, potential for crop and livestock improvements and proximity to government support agencies and experiment stations.

Two villages, Malanay (an irrigated area) and Carusucan (a purely rainfed area) were chosen as sites for the farming systems research. Carusucan is about 6 kms from the town and 2 kms from the main highway leading to the commercial centers. Inspite of the short distance from the main highway, very few vehicles ply routes leading to the village. The village is also not served by the local electric company. Malanay is located in the eastern part of Sta. Barbara. It is one kilometer away from the town proper and is traversed by the main highway. Unlike Carusucan, the majority of the households in Malanay have electricity (Fig. 1).

Agro-climatic characteristics

Sta. Barbara falls under a climate characterized by 5-6 wet and 3-4 dry months. Rains come as early as April or May but the peak level of rainfall comes around August which usually causes floods particularly in Malanay (Fig. 2). The rainfall ends in late September thru October and averages 2200 mm annually.

Demographic characteristics

Of the total households in Malanay, 53.7% have agricultural lands while 46.3% are landless. The landless population is higher in Malanay. Of the total population, 78.5% have agricultural lands and 21.5% are landless in Carusucan. The population density is higher in Malanay than in Carusucan with 1291 and 598 persons per square kilometer, respectively (Table 1).

There are more males than females in both villages. In Malanay, 51% and 49% of the total population are males and females, respectively while in Carusucan, 53.7% and 46.3% of the total population are males and females, respectively. The distribution of population between the children (0-14 years old) and adults (15-64 years old) is almost equal at both sites.

Five percent of the population are 65 years old and above (Table 2).

Education

Literacy rates are high at both sites. Forty-five percent of the adult population have finished elementary grades. In the irrigated site, seventy percent of the adult population who did not have a formal education were females while more females (58%) than males (42%) were able to finish college. In contrast, in the rainfed site, 58% of the uneducated population were males. More males (58%) were able to finish college. There is only one elementary school in each village (Table 3).

Farm Level Characteristics

A benchmark survey of 25 samples in Carusucan and 40 samples in Malanay was conducted in 1984 by the Department of Agriculture. Farmer cooperators from each village were selected from the benchmark survey of the two sites. The selection was based on criteria developed for on-farm cattle fattening trials as well as the farmers' willingness to collaborate. Twenty farmers from Malanay and 18 farmers from Carusucan were finally selected as farmer-cooperators for the crop and cattle fattening trials on farm trials. Whole farm records and simplified records of crop and livestock activities were gathered and analyzed by the economics group of the Department of Agriculture. The same cooperators were also included in the Women in Rice Farming Systems Project.

Household Characteristics

The average age of a male farm operator was 44 years and 45 years, in Malanay and Carusucan, respectively. Spouses are 2 to 3 years younger with about 5 to 6 years of formal education. The farmers in Malanay have more years of farming experience (23 years) than farmers in Carusucan (16 years) as shown in Table 4. A typical farm household in Malanay has 7 members, 4 of whom work regularly on the farm while a household in Carusucan has 6 members, 3 of whom work regularly on the farm.

Labor

Family, hired and exchange labor are used in rice production activities at both sites with the family as the main source of labor in rice production. Of the total labor for rice production, 13% and 17% in the irrigated and rainfed site are contributed by women. Hired labor is an important labor source in the irrigated site and exchange labor provides an important labor source in the rainfed site (Table 4).

Land Use

The dominant cropping pattern in the irrigated site is HYV rice-HYV rice. Sixty nine percent of the total crop area is planted to double cropped rice. Establishment of the second crop and planting a mungbean crop after the main rice crop depends upon the release of water from the National Irrigation System. In the rainfed site, 69% of the total crop area is planted with one HYV crop. Lands are left fallow for the carabao and cattle to graze. A few farmers grow local varieties of mungbean or cowpea whenever residual moisture remained after the main rice crop. Glutinous rice (traditional varieties) are also grown in small areas. Nine percent of the total crop area are planted with glutinous rice. Four percent grow local cowpea varieties after the rice crop.

IR-42 is the most common HYV grown with an average yield of 4.3 t/ha in Malanay and 2.9 t/ha in Carusucan. In general, farmers in Malanay use higher fertilizer levels (80-100 kg N/ha) than in Carusucan (30-40 t/ha). The average landholding in Malanay is 1.92 ha and 1.19 ha in Carusucan (Table 5).

Land Tenure

Of the crop area, 71% and 26% are under share-tenancy and leasehold, respectively in the rainfed site. Sixty percent of the total crop area is under leasehold and 39% is under share-tenancy in the irrigated site (Table 5).

Livestock

The carabao is mainly used for draft crop production activities while cattle are used either for draft, breeding or fattening. They are also raised for security reasons, as collateral for production loans and as means of farm transport. The number of draft animals per hectare was 1:2.2

and 1:1.2 in the irrigated and rainfed site, respectively (Table 5). The carabao is more widely used in Malanay while few are found in Carusucan (Table 5). Swine are raised for fattening and breeding. The income from swine is usually used to provide cash during the transplanting season and for the household's immediate needs. Poultry are raised to provide food for hired workers during planting season and also as a source of cash.

Large animals depend on rice straw for feed while swine and poultry are fed with rice bran, midlings and broken rice. Animal manure is used as compost for crop production. Dried cow dung and rice hulls are used for fuel at both sites.

Sources of Income

In both sites, farming is the major household occupation. Fishing, working as hired labor in land preparation, transplanting, hauling, carpentry and construction work are the major sources of off-farm and non-farm income for men. Women earn income by working as hired labor in the pulling of seedlings. Raising fattening pigs and selling vegetables are other sources of income for women. In the rainfed site, processing and selling glutinous rice is an important income generating activity before harvesting the main rice crop. Gross income is higher in Malanay than in Carusucan (Table 5).

Women's Participation in Agricultural Activities

During the initial stage of the project, a benchmark survey was carried out to gather information about the household, landholdings, cropping patterns, livestock inventory, utilization of crop residues, livestock feeding practices and constraints to crop and livestock production.

There was, however, a lack of information on the specific tasks and responsibilities of men, women and children in crop and livestock activities. The economics group has just begun collection of farm labor data disaggregated by sex and source through farm recordkeeping. The information gathered from recordkeeping included activities related only to large animals (carabao and cattle) and not to swine production which turned out to be an important women's activity and an important source of finance for household activities and crop production.

Thus, a diagnostic survey of the population was carried out to identify the specific tasks that men and women undertake in crop production. Because there was little understanding about swine management and feeding practices, a different method of gathering information was used. Informal, structured interviews were held with nineteen (11 crop-livestock cooperators, 4 non-cooperators, 4 landless) and eighteen (10 crop-livestock cooperators, 5 non-cooperators, 3 landless) households rearing large and small animals in Malanay and Carusucan, respectively. Questions were directed to the women rather than allowing the men to answer for them.

The interview was also used to test simple methods of gathering information disaggregated by sex. The objective was to provide reliable and timely data to the FSR team to permit incorporation of women's concerns at the outset of the research process particularly in the design and dissemination phase, rather than doing it later after the project was completed. Knowing "who does what" will provide information as to whose labor is affected by specific interventions. The simple method of reporting who does what in crops and livestock activities allows a disaggregation of labor by activity and gender.

Crop Production

In general, men are heavily involved in production while women are primarily involved in processing and marketing. In rice production, land preparation, transplanting, and threshing are mainly done by men while pulling of seedlings is a women's task. Harvesting, buying of inputs, conveying palay to the mill, and marketing are done jointly.

At the rainfed site where glutinous rice is grown, cooking and marketing are done by women while handpounding grain is done by men. It is interesting to note that men are more involved in marketing palay while women are more involved in marketing processed glutinous rice. This is because at the time that demand for processed glutinous rice is highest, men are already busy harvesting the main rice crop. Women also generally possess a clearer understanding of consumers' preferences and prejudices and have easier access to marketing information and prices.

For farms growing mungbeans, women were more involved in broadcasting, harvesting, threshing, marketing, and buying of inputs. Growing of vegetables was handled by men while marketing is the responsibility of women (Tables 6 and 7). The increased output resulting from improved technology (mungbean, cowpea) have to be marketed outside the village. Handling the marketable surplus is an important contribution of women.

Livestock Production

In general, men are responsible for large animals (carabao and cattle). Women normally handle swine and poultry. Despite the traditional view that large animals are men's business, women do participate substantially in their care. Unlike in rice production which involves considerable specialization of labor, there is flexibility for substitution of labor among family members in routine animal care activities. Putting up of an animal shelter, stacking rice straw, buying and selling of animals are mainly done by men but women and children help or replace men in gathering forage (straw, Leucaena, grasses, etc.), feeding, providing water, grazing, and cleaning and bathing the animals. Collecting dry cattle dung for fuel is generally done by women (Tables 8 and 9).

In swine production, practices such as the care and maintenance, buying of rice bran, taking rice for milling, and buying and selling swine are women's responsibilities. Gathering and feeding Leucaena and rice bran to swine is also a part of the women's routine (Table 10). When Leucaena feeding intervention was being introduced at the initial stage of the project, women were not involved in the discussions. It was assumed that men would gather Leucaena for the cattle. At this point, problems of adoption surfaced.

A sociologist conducted a case study on the non-adoption of this particular intervention. Since feeding Leucaena to cattle was new, some problems were observed, e.g., gathering of the leaves disrupts the farmer's routine. In contrast, feeding Leucaena to swine is a routine activity. There were other misconceptions such as the Leucaena's potential abortive effect on cattle, a side effect evident in the case of pregnant sows (Juliano and Tolentino, 1985).

Rice bran is an important swine feed. In times of scarcity (during the dry months), hard decisions are often necessary on whether to feed rice bran to cattle or to swine. Interviews with both men and women indicate that greater preference is given to swine because there are alternative feed sources for large animals. Clearly these decisions affect the degree to which rice bran is fed to cattle, a strategy being promoted by the livestock nutritionist.

Women are not only involved in the care, maintenance and marketing of swine but also in decisions pertaining to milling of palay from which the bran is derived. These decisions determine the texture of the rice bran i.e., whether it is fine or coarse, processed through either Engelberg "Kiskisan" or cone-type mills. These decision-making processes have just started to be studied in detail.

Identifying Possible Technologies Which Could Benefit Women

To develop an understanding of the role of women in both crop and livestock activities, the researchers lived at the site, talked with key informants, and observed on-going activities in the village. During this visit, the processing of glutinous rice was underway. At this point the research team realized that the processing of glutinous rice at the rainfed site was a major traditional activity and a significant source of income for women.

Glutinous rice is grown and harvested two weeks earlier than other rice varieties to take advantage of the high price on November 1st (All Saints Day), a special Filipino holiday. Demand for glutinous rice is high at this time as it is used as the main ingredient in rice delicacies. A unique feature in the preparation of glutinous rice is the manner it is processed into black grains, which consumers in Pangasinan prefer in making rice delicacies.

Method of Processing "Dirimen" (Black Glutinous Rice)

The original process for producing "dirimen" (black glutinous rice) is to burn the glutinous rice from the panicles at the hand dough stage using bamboo "buho" for fuel. When all burnt panicles have fallen off, these are handpounded and winnowed three times. A can (12 kgs) of the local variety used will take about 15.5 hours (6 hrs. for burning, 6 hrs for pounding and 3.5 hrs for winnowing). Because of the increasing scarcity of fuel and demand for black processed glutinous rice, a new adulteration process (adding charcoal to blacken the grains) is widely practiced.

Discussions with older people reveal that a black rice variety was actually used previously but has disappeared from the market. Instead of burning the panicles directly, newly harvested glutinous rice is washed to remove the empty grains or soaked for a few minutes (for old stock), and then parboiled. Parboiling is carried out in a shallow galvanized basin over a crude furnace made of clay which uses dried cow dung and other kinds of fuel. After parboiling, the wet paddy is stirred in the basin until the grains are nearly dry. This is the most critical part of the process because the grain should be gelatinized but not puffed.

The traditional process consumes considerable fuel and the continuous stirring is very laborious. When the water has evaporated, the grain is cooled for 5 minutes and then hand pounded to separate the hull from the grain. A second handpounding incorporates the charcoal with the milled grain to produce a black product.

One 12-kg can of glutinous rice takes about 4 to 6 hrs to process. Because the processing is performed by informal groups (relatives, friends) there is no payment for the labor. Men, women, and children are involved in this activity. Thirteen sample households were interviewed to estimate the total time required for processing. Sixty-two percent of the total time spent in cooking, 35% of handpounding, 52% of adding charcoal, and 96% of winnowing were contributed by women (Table 11).

Fifty-four women involved in glutinous rice processing/selling were interviewed to find out the profit gained from this activity. On the average, about 348 kgs of newly harvested glutinous rice were handled by a female processor/seller during the two month period (September to October). Analysis of costs and returns of processing glutinous rice shows that for every peso invested P1.79 can be earned (Table 12). Three women respondents were able to process a large quantity and grossed about P13,000 each. Of the total gross income earned by 17 WIRFS cooperators, 13.5% came from earnings from glutinous rice processing and selling.

Income derived from wages through pulling of seedlings and harvesting is quite low at 1.2% (Table 13, Figs. 3 and 4). Glutinous rice was bought from other farms. These women awoke at 3:00 in the morning to arrive at the Urdaneta market early to secure advantageous selling places.

Incorporating Women's Concerns

The importance of incorporating women's concerns was underscored in a crop-livestock workshop which was held to discuss the accomplishments and plans of the project. The workshop concluded that because women are intimately and subsequently involved in farm production, decision-making, processing and marketing, they should also be included in all discussions pertaining to new or improved technologies. It was generally recognized that as partners in production and income generation, the productivity of women could also be enhanced by increasing their technical knowledge about farming practices, by teaching them skills and providing employment opportunities, and by developing technologies which will benefit them.

These concerns were discussed by a livestock nutritionist, agronomist, animal breeder, economist and sociologist. And as a result, the following tasks were undertaken: (a) conducting crop and livestock classes; (b) testing glutinous rice varieties; (c) developing cooking devices for processing glutinous rice; (d) training in mushroom production; (e) introducing the "Farmer's Primer on Growing Rice"; and (f) organizing a farmers' association.

Conducting crop and livestock classes. A series of classes were conducted on topics based on the needs indicated by the men and women in the project. The classes were held to develop understanding about the recommended technology to promote active interest in project activities; to maintain interaction between the scientists and the farmers; and to obtain feedback about the proposed technology.

For the first time, women were included in farmers' classes. The female livestock nutritionist explained the importance of the nutritive value of different crop residues and fodder. Many farmers admitted uncertainty about their particular feed value. She clarified misconceptions about the abortive effects on pregnant cows of cassava leaves and other leguminous fodder and explained the elements of the ruminants' digestive system. In the proposed activity to add legumes before and after rice, women can be trained in the techniques of integrated pest management to help reduce frequent spraying on mungbeans. Also, since they harvest and thresh mungbeans, they can be taught how to prepare and preserve mungbean hay for animal fodder.

Responding to the problems in swine production enumerated by the women, an animal husbandry man from the UPLB Institute of Animal Science visited the sites and explained the importance of improving the quality rather than the quantity and frequency in swine feeding programs. The importance of proper nutrition and disease control was also discussed.

Recognizing the importance of women in the dissemination of technology, greater attention was given to explaining the details of the technology. An example is the breeding intervention program, where detection of estrus as well as maintaining the health of the animals was critical. In a class conducted by the animal breeder, women were also invited. Teaching women the technique to detect estrus, how to monitor estrus cycles and to detect animal illness will strengthen the artificial insemination program. When interviewed, women who attended the class indicated they did not know how to detect estrus in large animals but did in swine. Many misconceptions pertaining to the impact of artificial insemination on size of offspring were clarified.

Provision of technical knowledge to farmers including women involved in rice production was given priority attention. A two-day class in rice production was held at the field office by the Department of Agriculture staff assigned to the site. The importance of using farm yard manure as compost was also stressed.

Testing glutinous rice varieties. Since processing and marketing glutinous rice is an important income generating activity for household women, particularly during the lean months, improvements in the existing glutinous rice production techniques were investigated by the FSR team.

During a crop-livestock planning workshop in 1986, it was proposed that IR65, a high yielding, early maturing glutinous rice variety be included in the component technology trials. The previous component technology trials included only high yielding varieties such as IR60, IR64 and other new varieties. IR65 matures in 114.5 days with a potential grain yield of 5 t/ha while local glutinous rice varieties mature in 130 to 140 days with a grain yield of 3 t/ha.

During the 1986 cropping season, 21 farmers (crop livestock cooperators and non-cooperators) were selected to test IR65 and local varieties such as "Waray", "Diket" and "Milagrosa", using farmers' inputs and management. Data show that the average yield (fresh weight) of IR65 is 16% higher than the local glutinous rice varieties (Table 14). The farmers mentioned characteristics such as early maturity, better tillering capacity, higher yields, uniform plant height, resistance to lodging, pests and diseases and better grain quality as advantages of IR65 over the local varieties.

Another advantage which the farmers found in growing IR65 is that the early maturity date (two weeks earlier than the local varieties) enables them to generate cash during the lean months before harvesting the main rice crop. Some agronomic characteristics of IR65 and local varieties obtained from farmers' fields were compared (Table 15). In terms of eating quality, IR65 is sticky and tacky but does not have the aroma which makes the "Milagrosa" fancy variety more preferred. The local variety has round grains while IR65 has fine elongated grains which makes hulling by hand difficult.

However, acceptance of IR65 has been encouraging. Farmers from the other villages who learned of IR65 bought seeds from the farmers who tested the variety. Some farmers in the irrigated site asked for seeds to be tested during the dry season. The farmers now refer to IR65 as "Cory" to differentiate it from the local variety called "Imelda". Further component technology trials involving UPLB glutinous rice varieties will be undertaken.

Developing cooking devices for processing glutinous rice. Because processing of glutinous rice is very tedious, time consuming and inefficient, engineers from IRRI's Agricultural Engineering Department were invited to see how they could improve existing processing practices. After a series of visits, discussions with village men and women, and men watching the actual process, they developed two simple designs for processing glutinous rice: an improvised cooking pan with a rotating wooden paddle (Fig. 5) and a small portable dehuller which reduces the hand labor in dehulling (Fig. 6). The dehuller is made of wood and hard rubber which can dehull 12 kgs or 1 can of glutinous rice in only 20 minutes. Using the improvised cooking pan with a rotary paddle allows close regulation of mixing. Puffing of the rice is avoided for higher hulling recovery.

After the engineers designed these devices, a farmer-carpenter was invited from the site to test the devices at IRRI. Following the recommendations of the farmer, the clearance of the dehuller was adjusted. Since drying after parboiling is the most time- and fuel-consuming element of the process, an alternative is to use an IRRI designed flash dryer with substantial capacity. Volume wise, this may turn out to be more efficient. The farmer-carpenter returned to the village and discussed the newly designed cooking devices and the dryer. The farmers indicated they are willing to invest in an inexpensive version of the flash dryer. This design was to be further tested at the site during the next cropping season. The high yielding glutinous rice, enhanced cooking and dehulling devices may enable women to earn more household income.

Training in mushroom production. To demonstrate opportunities for increasing income and diversifying income sources, twenty women from both research sites were given "hands on" training through the "Prosperity Through Rice Project at IRRI". Oral tests were given to check the degree to which they understood and retained information. Technical terms like mycelium, inoculum, culture medium etc. have now been familiar to them. Two women researchers interpreted most of the lectures in the native dialect. For each material used in the laboratory, the women thought of inexpensive, readily available substitutes obtainable in the village.

Upon returning to the village, they tried what they learned from the training course. They successfully produced their own mushroom spawns using indigenous materials and have used the mushroom they produced for home consumption. The production of Volvarella mushroom using rice straw as a substrate had contamination problems. To minimize this problem, a small, portable inoculum chamber made of wood was made by a farmer-carpenter. To sustain their enthusiasm, selected women were brought to a nearby village which grew mushrooms commercially. They were able to interview women in the area who are now deriving their income as mushroom planters. There is a strong market for mushrooms not only in Urdaneta but also in Manila. Buyers even place orders because of the limited mushroom supply. Trained women are still attempting to perfect the Volvarella mushroom production using the inoculum chamber.

Introducing the Farmer's Primer in Growing Rice. In cooperation with the IRRI Communications and Publications Department, the Pangasinense translation of the Farmers' Primer on Growing Rice was introduced to farmers in the irrigated site. The Primer was tested on both men and women involved in rice farming to assess their benchmark technical knowledge and also to evaluate the effectiveness of the Primer in introducing rice technology. Based on these results, revisions will be made to make the Primer more useful and effective to the farmers, both men and women. Introducing the Farmers' Primer to women as well as men, was recommended in a study conducted by the Communications and Publications Department (Cabanilla, 1986). The study revealed that wives of farmer respondents read the Primer at least as comprehensively as did the husbands.

Monitoring household data. Economists from the Department of Agriculture are collecting labor data on crop and livestock (for large animals only). Data are disaggregated by sex and source. Disaggregating labor data by gender is part of the routine in data collection at sites.

Along with these action research activities, two female field workers stationed at the site are collecting weekly household data which include labor, income, expenditures, credit and monthly rice purchases throughout the cropping season from selected households (female heads, landless and cooperators of the project) in both research sites. These information will be used to examine the possible effects of technologies (crop, livestock) on the intrahousehold allocation of resources and the decision-making patterns of the household members, particularly of women.

Income sources from farm, off-farm and non-farm sources by week are disaggregated by sex. These information display the contribution of household members (particularly of women) to total income and whether income increases following adoption of the technologies.

The credit schedule includes information on loans borrowed, amount borrowed, date of maturity, source, purpose, collateral used, interest rate, credit arrangements, repayments and name of borrower. Data from the survey will be used to test the hypothesis that there is gender differential access to both formal and informal credit. Food consumption patterns of the household were also gathered.

Case studies on women's work and child care are being conducted in Carusucan as part of a research project entitled "Women's Work Support Systems: Focus on Child Care Support Structure". This is in collaboration with FILIPINA, a non-*profit women's organization.*

Organizing farmers' association. A farmers' organization is quite important in promoting and sustaining adopted technologies for the community. In response to farmers' request in the rainfed site for the research team to help them organize, the sociologist helped them organize an association composed of men and women cooperators. Upon the suggestion of the farmers themselves, their wives were included as members. Three women members were elected as officers. At present, four women farmers in Carusucan are active members of the "Samahang Nayon". In Malanay, there are no women's associations and the farmers' organizations are all composed of men.

SUMMARY

This report describes on-going activities under the <u>women and technology development</u> component of the Women in Rice Farming Systems program. The preliminary results demonstrate that addressing the needs of women does not require a separate women's project. Integration of women's concerns into the design and dissemination process of the crop-livestock project in Sta. Barbara has proven to be an efficient and effective mechanism. The farming systems methodology first describes existing farming systems (including analysis of the specific roles of men and women in production as well as decision-making activities); constraints to production and processing are identified, and existing; emerging and future technology options (particularly for women) are reviewed; and promising technologies are then tested by users. This methodology is generalizable and can be replicated in other farming systems sites.

At these two research sites, men are involved primarily in production activities while women handle processing and marketing. Several promising technologies, including varietal improvements (IR65 vs. local varieties), agricultural machinery (equipment for dehulling and processing glutinous rice) and biomass utilization using rice straw as the substrate for mushroom production) were introduced and tested. To complement these technologies, technical knowledge and skills were introduced to both men and women. Farmer classes were conducted, the "Farmer's Primer" was distributed, hands-on training in mushroom production was provided for women and several educational field trips were arranged.

One year of experience with this prototype project provided a number of important insights:

a) The need for an initial, comprehensive description of the farming system focusing on the differential roles men and women assume in activities.
b) Biological scientists must focus on women's needs during the technology design phase. There are few readily usable technologies which specifically address the needs of women in rice farming systems. Social scientists can assist by providing timely, reliable data describing the role and needs of women.
c) Research staff must spend time in the field to clarify farmers' problems and assess alternative solutions.
d) Social and biological scientists must interact more to create an effective environment for productive, relevant research.

FUTURE ACTION RESEARCH

There exist many technologies which are potentially usable by women and which can be tested within the farming systems framework. These include techniques for:

Seed Production and Management
Seed sourcing and distribution is normally handled on a farmer-to-farmer basis rather than tapping certified sources. Unfortunately, locally procured rice seed is often too expensive, of poor quality or contains mixtures. Estimates of the yield reduction attributable to poor seed ranges from 12 to 20 percent. Seed storage and preservation are normally a women's responsibility, thus women's skills and labor can determine seed quality. There appears to be considerable scope for improving seed viability through better management and storage. We feel women can be trained in modern techniques of seed selection, production, management and preservation.

Research and training techniques of this type might be developed by IRRI and propagated through national seed growers associations and other groups interested in enhancing seed quality.

Integrated Pest Management
Women can readily be trained in the techniques of integrated pest management (IPM). A prototype IPM field project is now underway in Calamba, Laguna to verify and generate location-specific pest thresholds in rice. Various methods are used to communicate the IPM concept to both men and women. Women are observed to perform supervisory and field monitoring functions very effectively. The IPM concept can also be used in mungbean growing areas where insect infestation is a major problem. Since women already handle much of the crop care, harvesting and threshing activities, they could easily be trained to employ IPM techniques for mungbean production.

"Tapak-tapak" Irrigation System
The tapak-tapak is a treadle powered, medium lift irrigation pump which can be easily operated by women. This low cost technology permits growing of a second vegetable crop during

the dry season in areas which have no gravity irrigation water available.

Charcoal Briquettes
Rice husk is commonly used for fuel in rural households but is not always available during the rainy season and is a dirty fuel which is difficult and expensive to transport. Charcoal produced from partially combusted rice husks is a promising technology which produces a low-cost, clean burning fuel very suitable for household storage and use. Although women would not necessarily be involved in the production of rice husk charcoal, they would be a primary beneficiary from the use of this technology.

Composting
Women already collect farmyard manure for fuel. With the provision of alternative fuel sources such as rice husk charcoal, these organic fertilizers can become available for use in crop production. Training and demonstration in the proper production of compost fertilizer would complement activities presently being handled by women and increase the productivity of backyard vegetable production.

Pedal Threshing
Rice threshing is often delayed awaiting arrival of contract threshing machines. A light, low-cost thresher suitable for manual operation by women would improve the timeliness and yield of the crop and release men for nonfarm activities.

The above list is not comprehensive but is indicative of the types of technology which can be integrated into rice-based farming systems and which raise income by increasing productivity and adding value to products of the farming system.

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Table 1. Demographic indicators of Malanay and Carusucan site, Sta. Barbara, Pangasinan.

Parameters	Malanay (irrigated)	Carusucan (rainfed)
Total no. of households	229 (100.0)	144 (100.0)
With 1and	123 (53.7)	113 (78.5)
Without land	106 (46.3)	31 (21.5)
Total land area (km^2)	1.18	1.42
Population density (personlkm 1 2	1291	598

Source: 1985 Survey.

Table 2. Demographic indicators of Malanay and Carusucan sites, Sta. Barbara, Pangasinan.

Parameters	Malanay (irrigated)			Carusucan (rainfed)		
	Male	Female	% of total	Male	Female	% of total
Population distribution						
0—14 yrs. old	363 (52.6)	327 (47.4)	45.3	226 (56.6)	173 (43.4)	47.2
15—64 yrs. old	379 (49.4)	388 (50.6)	50.4	207 (50.6)	202 (49.4)	48.4
65 and above	34 (51.5)	32 (48.5)	4.3	21 (51.4)	20 (48.6)	4.8
Total population	776 (51.0)	747 (49.0)	100.0	456 (53.7)	393 (46.3)	100.0

Figures in parentheses are percentages of columns.

Source: Survey, 1985.

Table 3. Levels of education of adults (15 years and above) of total population, Sta. Barbara, Pangasinan.

Educational attainment	Malanay (irrigated)			Carusucan (rainfed)		
	Male	Female	% of total	Male	Female	% of total
No schooling	6 (30.0)	14 (70.0)	2.0	14 (58.0)	10 (42.0)	5.0
Elementary	81 (48.4)	193 (52.0)	45.0	107 (52.0)	97 (48.0)	45.0
High school	172 (56.0)	137 (44.0)	37.0	82 (46.0)	97 (54.0)	40.0
College	54 (42.0)	76 (58.0)	16.0	25 (58.0)	18 (40.0)	10.0
Total	413 (49.6)	420 (50.4)	100.0	228 (51.0)	222 (49.0)	100.0

Figures in parentheses are percentages of columns

Source: Survey, 1985.

Table 4. Household characteristics, Carusucan and Malanay, Sta. Barbara, Pangasinan.

	Malanay (irrigated)	Carusucan (rainfed)
	(n=20)	(n=18)
Age: Operator	44	45
Wife	41	43
Years in school		
Operator	6	5
Wife	6	5
Farming experience of		
Operator	23	16
Household members		
Number	7	6
Working in farms	4	3
Labor source in rice production (%)		
Family (male)	49	56
(female)	3	8
Hired (male)	35	12
(female)	9	5
Exchange (male)	3	15
(female)	1	4
Total (male)	87	83
Total (female)	13	17

Source: Ministry of Agriculture, Crop and Livestock Project, Sta. Barbara, Pangasinan.

Table 5. Farm characteristics, Malanay and Carusucan, Sta. Barbara, Pangasinan.

Items	Malanay (Irrigated)	Carusucan (rainfed)
% area planted to:		
HYV-HYV	69	—
HYV-fallow	20	69
HYV-mung (local)	4	12
Glutinous rice fallow	—	9
Others	7	10
Most common HYV grown	IR-42	IR-42
Average yields (t/ha)	4.3	2.9
Levels of fertilizer use (kgN/ha)	80-100	30-40
Average landholding (ha)	1.92	1.19
Land tenure		
% of cropland under		
Ownership	1	3
Share tenancy	39	71
Leasehold	60	26
Animal-land ratio (A.U/ha)	1:2.1	1:1.2
Gross income (₱/yr)	5,000	3,000

Source: Ministry of Agriculture, Crop-Livestock Project, Sta. Barbara, Pangasinan, 1985.

Table 6. Labor participation in crop activities of farming and landless households, Carusucan, Sta. Barbara, Pangasinan, 1985.

Crop/Activity	Farming household Male	Farming household Female	Landless households Male	Landless households Female
		(%)		
Rice				
Land preparation	95	5	100	0
Pulling of seedling	6	94	9	91
Transplanting	98	2	100	0
Harvesting	76	24	69	31
Threshing	94	6	83	17
Buying inputs	82	18		
Taking palay to mills	56	44	100	0
Marketing	69	31	100	0
Glutinous rice				
Cooking	36	64	50	50
Pounding	71	29	59	41
Marketing	14	86		100
Mungbean				
Broadcasting	17	83	–	–
Harvesting	57	43	53	47
Threshing	42	58	53	47
Marketing	36	64	0	100
Buying inputs	79	21		
Vegetables (farm)				
Growing	79	21		
Selling	42	58	0	
Total households interviewed	69			26

Source: Census of total households, 1985.

Table 7. Labor participation in crop activities of men and women farming and landless households, Malanay, Sta. Barbara, Pangasinan, 1986.

Crop/Activity	Farming household Male	Farming household Female	Landless households Male	Landless households Female
		(%)		
Rice				
Land preparation	100	-	100	-
Pulling of seedlings	15	85	19	81
Transplanting	95	5	94	6
Harvesting	68	32	71	29
Threshing	76	24	74	36
Buying inputs	80	20		-
Taking palay to mills	46	54	60	40
Marketing	56	44		
Mungbean				
Broadcasting	33	67		
Harvesting	64	36	50	50
Threshing	33	67		
Marketing	40	60	-	-
Buying inputs	81	19	-	-
Vegetables				
Growing	75	25		
Selling	26	74		
Total households interviewed	100		51	

Source: Census of total households, 1985.

Table 8. Percentage of total individuals in a household involved in carabao and cattle care production. by type of activity, Malanay, Sta. Barbara, Pangasinan, 1986.

ACTIVITY	ADULT		CHILD[b]	
	Male	Female[a]	Male	Female
Gathering rice straw	74	63	26	0
Stacking rice straw	89	37	32	0
Gathering weeds	79	53	37	0
Gathering Leucaena leaves	11	53	11	0
Gathering sugarcane tops	47	11	16	0
Giving rice bran	37	47	11	0
Feeding	79	84	37	0
Giving water	68	74	37	0
Grazing	79	68	32	0
Putting up animal shelter	84	16	16	0
Cleaning pen	79	74	32	0
Bathing	79	42	37	0
Detecting estrus	74	4	0	0
Taking animal for breeding	58	0	0	0
Buying/sel1ing animal	47	21	0	0

[a]Two of the households are headed by women (widows).

[b]Age 7 - 15 years old.

n = 19

Table 9. Percentage of total individuals of the selected households involved in carabao and cattle production, by type of activity and labor source, Carusucar, Sta. Barbara, Pangasinan, 1986.

ACTIVITY	ADULT		CHILD[b]	
	Male	Female[a]	Male	Female
Gathering rice straw	83	94	44	0
Stacking rice straw	83	28	44	0
Gathering weeds	83	89	39	0
Gathering Leucaena leaves	33	56	17	0
Gathering mungbean fodder	28	33	17	0
Gathering acacia leaves	17	11	0	0
Gathering corn stover	11	6	0	0
Giving rice bran	56	72	11	6
Feeding	78	89	50	6
Giving water	83	78	39	6
Grazing	72	89	56	0
Putting up animal shelter	61	6	6	0
Cleaning pen	56	72	33	0
Bathing	83	94	33	11
Collecting dung	0	28	0	0
Detecting estrus	39	6	0	0
Taking animal for breeding	8	6	0	0
Buying/selling animal	78	17	0	0

[a] Two of the households are headed by women (widows).

[b] Age 7 - 15 years old.

n = 18.

Table 10. Percentage of total individuals of the selected households involved in swine production, by type of activity and labor source, Malanay and Carusucan, Sta. Barbara, Pangasinan, 1986.

Activity	Malanay				Carusucan			
	AM	AF	CM (N=18)	CF	AM	AF	CM (N=19)	CF
Gathering swamp cabbage	6	47	0	6	56	89	11	11
Gathering/giving Leucaena	0	47	0	0	6	72	0	0
Feeding starter	0	53	0	0	0	61	0	0
Feeding rice bran	0	100	0	0	0	94	0	0
Buying rice bran	0	26	0	0	0	56	0	0
Cooking/feeding rice porridge	0	11	0	0	0	22	0	0
Gathering/grating banana stumps/stalks	11	26	0	0	6	33	0	0
Putting up shelter	79	0	0	0	89	0	0	0
Cleaning the pen	16	100	0	0	22	94	6	11
Bathing/fetching water/ giving water	11	100	0	0	17	100	6	0
Detecting illness	0	100	0	0	0	100	0	0
Buying/giving medicine	0	79	0	0	0	61	0	0
Applying traditional cure for illness	0	26	0	0	0	17	0	0
Detecting estrus	0	74	0	0	0	83	0	0
Taking sow for breeding	0	53	0	0	6	78	0	0
Castrating	0	0	0	0	0	17	0	0
Buying/selling/pricing	0	100	0	0	0	100	0	0

The abbreviations stand for the following:

AM - male adult
AF - female adult
CM - male child
CF - female child

Table 11. Total time spent in processing glutinous rice, Carusucan, Sta. Barbara, Pangasinan, 1986.

Activity	Family			Hired			% of Total		
	Male	Female	Children	Male	Female	Children	Male	Female	Children
					(mhrs)				
Cooking	54.0	85.0			3.0		38.0	62.0	
Pounding	23.0	23.0	10.0	6.0		4.0	43.9	34.9	21.2
Adding charcoal	15.7	25.8	7.0	.8			33.0	52.0	14.0
Winnowing	1.0	21.5			.5		4.4	95.6	
Total	93.7	155.3	17.0	6.8	3.5	4.0	35.9	56.6	7.5

n = 13 households

Table 12. Costs and returns of processing glutinous rice Carusucan, Sta. Barbara, Pangasinan, 1986 (₱).

Items		
Gross returns (A)		
174 kgs. at ₱ 12.50/kg. (processed)	₱2175.00	
Cash costs		
348 kgs. at ₱ 2.92/kg. (unprocessed)		1016.16
Basin		45.00
Fuel		50.00
Transportation		80.00
Others		26.00
Total cash costs (8)		1217.16
Net Returns (A—8)		957.84
Cost of processing/selling/kg. (B/174)		7.00
Net returns/kg. (A-B)/174)		5.51
Rate of returns to capital (5.51/6.99)		.79*

n = 54 interviewed who are involved in processing and selling glutinous rice.

* For every peso invested ₱ 1.79 can be earned.

Table 13. Income of farm households by source, by location, Sta. Barbara, Pangasinan, January–December, 1986.

Income source	Malanay (irrigated)	%	Carusucan (rainfed)	%
Own-farm (₱)				
Crops	5451	40.4	3057	19.0
Livestock	2404	17.8	2293	21.7
Others	618	4.6	353	3.3
Sub-total	8473		5703	
Off-farm				
Male wages	871	6.4	240	2.2
Female wages	281	2.2	124	1.2
Both	149	1.1	–	
Sub-total	1301		364	
Non-farm				
Remittances	716	5.3	1804	17.1
Other business/lottery	1530	11.3	388	3.7
Male (non-farm)	1248	9.3	873	8.3
Female (non-farm)	213	1.6	1424	13.5
TOTAL INCOME	13481	100.0	10556	100.0
No. of households	18		17	

Table 14. Costs and returns of glutinous rice varieties, Carusucan, Sta. Barbara (rainfed site), Pangasinan, 1986. (P/ha).

Items	IR65	Local
Yield (kg/ha) freshwt.	5,420	4,680
Price/kilo (P/kg)	2.92	2.92
Gross returns (A)	15,826	13,666
Labor and power costs (B)	4,949	4,372
Land preparation	1,161	1,023
Crop establishment	575	569
Weed control	1	6
Fertilizer application	14	11
Insecticide application	2	2
Other care	31	28
Harvesting	3,165	2,733
Material costs (C)	797	607
Seeds	343	119
Fertilizer	425	419
Insecticides	29	63
Others		6
Total variable costs	5,746	4,979
Returns above variable costs (A/D)	10,080	8,687
Returns to labor and power costs (A−C/B)	3.04	2.59
Returns to material costs (A−B/C)	13.65	15.31
No. of plots 2	22	22
Ave. plot size (M)	429.79	645.56

Source: Ministry of Agriculture, Crop−Livestock Project, Sta. Barbara, Pangasinan, July-December, 1986.

Table 15. Agronomic characteristics of glutinous rice varieties, farmers' fields, Carusucan, Sta. Barbara, Pangasinan. 1986.

Varieties	Ht. (cm)	Maturity (days)	Panicle length	% Filled (Grains)	PT[a] Hill	Wt. of 100 seeds Fresh	Dry
IR65	89	120	22	77	11	3.2	2.5
Imelda	102	130	24	75	10	3.8	3.2
Miracle	80	130	21	76	10	3.3	2.8
Milagrosa	136	130	24	89	7	3.7	2.8
Waray	111	150	26	62	9	3.7	3.2

[a] Productive tillers/hill.

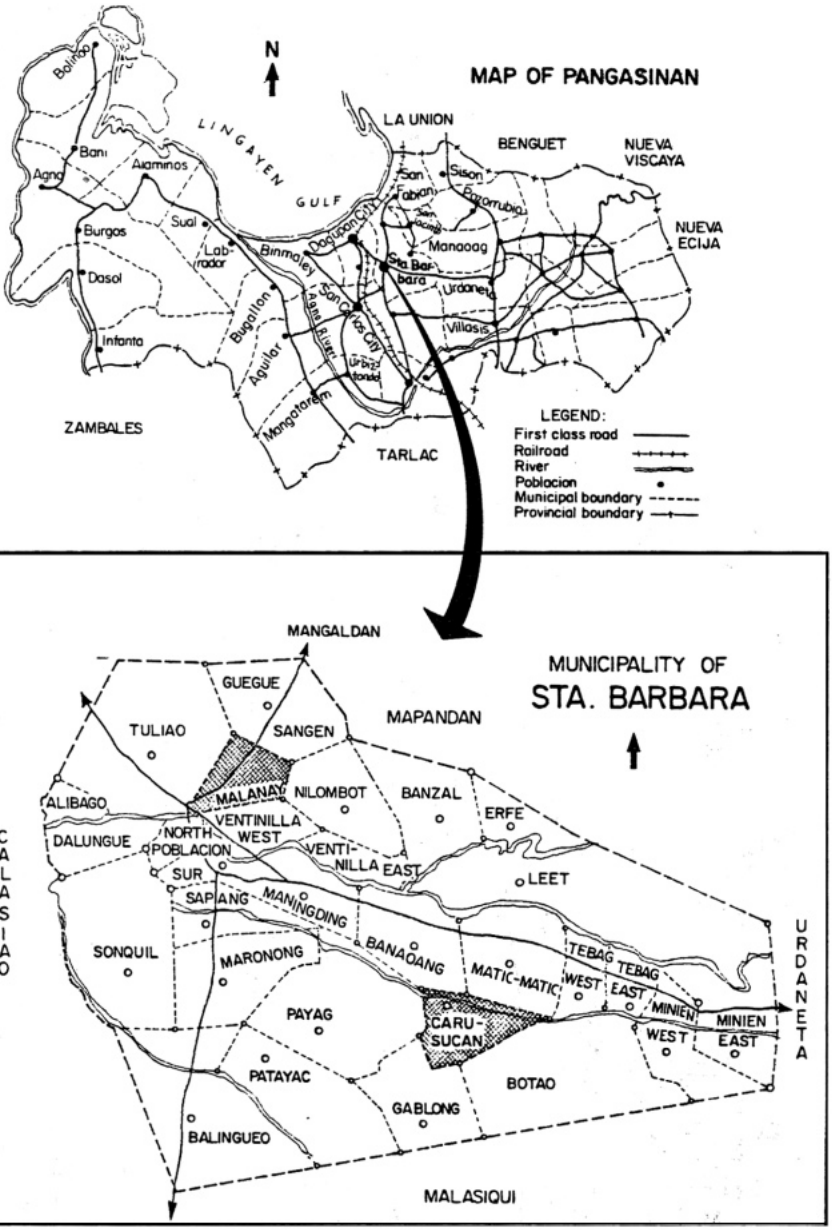

Fig. 1. Map of farming system site in Sta Barbara, Pangasinan.

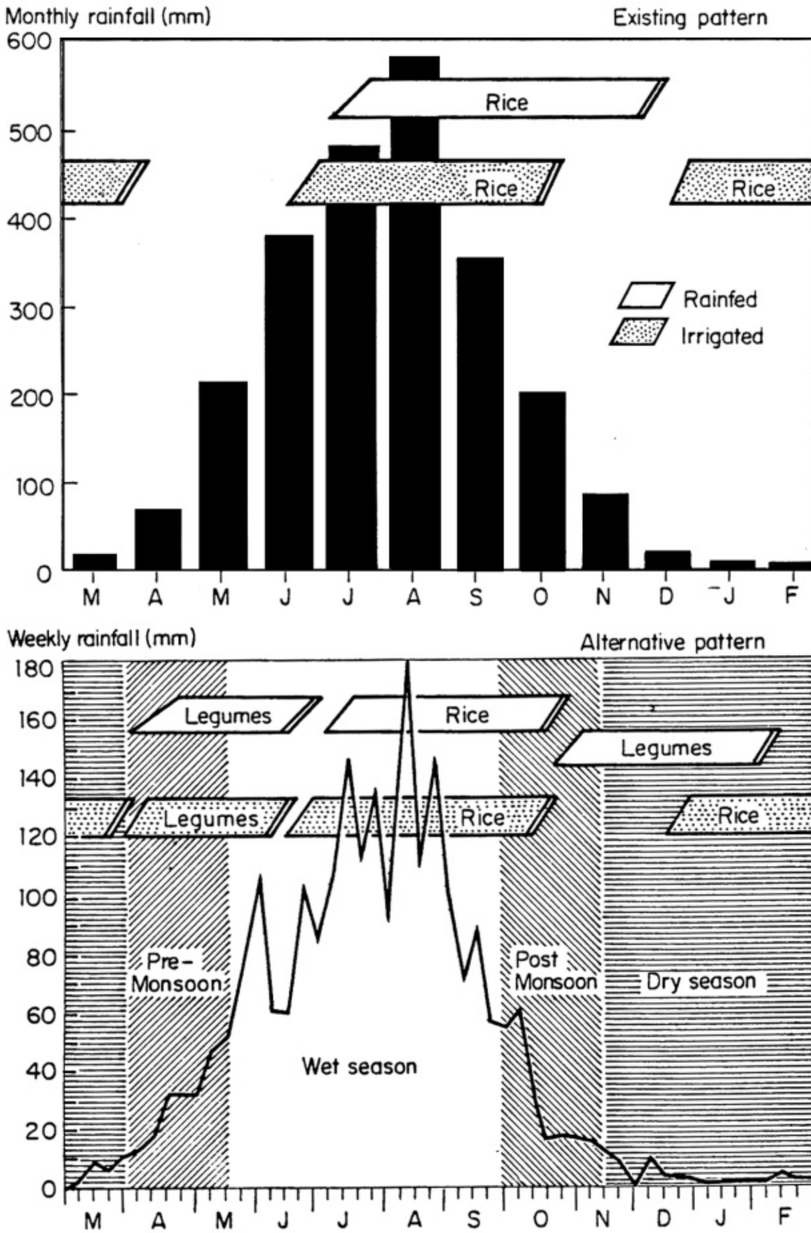

Fig. 2. Average monthly and weekly rainfall distribution (34 years), crop-livestock research sites, Pangasinan, Philippines.

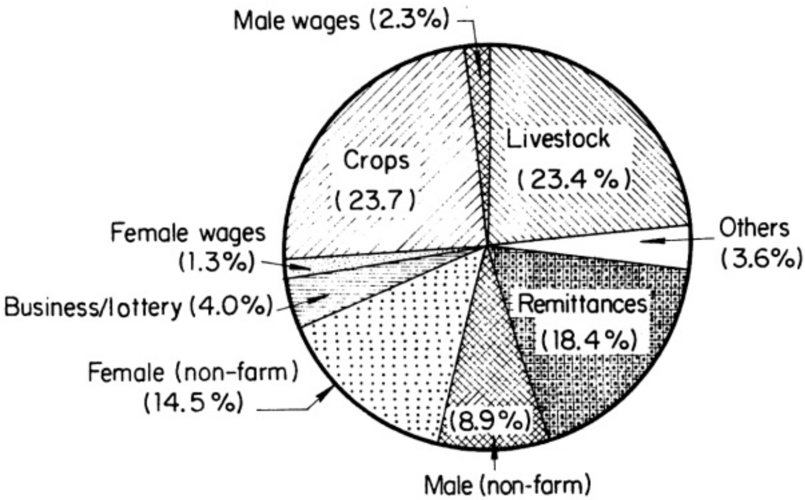

Fig. 3. Income sources in Carusucan, rainfed site, Sta. Barbara, Pangasinan, Jan. –Dec. 1986

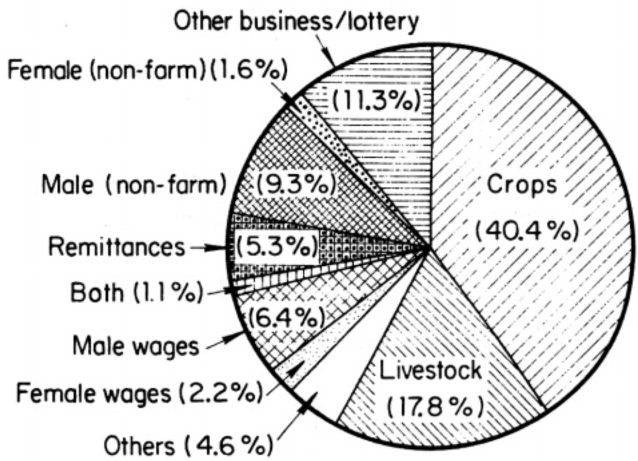

Fig. 4. Income sources in Malanay, irrigated site, Sta. Barbara, Pangasinan, Jan. – Dec., 1986.

Fig. 5. Existing and proposed innovation of cooking glutinous rice at the rainfed site

Fig. 6. Existing and proposed innovation of dehulling glutinous rice at the rainfed site.

Arrowroot production and processing: A project on women in agriculture

Rufina R. Ancheta*

INTRODUCTION

One of the problems of rural women is inadequate knowledge and skills in improved technology in the production and processing of farm crops. In order to increase productivity and income, improved technology in the production and processing of arrowroot was introduced to a group of rural women in the village of Gugo, Samal, Bataan.

Grown largely as an intercrop, arrowroot is a sturdy crop which is easy to grow and can withstand extreme climatic conditions such as typhoons and long dry seasons. Starch from the crop commands a good market price and it is used extensively by cookie bakers in the town adjacent to the project site.

Started in May 1985, the project is being undertaken by 34 rural women. The project plan included activities in production, processing and organization. Support to the project includes training programs, provision of a revolving fund, and monitoring and evaluation.

As of March 1987, a total of 53,000 square meters has been planted to arrowroot in individual home yards. A two-hectare field is maintained as a group project. Training in

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project management, skills training in processing, and leadership development were conducted. A revolving fund of P56,200.00 was made available. Since arrowroot is a long term crop (it takes 10 months before it is harvested and processed), additional income generating activities were introduced such as swine raising, buying and selling of vegetables and fruits, bagoong making and food preservation.

Three aspects of the project were evaluated and are discussed in this report:

1. Methodology Adopted for Identification of Technology Appropriate for Women.
2. Methodologies for Transfer of Technology.
3. Use of Income Generating Activities for Promotion and Transfer of Technology.

EVALUATION OF METHODOLOGY ADOPTED FOR IDENTIFICATION OF TECHNOLOGY APPROPRIATE FOR WOMEN

In the arrowroot production and processing project of the Philippines, several methods/activities were adopted to identify appropriate technology for women. The appropriate technologies identified for the project are: (1) in production, the use of improved cultural management practices such as the use of high yielding varieties, soil testing, and use of fertilizers; and (2) for processing, the use of a presser, starch making, and the use of energy/time saving devices. The following are some of the methods, techniques and tools used in identifying the technology.

Criteria/Checklist on the Choice of Technology Developed at the Bangkok Conference for Women in Agriculture

The criteria which also served as a checklist for choice of technology, are the following:

* <u>Setting</u>
It must not be one that isolate the women.

* <u>Users</u>
It must link with policies and plans of the community.

* Purpose

It must raise productivity, reduce labor/time, drudgery, and promote greater participation and integration of women for socio-economic development.

* Viability

The technology must be transferable, economical, efficient, simple, and must answer an identified need.

The above criteria were used as guidelines by the project staff of Women in Agriculture. They were used initially in the proposal for rootcrop production and processing. Rootcrops were expected to thrive despite Philippine climatic conditions like typhoons during the monsoon months and long dry seasons. The probability of success with these crops is therefore greater than with other agricultural crops.

Rootcrops Research

In the search for a specific rootcrop for the Women in Agriculture project, a research on Philippine rootcrops was made, looking into their cultural requirements, utilization and processing. Four rootcrops were the object of the study. They were arrowroot, yam, sweet potato and cassava. The project staff, who were not agriculturists, were provided a good background of rootcrops. The information gained were useful in discussions with technical staff and women farmers.

Consultations with Technical Staff of the Department of Agriculture

The project staff conferred with personnel of the National Food and Agriculture Council (NFAC) and the Bureau of Plant Industry (BPI) regarding the project of Women in Agriculture on the search for the type of rootcrops technology for income generation. However, experiences of both agencies were not encouraging. Small farmers cannot meet the demand created by feed millers. From the consultation, the idea of sweet potato was discouraged and so with the other rootcrops.

Another consultation with the Director of the Bureau of Agricultural Extension gave direction to the project staff. Director Segundo C. Serrano used to work as a school principal at the Bataan Agriculture School. He suggested piloting a project on arrowroot production and processing. He cited several reasons such as:

* There is a potential market among cookie bakers in one of the towns in the province.
* Arrowroot still grows wild in Bataan.
* It is a good intercrop under coconut trees.
* It is very easy to grow.

This consultation was encouraging.

Social Preparation

To prepare for the project a series of activities was undertaken. They were aimed at preparing the target groups, participants, and supporters to be part of the project. The following activities took place:

Exploratory meeting. An exploratory meeting was arranged that put together the Provincial Agricultural Officer and his agriculture and home economics extension staff, and the local government office which was represented by the Lady Vice Governor and a Lady Mayor.

The search for a project was discussed. Director Serrano's suggestion was mentioned and the group reacted positively to and confirmed the director's observations on why farmers abandoned the crop. The group was also aware of the potential market in the province. It was gathered that because of lack of market for fresh arrowroot and the tedious task of processing, the farmers abandoned the production of the crop. However, arrowroot still thrives as a wild crop. The provincial officials agreed to give arrowroot a try, subject to consultation with the farmers and the women.

Field Visits. Three field visits were made by the project staff. The first one was in a barangay where women have organized themselves to grow sweet potato. They were not fully satisfied with their present project. As to the possibility of another crop that will provide a processing technology, some of the women were ready to try.

The other place visited was the cookie bakers' town which was about seven (7) kilometers from the barangay first visited. Cookie bakers aired the problem of starch supply.

During lean months supply is not enough which forces some of them to stop baking. They informed the project staff that their supply of starch came from Laguna, Cavite, Quezon and Romblon. These places are far away from Bataan. Expenses for transport is an added cost to their raw material. There is a need for about 30,000 kilos of starch every year.

The third field visit was in a farm in Antipolo, Rizal, where arrowroot grew under coconut trees. The farm is directly supervised and tended by a homemaker who has a crude presser near her house. She has about three hectares of land planted to arrowroot. She hires farm hands for weeding, harvesting and processing. She is very happy with her project and claims that it has helped her send her children to college and also build their beautiful home. It was observed that almost all farms in the area have arrowroot as intercrop.

Community Assembly. A general meeting in the barangay was called. It was to inform the community about the project if it was acceptable. It was attended by 43 villagers, both men and women. The assembly started with the identification of problems and how they can be solved. Community resources were also identified, such as the presence of a school, a health center, and a feeder road. For manpower resources, there were about 181 families whose main occupation was farming. The women also identified their roles in farming as assisting in farm chores.

Meeting with the Women. Subsequent meetings with the women were held. Seventeen (17) women indicated the desire to undertake the project specially after the presentation of the project concepts and technical requirements.

In meetings some expected problems were discussed, such as: lack of water and suckers, limited technology and attitude of other members of the village. The areas of responsibilities were identified as follows:

a. the barangay captain to coordinate with local government in the repair of the well to supply water requirements;
b. the Department of Agriculture office in Bataan to locate sources of the UPLB Variety of arrowroot suckers

c. BAEx and NCRFW to negotiate project funding;
d. the women to start clearing their land in preparation for delivery of arrowroot suckers.

Pre-Project Feasibility Study
A pre-project feasibility study was prepared by a technical consultant on processing from the data gathered from the research and from farm experiences. The project feasibility made a list of assumptions and estimates for labor on land preparation, material costs, tools and equipment, yield and selling price.

The pre-project feasibility study served as a good guide for discussion among the farm women. (Please refer to Technical Requirements for Arrowroot Products and Processing in Annex 1.)

Women's Participation
The 17 participants who signed up for the project attended the pre-feasibility meeting. The other activities undertaken were:

Project Development. Succeeding meetings were training sessions in their own project. With the assistance of the home economics extension specialist, the women prepared their own projects by making a:

* production and processing plan
* financial plan (based on project feasibility)
* market plan
* organizational plan

Collection of Baseline Data. The socio-economic profile of the members was collected by the NCRFW with the assistance of the women themselves. This baseline data was useful for planning, monitoring, and evaluation.

Monitoring and Evaluation. The involvement of the women participants and the project leaders in home-based monitoring identified problems needing attention. The group assisted in initiating other village development projects such as women's income generating projects, environmental sanitation, road improvement, repair of water pumps, and exchange of technology with teachers and non-members.

Involvement of Government Agents and the Women

The participation of government agents and the women at all levels in the preparation of the project assured the direct participation of the beneficiaries themselves. The national meeting brought different agencies together and became a venue for soliciting assistance and support for the Women in Agriculture project.

The activities mentioned served as the guides for identifying the technology that are appropriate for women. As a result, more women have joined the project. The farmers, with the assistance of the provincial government, have planted more areas to arrowroot to increase the supply for the women's processing activities.

EVALUATION OF METHODOLOGIES FOR TRANSFER OF TECHNOLOGY

What is the Technology?

Two major technologies were introduced. The first was the Production Technology which included the preparation of the land, proper cultivation, care and management, soil test, HYV arrowroot, and the use of simple farm tools for women.

The second was the Processing Technology which included the presser and its use, processing techniques, drying, storing, and the use of time and labor saving devices/ equipment.

What is the Nature of the Technology?

Both the production and processing technologies were modified, improved and adapted to existing technologies in other localities such as Laguna and Quezon, provinces south of Manila and about 180 and 220 kilometers, respectively, from the project site.

How was the Technology Transferred and Taught?
Many times, people will not accept a new technology because they are not aware that it is useful to them in improving their lives and their families. The following methods were used in the arrowroot project to realize a smooth and effective transfer of technology:

Identification of Problems/Needs of the Women and Community. Thru a meeting conducted in the village and which was attended by women and men, the women mentioned that growing of the roots was stopped because there was no market for the fresh roots. Also, they used to get starch from the root by pounding them in the mortar and pestle. The starch is used for food and for laundry. The practice was also abandoned because it is very laborious. They expressed the need for machines such as those existing in Laguna which could be constructed in their village, so that they can intensify arrowroot starch production and processing. This will enable them to supply to the cookie bakers in town.

The problems/needs of the women were clear to them because they themselves identified them.

Identification of a Mechanized Presser for Arrowroot Processing. Motivated by the needs of a depressed barangay, the technical project officer visited the engineering section of the Bureau of Plant Industry as well as some agricultural machine distributors in Manila to look for a possible presser. The machine he found used electricity which the village did not have. He also found that the machine could heat up and cook the starch during processing. Although it could be modified for manual operation, it will be costly, as the materials will have to be imported from outside the village, and operation will be laborious.

He was looking for a commercially fabricated presser that could be adapted to the particular local cultural, economic and environmental conditions of the community which needs it. He could not find a suitable presser, however.

Observation and Study of Existing Technology. To pursue their search for an appropriate presser, the project staff and a female engineer motored to Laguna. There, underneath the coconut trees and within the arrowroot plantation, stood the unassuming traditional stone and wood presser. The processor, a farmer wife explained to the group the nature and usefulness of her presser. The project staff realized at once that this presser was the answer to the need of the women in Gugo. Its advantages were identified: (1) it is made of wood and other local materials which are easily available in the community; (2) it could be constructed within the project site and is therefore easily accessible to women-users; (3) the women can be trained to use it; (4) its use is not taboo for women; (5) pressing rootcrops is a job of rural women; (6) the presser could increase efficiency and productivity of women and lessen labor and time inputs: and (7) it does not use electricity.

The visit proved to be very meaningful and fruitful.

Presentation of the Technology. The project staff was enthusiastic of the "newly found" technology. What was needed thereafter was an "appropriate technology" that included not only the "physical thing" but all the systems/factors that go with it; for example, the presentation of the technology to intended users. Following are the methods of presentation of the presser to the women of Gugo.

* *Brainstorming thru a community assembly meeting.* Free wheeling questions were given to the women and the community, such as: "What technique did you say you used before in getting starch from the arrowroot?"; "How did you find the process?", etc.
* *Sharing of experiences.* The project participants shared what they saw; studied in Laguna.
* *Presentation of the pictures and the sketch of the technology during the Community Assembly.* The concept and design of the presser was displayed during a community assembly. Also shown in pictures were some simple tools and equipment. A floor plan of the processing center showed improved working areas.

  These activities/strategies aroused people's creativity and curiosity, motivated them to discuss scientifically, use local materials and talent/ skills of the local carpenters who can build the presser. This method also stimulated the people to think about the steps that must be taken to reach their desired goal - to build and have a presser of their own. They suggested that they be given training on the use of the presser and processing technique right there in Laguna.

On the Spot Training on:

* *Land preparation, cultivation, care and management, harvesting.* Two project leaders and two local carpenters were brought to Laguna. The farmer/housewife, with her husband, explained to the group how they plow and harrow their land, clean it and prepare furrows for planting. She showed the project leaders how to harvest with the use of a pitch fork without damaging the roots. She also taught them the skill of selecting planting materials during the harvesting.
* *Processing techniques and the use of the presser.* The women processors employed by the farmer showed the group how to clean, wash, press the roots, set and decant the starch in preparation for drying.

  The farmer demonstrated the use of the presser. It operates by pushing and pulling the handle to and fro with the use of the right hand while the left puts the roots under the presser.

  In all these processing activities, the women of Gugo actively participated. They did the process themselves after the demonstration. They also realized that the presser is flexible. It could be used to press ginger, cassava and corn.
* *How to construct the presser.* Meanwhile, the two carpenters took the measurements of the presser, and the floor area of the processing center. They also studied and made specifications of the labor saving devices used in processing such as the strainers.

  The on-the-spot approach to the transfer of technology gave the people the opportunity to learn and do by themselves. It is also a beautiful approach as women exchange ideas among themselves very informally. Camaraderie is also developed.

Peer Teaching. Peer teaching or "women teaching women" was first demonstrated in Laguna during the on-the-spot training/demonstration. Peer teaching for these women proved to be an effective methodology in the transfer of technology. The women could easily relate with one another in their own level of understanding. It has engendered a feeling of equality, oneness and camaraderie.
When the women of Gugo returned to their barangay, they in turn applied peer teaching as soon as the presser was ready for use and as soon as matured roots were available for demonstration purposes.
The project leaders explained casually. They were happy as they worked and learned in their community.

The Use of Extension Workers

* *Through Seminars and Workshops.* What the project leaders learned in Laguna was reinforced by the local extension workers through seminars and workshops on production and management.
  The use of HYV, proper land preparation, proper weeding and fertilizing and proper cultivation were emphasized.
* *Through Technical Supervision / Monitoring and Evaluation.* The extension workers such as the agriculturists and the home management technicians directly supervise the production component and the conduct of home extension classes. The HMT directly supervises the project leaders and participants.

The Role of the Designer and Local Carpenters. A female designer conceptualized the presser and the processing center. With the help of local carpenters, the presser and the processing center were constructed. All the materials used were available in their barangay and in the nearby town.

The project participants helped in the building of the presser by handing out tools and materials to the carpenters, mixing the cement and preparing their food.

EVALUATION OF THE USE OF INCOME GENERATING ACTIVITIES FOR PROMOTION AND TECHNOLOGY TRANSFER

There are two issues involved in this paper: that of identifying the income generating activities (IGA) and the effects of promoting and transferring the technology.

Income Generating Activities

In the arrowroot project, the activities undertaken under income generation were:

Identification of the Income Profile of the Household. This included the following:

> The annual income of farm households is about P8,500.00. The original women participants earned about P2,800.00 annually while their husbands earned about P8,230.00. Among the later participants, the women earned less and the others did not have any income.
>
> The main source of income is farming - upland rice and corn, fruit trees and vegetables. Households sold their produce themselves. Another source of income is making bamboo walls, the raw materials for which come from the mountain.
>
> As the above data suggest, the participants belong to the low income group. As a whole, the community is economically depressed. There is one school, four chapels, and a multipurpose center. There are 181 houses mostly made of grass and bamboo materials.

When asked about their problems, their common reply was inadequate income to meet their needs. Transfer of technology that will increase income was the most important suggested solution to their problems.

Training on Project Development. From the exercises in the training sessions on project development and after they were provided with pre-project feasibility studies, the women participated in project planning, financial planning and organizational development.

Assumptions for Arrowroot:

Expected Gross Revenue		P 78,000.00
Production	P 30,000.00	
Processing	P 48,000.00	
Expected Expenditures		P 50,210.00
Production	P 18,480.00	
Processing	P 31,730.00	
Profit		P 27,790.00

The participants, who were exposed to this kind of training for the first time saw the relationship between improved technology and increased income.

Patterns of Loan Disbursement and Repayment. The women themselves stipulated the patterns of loan disbursement and repayment in the loan agreement that they signed.

Policy Formulation. Policies regarding the operation of the revolving fund were also formulated by the women during their training sessions.

Policies Formulated

Fund Use

a. Funds shall be deposited in a bank.
b. There shall be two signatories, the treasurer and the president of the organization.
c. All expenses shall have the approval of the officers.

d. The amount of P/300.00 can be withdrawn for emergency expenses.

Record Keeping

a. A record of fund expenses shall be made by the treasurer, with a copy furnished the secretary.
b. The auditor shall audit the records monthly.
c. Records of the organization are open to all members.

Profit Sharing

a. All members who contributed in the production process will be paid for labor rendered.
b. There shall be equal sharing of profit after expenses have been deducted.

The Use of the Presser. A certain amount shall be collected from the use of the presser. This amount shall be used for the repayment of expenses for construction and maintenance.

How income generating activities helped promote and transfer technology.

A. Promotion activities refer to those activities done to generate interest and encourage people to use the new technology.

The growing participation of women in initiating new project has enhanced the interest of the whole community. Even the farmers made their own move to plant more arrowroot.

The Rural Improvement Club (RIC), a women's organization, reorganized themselves for more dynamic leadership. They identified leaders with potentials for organization and technology transfer. For example, they judiciously selected a secretary who can record activities and minutes of meetings; a treasurer who is honest and trustworthy in keeping track of expenses; and a president who can provide leadership and direction for the group.

Since the project provides revolving funds, it has also developed managerial skills in small agri-business.

B. Transfer of technology consists of delivering packages of technology for the specific users. It usually involves the designer of the technology, extension worker and linkages.

When the group of women agreed to undertake the project with funding support, they manifested:

* Positive attitudes towards the use of the technology and confidence in themselves that they can undertake the project.
* A better understanding of project management, monitoring and evaluation.
* A cooperative spirit among the community as evidenced by the sharing of the multi-purpose center and the road improvement project.
* Community involvement in innovation and experimentation by maximizing the use of the presser for other crops like ginger and corn for added income.

The use of income generating activities for promotions and technology transfer affected not only the women but also the:

a. Extension worker, who served as mobilizer.
b. Designer of the technology, who found it easier to get people to accept the technology.

PROBLEMS, RECOMMENDATIONS AND CONCLUSIONS

Problems

1. The peace and order situation in the province hindered regular monitoring.
2. Wild pigs destroyed the crops in the far fields.

3. There is a long slack period before arrowroots can be harvested and processed.
4. Low price of starch during the peak season affected processing activities.

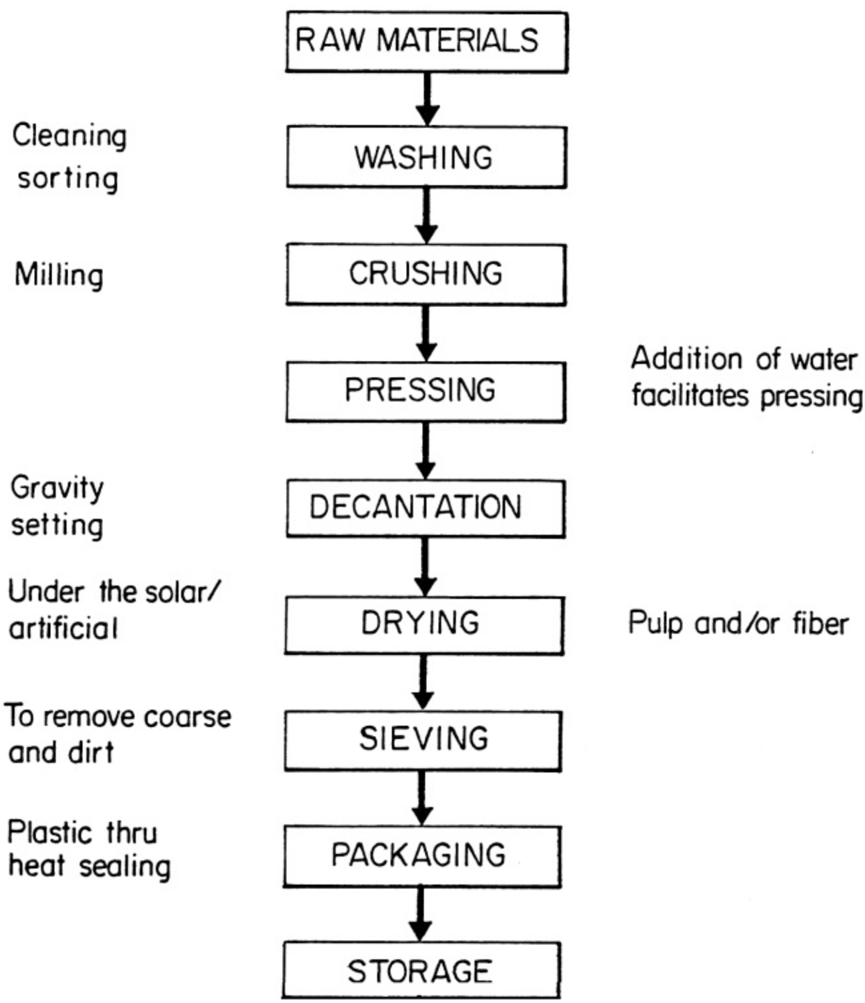
Recommendations

1. Arrowroots could be processed, then stored. Selling the starch should be done during the lean months (when the product is in great demand and the supply is low).
2. Women should create new uses for arrowroot starch other than for making cookies. Testing arrowroot starch for sauces, emulsifiers or binders and native kakanin may create market demand.
3. Since arrowroot is a long term crop, women have to engage in other income-generating activities during the slack period.

Conclusions

1. The arrowroot production and processing project is a viable undertaking although the women have to wait for ten months before they can start processing.
2. The identified and requested technology (presser for processing arrowroot) motivated women to engage in the production and processing of arrowroot.
3. The social preparations done at all levels (barangay, municipal, provincial and national) resulted in participatory planning, implementation and evaluation.
4. The availability of resources - land, credit, manpower technical assistance, infrastructure, identified market outlets - is a factor of success of the arrowroot project.
5. Peer teaching and on the spot learning approaches enable easier and wider transfer of technology.
6. The process used in the arrowroot project can be replicated using other crops.

This is the: **Processing Flow Chart**

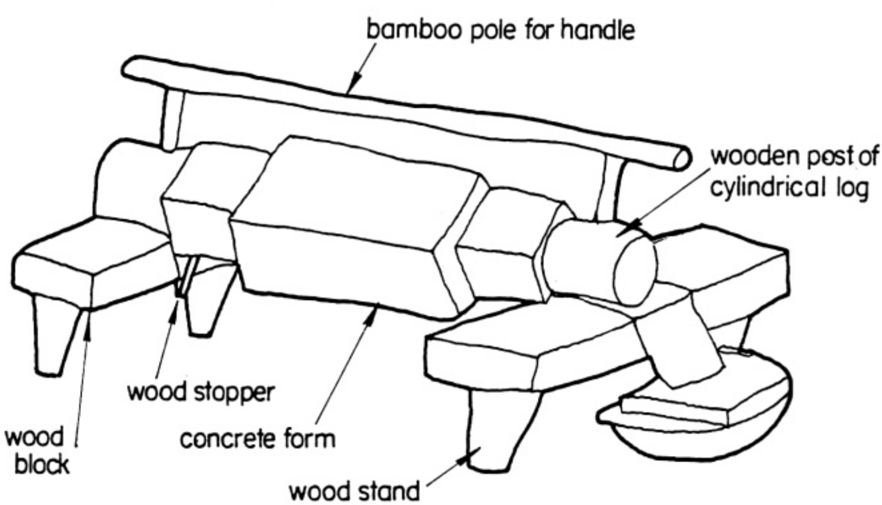


THE COMMUNITY PRESSER

Description of the presser
The presser is made of cement molded around a heavy six feet cylindrical log. The molded cement for weight needed to crush the arrowroot, in four (4) feet long and one foot thick. The protruding ends of the log rest against two thick parallel slabs of timber. Concrete posts support the slabs of timber and the presser. Steel handles are attached to the concrete mold. Galvanized iron roofing protect the presser and the workers from the natural elements. The processing unit was built near the water source.

How the presser functions
Two or four women take turns in moving the presser to and fro (forward and backward) by holding on to the steel handles. The clean arrowroot are swiftly placed under the protruding ends of the log crushing and pressing them. In the process, the juice with the starch and the pulp fall into large basins placed under the presser.

Twenty-five (25) kilograms of arrowroot can be pressed in five minutes.



Women in root crop technology

Monina M. Escalada and Salome G. Binongo*

INTRODUCTION

Rationale

Besides being important crops in subsistence farming, root crops have emerged as a promising cash crop for the small farmer. In subsistence farming, cassava and sweet potato are important crops because of their versatility and usefulness. Root crops can thrive and produce modest yields in marginal areas where rice and corn cannot be grown successfully. They can also tolerate diverse environmental conditions. As such, idle lands not suited for rice and corn can be profitably utilized for root crop production (PCARRD, 1984 and 1979).

Cassava and sweet potato are reliable substitutes or supplements for rice and corn, especially in low income households. In the uplands, root crops are an important part of the farmer's diet.

With the substitution of cassava chips for yellow corn in animal feed and cassava flour for wheat flour, root crops will help conserve precious foreign exchange since these will reduce corn and wheat imports.

The increasing value of root crops to small farmers emphasizes the importance of assessing selected root crop technologies. Moreover, the need to take into account the small farmer and the rural people in the design and

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development of appropriate agricultural technology has been pointed out by Castillo (1983) when she suggested that agricultural technology should be humanized.

It is therefore necessary to examine and understand farmers' perceptions of the technology and the process through which the technology diffuses to them and to the rest of the community. Information on farmers' response to or acceptance of recommended root crop varieties is a significant input in any breeding program. Likewise, data on the diffusion process of recommended varieties among farmers would guide policy makers and extension workers in the planning and management of technology diffusion activities.

Finally, an investigation of the contribution of household members, particularly women, in root crop farming systems, will provide definite indications of the role women play in agriculture which could lead to optimal involvement of women in agricultural production. Economic quantification of women's contribution to agriculture and greater utilization of family labor has employment implications.

Research Objectives

The research project reported in this paper seeks to:

1. examine the process of diffusion of indigenous and improved root crop varieties developed by PRCRTC-ViSCA, UPLB, and BPI among farmers;

2. determine farmers' response to and adoption of the following root crop varieties:

   a) indigenous and recommended sweet potato varieties: UPL Sp-1, UPL Sp-2, BPI Sp-1, VSP-4

   b) indigenous and improved cassava varieties

3. determine the performance of indigenous and improved root crop varieties on farmers' fields.

METHODOLOGY

Scope of the Research

Although several root crop technologies have already been developed by the Philippine Root Crop Research and Training Center (PRCRTC), Visayas State College of Agriculture (ViSCA), UP at Los Baños, and Bureau of Plant Industry (BPI), only root crop varieties are the focus of this research.

The criterion used in the selection of this technology is its representativeness in terms of the different stages of technology development and dissemination. Indigenous and recommended sweet potato and cassava varieties are mature technologies in the sense that these can be adopted by farmers on their own without the need for external assistance.

Respondents

Although the list of trainees in root crop production and recipients of planting materials include a little more than 20 percent non-farmers such as personnel of the Department of Agriculture (DA) businessmen, teachers, employees of private companies, and others, this research is addressed to farmers who cultivate and grow root crops.

Sampling Scheme

Due to the limited resources of this research project, the study areas are concentrated around geographical locations where PRCRTC, UPLB, and BPI have disseminated their root crop varieties. Tentatively, these comprise Leyte, Southern Leyte, Bohol, Laguna, and Bicol provinces. A combination of purposive and stratified random sampling procedures were followed in drawing the respondents. The total sample size of farmer-respondents was set at 240.

Research Design

Both quantitative and qualitative research approaches were utilized in order to meet the research objectives. The quantitative approach will rely on the use of a semi-structured interview schedule to collect data from respondents. The qualitative part will deal with the process aspects of diffusion in order to trace the sequential flows of root crop varieties as they spread through a community.

Research Instrument

Using the list of variables as a guide, an interview schedule was developed in order to obtain quantitative data on respondents' socio-economic characteristics, diffusion, and performance of the technology. An interview guide for experiment or testing stations staff was also prepared to look into the possible diffusion of the technology from the experiment stations to other farmers.

PRELIMINARY RESULTS

Involvement of Household Members in Root Crop Technology

The data used in this paper are the initial findings of the study on technology assessment. Two groups of respondents were included in the study: the sweet potato growers and cassava producers. Generally, most of the activities in the farm are done by the male members of the family, particularly the husbands. However, other family members such as the wife and the children also perform some of the farm activities.

Procurement of Planting Materials

For both crops, procurement of planting materials is done mostly by the husbands as revealed by the respondents. Of the 29 sweet potato growers interviewed, 66 percent reported that the task is performed by the husbands, 14 percent by the wives and 17 percent by the children (Table 1). Of the 27 cassava producers, 19 or 70 percent indicated that planting materials are secured by the husbands, 14 or 52 percent by the wives, and 16 or 59 percent by the children.

Land Preparation

Land preparation is done by plowing the field. This task is performed most of the time by the husband as stated by 78 percent of both the sweet potato and cassava producers interviewed (Table 2). Forty-eight percent of the sweet potato producers claimed that the wives, as well as the children also assist the husband in preparing the land. Assistance of the wives is usually needed among farmers with limited areas to cultivate and with no working animals. This supports the findings of Alcober et al. (1986) in their study on gender roles in upland crop production. They found that assistance of the wives is needed especially in cases where the children are not yet capable of helping in the farm and in cases where the producers cannot afford to hire laborers.

Weeding/Soil Cultivation

Weeding and cultivating are done by most respondents. Majority of the sweet potato producers (62%) claimed that weeding is done by the husbands, while the rest (45%) stated that weeding is done by the wives and children (Table 3). Just like land preparation, weeding is considered to be a man's job, and is probably the reason why it is done mostly by the male members of the household, particularly the husbands.

Pest Control

Of the 29 sweet potato and 27 cassava producers interviewed, only one sweet potato and two cassava growers practiced pest control which involved application of insecticides (Table 3). Both producers reported that all members of the household are involved in the task.

Fertilizer Application

Only 10 sweet potato producers and 11 cassava growers applied fertilizer (Table 4). Of these farmers, majority reported that the activity is done mostly by the husbands with assistance of the wives and the children.

Harvesting

Harvesting is usually done on a staggered basis. Most of the sweet potato producers (29%) reported that the husbands are mainly the ones doing the activity, while the rest (21%) claimed that the wife also assist in harvesting (Table 5). About 18 percent of the sweet potato producers also reported participation of children in harvesting. For the cassava producers, 70 percent revealed that harvesting is undertaken by the husbands; wives, 67 percent; and children, 59 percent.

Processing

Only seven sweet potato producers and five cassava growers practiced processing. All of these farmers said that the wives are the ones who are really involved in processing. Two cassava producers claimed that husbands also assist the wives in processing rootcrops. The wives' high involvement in rootcrop processing can be attributed to the fact that cooking and food processing are tasks generally performed by the women in the household. Also, for most women, processing rootcrops is considered as a source of income.

Marketing

Majority of the rootcrop farmers interviewed market a portion of their produce (Table 8). For both the sweet potato and cassava growers, marketing activities and decisions related to marketing of farm produce are usually made by the wives since they are the ones who generally take charge of matters related to money in the household.

SUMMARY

The findings indicated that women are involved in rootcrop production. It was observed that women have more participation in farm operations which do not require much physical effort on their part or in activities which are less strenuous. Other particular activities where women are also involved include harvesting, marketing and processing. Usually, decisions related to marketing and processing are made by the wives.

Implications

As revealed by the preliminary results reported in this paper, women assume greater roles than men in processing and marketing of root crops. An important implication of this finding is on the selection of priority clientele of training programs. With women performing more of the processing and marketing functions in root crops, extension efforts could be geared more to women instead of purely men, which has been the case in most training programs in agriculture.

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Table 1. Involvement of household members in the procurement of planting materials.

MEMBERS INVOLVED	SWEET POTATO N=29		CASSAVA N=27	
	Number	Percent*	Number	Percent*
Husband	19	66	19	70
Wife	14	48	14	52
Children	17	59	16	52

* multiple responses

Table 2. Involvement of household members in land preparation.

MEMBERS INVOLVED	SWEET POTATO N=29		CASSAVA N=27	
	Number	Percent*	Number	Percent*
Husband	20	78	21	78
Wife	14	48	13	48
Children	14	48	14	52

* multiple responses

Table 3. Involvement of household members in weeding and soil cultivation

MEMBERS INVOLVED	SWEET POTATO		CASSAVA	
	N=29		N=27	
	Number	Percent *	Number	Percent *
Husband	18	62	18	67
Wife	13	45	13	48
Children	13	45	13	48

* multiple responses

Table 4. Involvement of household members in controlling pests.

MEMBERS INVOLVED	SWEET POTATO		CASSAVA	
	N=29 *		N=27 *	
	Number	Percent	Number	Percent
Husband	1	3	2	7
Wife	1	3	2	7
Children	1	3	2	7

* Of the total number of respondents, only 1 sweet potato farmer and 2 cassava farmers practice control of pests.

Table 5. Involvement of household members in fertilizer application.

MEMBERS INVOLVED	SWEET POTATO		CASSAVA	
	N=29 *		N=27 *	
	Number	Percent	Number	Percent
Husband	10	34	11	41
Wife	8	26	a	30
Children	5	17	a	30

* Only 10 sweet potato farmers and 11 cassava producers applied fertilizer.

Table 6. Involvement of household members in harvesting.

MEMBERS INVOLVED	SWEET POTATO		CASSAVA	
	N=29		N=27	
	Number	Percent *	Number	Percent *
Husband	23	79	19	70
Wife	21	72	18	67
Children	18	62	16	59

* multiple responses

Table 7. Involvement of household members in root crop processing

MEMBERS INVOLVED	SWEET POTATO N=29*		CASSAVA N=27*	
	Number	Percent	Number	Percent
Husband	0	0	2	7
Wife	7	24	5	19
Children	0	0	0	0

*Only 7 sweet potato farmers and five cassava farmers processed root crops.

Table 8. Involvement of household members in marketing.

MEMBERS INVOLVED	SWEET POTATO N=29		CASSAVA N=27	
	Number	Percent*	Number	Percent*
Husband	8	28	7	26
Wife	22	75	21	78
Children	3	10	3	11

*multiple responses

Participation of rural women and children in handwatering agriculture for crop diversification

Fermina T. Rivera*

INTRODUCTION

Women are said to have (a) initiated the art and science of farming by being the first to have domesticated plants, (b) viewed farming problems in their totality from seed selection, gathering and sowing to ultimate utilization as food/feed, fiber and fuel, and (c) played a key role in the conservation of basic life systems such as land, water, flora and fauna (Swaminathan, 1985). In rice-farming systems in the Philippines women's participation in farming has been observed to be increasing. This underscores the growing importance of rural women (RW) in intensified farming enterprises today. Probably, rural women must have played an equally significant role in the advancement of handwatering from primitive to modern farming despite the fact that the dug-well irrigation component remains crude.

Children's participation in handwatering agriculture is included in this study because most RW studies mentioned that under the women's supervision, children are partners in the family enterprise. Children have generally augmented the women's contribution to household income. In Philippine farms, RW-children/father-children cooperation in farming is

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also culture-bound. (The author is not aware of any study on farm children's share in rice-farming system operation and innovation; hence no related literature can be included in this report.)

Objectives

This study sought to describe RW's and children's participation in multicrop handwatering within rice farming systems. More specifically, the objectives of the study were to:

(1) determine the structure and processes of handwatering agriculture for crop diversification, and the place of RW and children in them;
(2) find out the relationship of RW's and children socio-demographic attributes with technology and living levels of farm households;
(3) relate family attributes, fertility and multicrop handwatering; and
(4) describe RW connections in and outside the rice farming systems.

Handwatering Agriculture in the Philippines

Little is known about handwatering agriculture in the Philippines, and the role rural women and children play in it. For most handwatering families squeezing in another crop after wet rice has high economic value, for this means survival. Since RW generally hold the family purse they are the first to know their dire situation if it happens, and probably also the first to initiate action on how to improve it. Learning about their problems and perspectives can yield lessons for rationalizing irrigation water management for crop diversification within rice farming systems.

As one travels through the whole length of the Philippines, one observes that the whole year round, oasis subsistence and cash crops are mostly manually irrigated (see Table 1). No known record exists when hand-dug wells for agriculture were first used in the Philippines. Older farmers in Pangasinan however recalled that handwatering of "batik" (native tobacco), used as ingredient in most manufactured cigars/cigarettes/chewing tobacco, dates back to the Spanish era. Early Filipinos used to handwater tobacco for Spaniards who occupied vast Royal Land Grants. Pangasinan to this day is known as the home of the best tobacco farmers in the country. Tarlac, where the other research site is found, on the other hand, is known as the home of fine "pakbit" farmers, an allusion to the resilient Ilocano farmers who by dint of industry and frugality are said to have saved their families from hunger during the dry months (so-called "tuyot" or "gawat").

Hand-dug wells for crop diversification have been used for thousands of years in many countries of the world but have become less popular with the advent of tube wells (Gibson and Singer, 1969). Interest in dug wells has been revived in developing countries because they hold much promise for areas with marginal water supply and suitable soil resources. Countries like India, Afghanistan (India Ministry of Food and Agriculture, 1962) and Bangladesh (Bhuiyan, 1983) had seriously reconsidered tube well and dug well irrigation as integral components of their food security program. In recent years, these wells have gained popularity with the introduction of new materials and construction equipment (National Academy of Sciences, 1974). As cost of energy becomes prohibitive, and for poor farmers without any access to government or private communal irrigation systems, hand-dug wells will continue to be the cheapest source of water and is likely to prevail for years to come.

Small-scale individualized irrigated agriculture is increasingly becoming important today in man's bid to produce more food. Some people have already suggested that in the next decade, water, instead of limited land and soil resources, will be the major constraint for increasing food production. When nature is niggard, the most important ingredient of rural/agricultural development program design and implementation is optimum management of human resources. In this instance, RW's and children's participation in rice farming system must be taken into account.

Swaminathan (1984) asserts that within social equity objectives, greater scientific attention should be given to resource poor farmers. Growth with social justice will not result unless the small farmers who constitute the majority of the rural poor are brought into the development stream. Aware of the small farmers' socio-economic situation in Asia, majority of whom are said to be living truncated lives, suffering from disease and malnutrition (Umali, 1984), this researcher conducted this study on RW and their families practicing small-scale watering for crop diversification.

TOWARDS A STRUCTURAL FARMING SYSTEM RESEARCH APPROACH TO THE STUDY OF HANDWATERING AGRICULTURE

This study was undertaken within the context of a farming system research and development (FSRD) general framework (See Fig. 1), incorporating a social structure theory (Blau, 1975). This refers to the farm-oriented holistic approach for viewing and studying farming conditions along the production-consumption continuum. As shown in the figure, the FSRD approach recognizes the bio-physical and socio-economic sub-systems of rice-farming and focuses on significant interrelationships.

The main objective of FSRD is the wholistic improvement of farm conditions. Its thrust is on-farm action research in which the small farmer and his family become a major input in on-farm technology documentation/testing and outcome. In this approach, basic assumptions are taken:

(a) from a historical perspective, the farm families who engage in rice-farming have full ecological awareness which gravitates on their decisions to utilize or not utilize a promising component or mix of technology;
(b) farm households adopt/discard traditional/new cropping systems which would best meet their requirements for procreation and living; and
(c) the welfare of every farm family is a small farmer's ultimate reason for being and working.

In accounting for gender issues in an FSRD framework, the first critical step in studying handwatering agriculture within rice farming system improvement and the role of RW and children in it, is to amplify current cropping system research (CSR)/FSR methodology (Norman, 1978; Banta, 1980; de Datta, 1983). This is because the current

CSR/FSR tradition has been mostly from technology generation to pre-production on-farm trials which focus on the farmers' perspective only to the exclusion of RW and children and incorporation of relatively newer component technology, like soybean, wheat or cattle and goat. By and large, a small enterprise is a family system that has to take into account the entire household resource (human and institutionalized, natural and produced). In this kind of conceptualization, the RW and children connection in and outside the rice farming system is readily established.

Figure 2 provides an idea of how handwatering agriculture within rice farming systems and the participation of RW and children were studied. This methodology consists of five phases namely: (a) site selection and description; (b) farmers and RW/children respondent selection and description; (c) handwatering multicrop selection and description, structure and processes description and analysis; (d) RW diffusion and adoption, concept determination and evaluation; and (e) estimation of RW and children participation and contribution to farming system improvement action (see Fig. 2).

For more than three generations, handwatering agriculture must have gone through a process of evolution, as a result of instinctive adaptation to both natural and man-made environment and use of systematized knowledge and better skills/tools. This CSR/FSR modified methodology is used to accommodate RW and children in the total handwatering agriculture system study to test its efficacy as a procedure for addressing gender issues in development, and to give due credence to irrigation water management (IWM) and indigenous crop diversification (CD) practices that have been there for generations. A practice that remains a practice for generations must have a reason for being, and it is the explanation to this stability that we seek. Present national efforts in FSRD using a regional integrated agricultural research system (RIARS) approach can derive principles of technological innovation and implementation, from this age-old handwatering multicrop system.

METHODOLOGY

Research Site Selection and Description

Site selection. The potential research sites were identified as those in which handwatering agriculture is more widespread. Study site selection procedures consisted of:

- formulation of criteria for barangay selection and use of such criteria for screening and final selection of research sites to be included in the study;
- preliminary reconnoissance and rural immersion;
- identification/selection of sites where handwatering using dugwells is most dominant;
- listing of potential research sites as sampling frame;
- tentative cluster/random selection of potential research sites;
- rapid appraisal of community and handwatering agriculture.

Criteria for barangay selection:

- Sizeable farming population engaged in handwatering
- Contingent farms devoted to selected handwatering cropping systems
- Subsistence/semi-commercial scale handwatering multicrop
- Generally peaceful and accessible
- Local leaders and people generally supportive

Site description. Data on population, bio-physicals, and agroeconomic, mostly from secondary sources were collected to characterize the research sites (see Table 2.). Histories and legends were also gathered from key informants to describe the place.

Farm Household Selection and Description

A farm household was selected if it is:

- engaged in handwatering multicrops.
- willing to participate in the study, field level workshop/farmer-researcher feedbacks and data validation.
- also planting rice.

Farm household profile. Characterization of farm households consisted of descriptive items as follows: family/household size/structure and members' attributes such as age, years in school and crops farm activities undertaken, labor use and occupational patterns, income, farm resources available, farm size, cropping systems.

Handwatering Multicrop Selection and Description

Handwatering multicrop design, structures and processes documented are those in which RW users have a general consensus as to their potential for improving farm life. Handwatering multicrop patterns are selected on the basis of dominance in Luzon, Philippines, which suggests environmental suitability, technical, economic feasibility, socio-cultural compatibility and acceptability.

Handwatering Practice and Contribution of RW and Children

The degree and extent to which farmers utilize indigenous and newer recommended component technologies was assessed. RW and children participation and contribution to farm incomes and benefits derived were determined by looking into certain relationships of RW and children, attributes and living/technological levels.

Data Gathering

Data requirements for the study were of two types: primary and secondary. Rapid rural appraisal techniques, limited survey/ monitoring of a sub-sample of farm households and their handwatering activities were used. A field level workshop (FLW) was availed of as a panel/Delphi technique for quickly generating preliminary consensus/information upon which to base decisions on field research and development operations. Results were useful for keeping project monitoring.

Data taken from primary and secondary soarces were synthesized and introduced as feedback/feed forward to target clientele/technology innovation facilities during the FLW.

Problem Identification and Prioritization

Problems of handwatering families and communities were identified and prioritized by undertaking the following activities: (a) secondary data retrieval synthesis and analysis; (b) getting "expert views" on handwatering agriculture using key informant technique; (c) conducting a series of interconnected FLW's involving people of different managerial levels (as field, middle, and top) and multi-structured groups representing hierarchical/intergroup elements - extension workers, researchers. senior and junior staff, etc; (d) survey of handwatering families and their communities; (e) monitoring of a few handwaterers on hand-dug well farming operations; and (f) limited participant observation.

Solution Exploration

The "tapak-tapak" (treadle foot pump) as solution to a water delivery problem was simultaneously considered in this study. This foot-operated pump is a Bangladesh model and was identified by the experts of the Department of Agriculture-International Rice Research Institute Extension Program for Small Farm Equipment as having potential for the improvement of hand-dug well irrigation in the Philippines. It was used as a means to study diffusion of a technology innovation among handwatering families and communities. More importantly, the study assessed its relevance to hand-dug well farming within the RW and children adoption model.

Data Analysis

The research design used was a one group one shot survey/documentation of handwatering cash/subsistence crops in Luzon, Philippines. Data analyses used were largely structural, consisting of frequency distributions, percentages, arithmetic mean, Chi-square, Spearman correlation, cost and return, and demographic-anthropological distinctions.

Hypotheses tested were the following:

1. No relationship exists between handwatering family living and technology levels and household attributes.
2. Fertility as an important aspect of human/RW and children agroecosystem is a function of desired family size, education and income.
3. No relationship exists between the two groups with regards to the biophysical, psychosocial and technological problems met by them.

DISCUSSION OF RESULTS

National Profile of Handwatering Agriculture

Data on handwatering agriculture in Luzon was studied vis a vis its practice in the entire country. Based on Table 1, the following observations were made:

(a) Most handwatering communities were in Region I, 645 barangays; Region IV, 621; Region VI, 509; Region IX, 382; and Region XI, 260. In terms of the three geographical divisions, Luzon (Regions I, II, III, IV, and V) leads in number of towns/barangays engaged in handwatering;

(b) All over the country, dug-well farming is a prevailing indigenous technology. Crops planted were vegetables, legumes and root crops;

(c) All regions had handwatering agriculture during the dry months, and a few practiced year-round manual irrigation. Ground/ surface water close to or in potential handwatering areas was used for income generating projects. Handwatering agriculture is widespread and contributes to farm family/rural economy.

The Research Sites as Population Centers

Population density. Relation between population size and area occupied are specified in terms of persons per square kilometer and the population growth rate as increases in population from 1903 to 1980 (Table 3). The concept of limit is used here but as the size of population approaches the limit, social and technological innovations might be stimulated more (Hardsty, 1977). Population density of Camiling ranges from 400-600 persons per sq. km. while that of Alcala ranges from 300-400, both much higher than the national average of 250 persons per sq. km. (NCSO, 1980). At the village level, as in the case of Sta. Maria, population density is around 175 per sq. km.

The Agrarian Community Structure. Sta. Maria is one of the oldest barangays in Luzon. Located on the southeastern part of Camiling (see Fig. 3), it is more than a century old, having been established in 1876.

The name Sta. Maria was derived from the patron of the early dwellers, the Virgin Mary. It occupies a total land area of 513 ha., 185.7 ha. or 36% of which are devoted mostly to rice farming, vegetables, sugarcane, cassava and corn. Other land uses are: residential, 6% and institutional forest, 3%. Of the total population of 1509, excluding transients, (mostly students), more than 50 (3%) are professionals, and 28 (2%) of family heads and elder children are working in Hawaii, US, Canada and the Middle East. It is interesting to note that at the time of the study, four big concrete houses owned by workers abroad were being constructed. Generally, the returning dollar-earners have also become informal sources of credit.

Principal sources of livelihood are farming (80%); employment (10%); business (7%); pensioners (2%); and livestock raising (4%). A portion of Sta. Maria lies some 200 m along the national highway. The newly asphalted provincial road enters into the heart of the barangay, 1.5 km. in length which ends at a cemented bridge leading to the interior. Before reaching Sta. Maria, one traverses the Tarlac Agricultural College campus site. At the center of the barangay are the multipurpose hall, health center, plaza with a basketball court which is also used for drying palay, the Catholic chapel, and the waterworks system which brings piped water to at least 20 houses. Houses are built along the national highway, provincial and barangay roads and some along the Bayating River, considered the life blood of many people. The river which runs through the barangay can be crossed by means of one cemented and two hanging iron bridges.

A barangay, like Sta. Maria or Macayo, is the smallest political unit in the Philippines. Its chief development officer is the barangay captain who is assisted by the District Councilmen and brigades (committees) in the management of purok affairs and implementation of government social welfare and development programs.

Toilet facilities which are either water sealed or pit privy are owned by majority of households while the rest (11%) have no such facilities. Seventy percent (70%) have electricity and the others use kerosene/LPG for lighting. For cooking food, wood is mostly used, with a few using electric and LPG stoves.

Macayo, the second research site is one of the five barangays of Alcala, Pangasinan. It is isolated by the Agno River from the town proper but has progressed from a mere sitio (small district) of Gualsic (another village) to a full fledged barangay in 1938. No one can tell exactly when handwatering agriculture in this area started. Macayo is around 2.5 kms. away from the poblacion of Alcala. Its main link to the national highway at Carmen, Pangasinan is the Bayambang-Villasis road dike which traverses the whole length of the barangay. Its distance from the Mac-Arthur Highway at Villasis is about 11 kms. Macayo has a land area of about 325 hectares, all plain and fertile alluvial agricultural area. About 80% is devoted to agriculture, 10% to residential, and the remaining 10% to school ground forest areas.

It has a "sitio" named Sta. Cruz with an area of about 30 hectares and populated by around 15 families. It is located southeast of the barangay proper.

The soil is sandy loam which farmers have observed to have high moisture holding capacity. The climate is moderately cool during the wet season from June to November, and pleasantly warm from December to May. The riverside portion of the barangay had its last flood in 1972 while the main site being protected by a dike, had been safe from floods since 1970.

Water for domestic needs come mainly from manualized tubewells at 10-15 m. water table depth. Almost every household owns one and water for agriculture comes from hand-dug wells, rivers, creeks and lift motorized pumps. A few farmers also used manualized tubewells/hand pumps called "poso" as source for handwatering their tobacco and vegetables.

The last population census in 1980 yielded 1026 people, an increase of only 37 since 1975. This small increase is attributed to the fast rate of migration of some families to Mindanao, Manila and the Middle East. For every working individual, there are on the average three dependents. About 80% of the total land area are suited to farming with the following major crops: (a) native tobacco; (b) corn; (c) rice; (d) eggplants; (e) peanuts; and (f) camote (sweet potato). Major backyard animal raising includes carabao, cattle, goat, swine, native duck and chicken.

Households with toilet facilities which are either water sealed or pit privy number 163 or 75% and those without comprised 55 or 25%. Electricity is enjoyed by majority of farm households.

Both Macayo and Sta. Maria are Ilocano speaking, since most of the populace originated from the Ilocos provinces. Ethnicity may be one important factor why to this day handwatering, like them, has become resilient. In the map, the two villages appear to be contiguous. Travel time from Macayo to Sta. Maria via the Bayambang rough road is around one hour.

Hand-dug Well Resources. Dug wells measure 0.93 and 0.88 in diameter in Tarlac and Pangasinan, respectively. Average water table depths ranged from 2 to 3 m and were deepened some more when these receded as the handwatering season continued (see Table 4).

The depth of water of 30 wells in Tarlac dropped by an average of 0.83 meters for a period of 40 days, from February to April 1984. The rate of recession was lower for 22 wells in Pangasinan. In 60 days the water table in these wells declined by about 0.46 m only. One possible reason was the fact that tobacco uses less water and was usually handwatered for about 2-3 times only depending on weather conditions until harvest time. Eggplant needed more handwatering as it needs daily watering for the first week and every 3-4 days thereafter.

Dug wells were sometimes deepened by an additional 0.5 m to hit the receding water table depth as the handwatering season continued and sometimes re-excavated by an additional 1.5 m to obtain water. Two farmers, one in each site, constructed a second well near the original dug well which had collapsed/dried up. Two to four dug wells were perceived by farmers of eggplant and other drought resistant crops. Tobacco farmers actually used one well for about 1.0 m since they used each others dug well by turns.

Ordinarily the dug well was located on one side of the field and there seemed to be implicit agreement on its location as there was a good scatter of the dug wells around the area. There were 2-3 users of a dug-well besides the owner who in turn also used other farmers' dug wells. Sometimes conflict of use arose especially in cases where one used the dug well which dried up before the owner could finish watering his plants.

Crop Area Handwatered. Information on area planted to vegetables and other crops in Tarlac is shown in Table 5. Eggplant, "ampalaya" (bittergourd) and tomato were the most common handwatered vegetables. They are the major ingredients of "pakbit", a favorite Ilocano vegetable dish. Farmer-respondents in Pangasinan also planted "pakbit" plants along the periphery of their tobacco farms, the area and number of which were not studied in detail.

Handwatering Practices. A family member starts to handwater as soon as he/she is big enough to lift water from the dug well, carry water in cans from the dug well to the crop area, and water vegetables. Some farmers and their wives said that family handwaterers start as early as 7 years although most of those found working were 10 years or older.

Some form of water scheduling and assignment to RW and children was adopted to apportion the scarce water. Both eggplant and tobacco received water individually. Handwatering was done by tying a small can at the end of a bamboo pole; when filled with water this was lifted up and poured in a bigger empty kerosene which can be used for bringing water to the plants. The general practice was to apply approximately 100 liters of water to 1000 hills of tobacco per irrigation. For eggplant more water per plant was used.

Three vegetable farmers watered their plants very early in the morning around 3:00 AM to avoid the hot sun, and also to avoid crowding at the dugwell by other users. Crops watered in the morning were no longer watered in the afternoon. Families followed a 2-3 day shift of handwatering. Each member in a shift spent 2-4 hours handwatering. Among the vegetables planted by small farm producers, eggplant was the most intensively watered, followed by bittergourd (native small rounded ones) and tomato. The rest, okra, patola, squash, mungbean, were all drought resistant and needed almost no handwatering.

As expected, handwatering families distributed among their male and female members various farming activities. As a whole, based on percentage contribution to each farming activity more family labor was used in handwatering, harvesting and planting/cultivating/weeding vegetable. The farmer-operator had the greatest handwatering participation followed by the wife and children. Planting vegetable was spread to several days or weeks so as to stagger harvesting dates, and allocate water and available family labor efficiently.

The crop production-marketing consumption link in which RW and children stand to benefit most influenced the use of the following strategies: (a) staggered and off season planting; (b) planting as many plants in one patch of land and (c) efficient management of available water and RW/children labor. Small farm producers perceived better chances of attaining good price for vegetables if production/ marketing was staggered. Stretching the cropping days also meant more number of days with food on the table for the family.

Participation of RW and Children in Handwatering Agriculture. As shown in Tables 6 and 6-a, RW contributed 20%, and children, 16%, of the total labor used in handwatering tobacco. In handwatering vegetables RW and children's contribution in terms of hours spent for each activity was 29% and 21% respectively. Percentage-wise, more labor hours were in vegetable farming than in tobacco production.

Tight cash flows and the desire to maximize profits to meet family needs did not warrant the use of both hired and exchange labor. Family labor was allocated based on age, sex and position of member in the family. Men and older members generally undertook relatively more difficult and risky farming activities. Lighter farming tasks were for women and younger children.

The tobacco farmers were sometimes assisted by their wives and older children in spraying and pruning their crop. Pruning was said to be a delicate operation which needed skilled hands while spraying was found to have its own hazards and the farmer-operator took the cudgels for whatever dangers chemical handling may entail.

Marketing of produce by RW was timed with their regular trips to the market. These trips were always pleasant occasions not only for marketing but also for visiting relatives. Whenever there was a good price for vegetables, the extra money left is spent on eating in a favorite "carinderia" (fast food) and on shopping for good bargains.

Marketing of tobacco was done jointly by farmer and wife, and generally, is done right in the barangay/farm household. A "comprador" buying agent (ahente) or the trader himself brings his truck to procure/haul the tobacco.

Family Size. Fertility and Crop Diversification. At the societal and community level, population increases also appear to have both significant and contradictory impact on benefits from agricultural development. Intensification of farming suggested by handwatering multiple crops in particular and IWM for crop diversification in general means greater agricultural labor requirement as compared to rainfed rice (see Tables 11 and 11a).

Table 7 shows data on fertility of handwatering RW in relation to couples educational attainment, family size and income. Observations from this table support the following previous relevant findings:

(a) Higher fertility has always been associated with farming and other low ranking occupations, as in the case of Pangasinan, where family size is higher than the national average of five.

(b) The higher the educational attainment the smaller is the number of children. The general trend of fertility being negatively associated with income level was negated by the results of this study. In the case of both the Tarlac and Pangasinan RW, there was a trend towards a positive relationship between income and fertility. The data showed that greater agricultural production accompanied higher fertility.

In some studies, there were indications that the higher the income, the higher the fertility rates. In this instance intensive use of labor may spur higher fertility or higher fertility may heighten small farmers' imagination and sensitivity to greater ecological awareness and innovativeness to provide for basic needs.

Based on national and local demographic data available, the 3.8 fertility rate of the Tarlac women is lower than the, national (4.5), Central Luzon (4.1), and Ilocos (5.0) rates of child-bearing reckoned by the time they are 50 years old. The 5.2 fertility rate of the Pangasinan women is higher than any of above cited rates.

Structural Attributes of Handwatering Families. As shown in Table 9, handwatering families were tenants or had mixed tenurial status. Quantitatively the Tarlac and Pangasinan households differed on selected attributes (see Table 10). Tarlac households were relatively smaller units, had younger children and hence more dependents, smaller households and better educated parents. Tarlac households also had higher scores in living and technology levels appraised in terms of more priced material possessions (furniture, etc.) and farm equipment (sprayer, etc.).

Important structural variables of farm households as shown in Table 11 significantly correlate to higher technology and level of living. These variables are parents, age, children's ages and years in school, and dependency ratio. Dependency ratio as used in this study is the proportion of household members less than 10 years to members more than 10 years old. The latter group comprises the potential handwatering labor force.

Educational Aspirations and Achievement. Rural women see schooling as a way out of poverty. Both parents and children view education as giving higher status and prestige. They would send children to school by all means. Handwatering families were no exception with regard to their high educational aspirations for their children. How they were able to provide opportunities for educational achievement of their children in spite of limited means is shown in Table 8. As shown some Tarlac and Pangasinan handwatering families managed to send their children to school up to the tertiary level.

Benefits from Manual Irrigation of Subsistence/Cash Crops. To assess benefits from handwatering agriculture, 14 farm households practicing rice-vegetable multicropping enterprises in Tarlac site, and 11 farm households engaged in the rice-tobacco-corn cropping pattern in Pangasinan, both comprising dominant cropping systems in Luzon, Philippines, were analyzed. As shown in Table 14, manually irrigated tobacco was a top grosser contributing 73% to total value of output and 81% to total farm household income. This was a much higher value occurring from either upland rice and native white corn, the latter being used to augment subsistence needs for rice.

On the other hand, the contribution of handwatering eggplant to total farm household income was around 7% while contribution to total value of crops planted was 61%.

Cost and return analysis (Tables 12 and 12a) of the component in the cropping system studied showed that the net surplus from manually irrigated crops, tobacco (P12,552) and eggplant (P10,216) on a per hectare basis was much higher than the rainfed in Tarlac (P6,333).

Over-all perceived benefits (see Table 14) derived from tedious handwatering were: food improvement (62%); children's education (51%); acquisition of material possessions (43%); augment needed daily expenses (38%); and purchase of rice farming inputs (23%).

Percentage-wise the contribution of RW in terms of labor-hours input per farm may be estimated at P480 (29% of total output for vegetables and P3,500 (20% of total output for tobacco). Adding contributions of children would amount to P830 (50%) for vegetables, and P2,670 (36%) for tobacco.

Major Problems as Perceived by Handwatering Families. Major problems and issues in handwatering agriculture (as shown in Table 15) were those that were mentioned by no less than 20% of farm families studied. Common areas of concern of vegetable and tobacco producers were: to the Tarlac group, the top three priority problems pertained to marketing, water resources and meager income; to the Pangasinan group, these were capitalization, meager income and labor intensiveness of "batik" technology. Since vegetable production needed more handwatering than native tobacco farming, a technological innovation like the "tapak-tapak" for water drawing and delivery was perceived by Tarlac farmer-respondents to be appropriate for farm use. Whichever commodity enterprise was considered, however, meagerness of income to meet high cost of living and provide capital for production, fragmentation of farms, drudgery of water-drawing techniques used and tenurial systems, may have contributed to the hardships faced by the handwatering families in attaining better living levels.

Farm families also identified marketing problems suggestive of the type of government interventions required to help them improve their capability to secure better margins of profit. For vegetable producers, these problems include (a) low price for farm produce, oversupply of vegetables at peak harvest; (b) high transportation cost for bringing vegetables to market; (c) poor market facilities/very little space for selling own farm produce; (d) high rates of ticket charges for use of crowded, unsanitary market space.

For native tobacco farmers, specific marketing problems were: (a) no direct market links (They always deal with the "comprador" or buying agents); (b) no permanent tobacco buyers and no buyers for low grade tobacco; (c) real price of tobacco remains a secret and cannot sell to the trader who gives the best price due to vertical production-market links where the farmer is forced to sell at prices at the financier's bidding; (d) unfair grading of tobacco; (e) long delays in the payment of tobacco, issuance of post-dated checks which could be encashed only after 25-30 days.

In "batik" production, where the average area cultivated was around one hectare, required material and labor inputs ranged from P4000 - P6000. The "amo" (financier-buyer)-tobacco farmer tandem facilitated by the local "comprador" was reinforced because of the need for scarce capital which the farmer could not provide himself. The importance of having a "suki" or permanent buyer assured the farmer of a steady market but low price for tobacco. This further strengthens the monopolistic production-marketing relations.

Capital needed for subsistence vegetable production was relatively small and hence production-marketing integration did not prosper.

Vegetable produce was considered inadequate by Tarlac families to tide them over during the dry season or until the wet rice crop and other crops were harvested.

RW and children perceived themselves to be living a hand-to-mouth existence at certain periods of the year especially during lulls in farm activities. A good rice-vegetable cropping system was always an occasion for thanksgiving. Reasons given on the tight fix they sometimes found themselves in were: (a) low productivity of land; (b) lack of capital for generating more income; (c) high cost of living and farm inputs; and (d) low price of farm products and fruit-worm infestation of eggplants which resulted in 30-50% eggplant rejects. One solution RW found was to feed eggplant rejects to 1-2 fattening swine. Farmers based the price to be set for farm products on the cost of a bag of fertilizer which was always higher than a bag of palay. For RW, their measures were the price of some commodities like sugar, coffee, vegetable oil and soap.

Tobacco farmers also experienced the economic crunch. Their inability to fight the rising cost of living was perceived to be a result of (a) poor production due to inability to cope with high input cost; (b) inability to combat tobacco diseases; (c) vagaries of nature, such as flood, typhoon and drought; (d) no other means of livelihood except rice-tobacco farming; (e) only 1-2 family members having regular but meager income; and (f) unfair product sharing.

SUMMARY AND IMPLICATIONS FOR POLICY RESEARCH AND ACTION

RW and children work long hours in the various stages of crop and animal care and disposal, in addition to time spent in household chores. Their participation and contribution, especially in rice farming systems, in augmenting farm household income and technology innovation, and benefits they derived from them, have not been fully documented.

On the other hand, crop diversification where they are observed to be playing important roles, and which appears more labor intensive than rice production, is being pushed as a strategy of intensifying farming operations and increasing small producers income in the light of scarce resources.

It was thought that studying handwatering agriculture, and the place of RW and children in such task would be able to accomplish several things at once:

(a) document handwatering by small producers in the Philippines;
(b) address the social equity issue in technology innovation and development vis-a-vis subsistence farming and RW/children as partners in rural/agricultural progress;
(c) evolve a rice farming system methodology from RW's and children's viewpoints; and
(d) explain the interconnections of policy, research and action in tackling current RW's and children's development issues.

Summary of Findings

The structural approach to the study of handwatering agriculture within rice farming systems and social equity framework yielded the following information:

(a) Handwatering agriculture seems to be as complex as the total agriculture endeavor itself. The important role RW and children play, is an intricate one. This can be described in terms of the population, household and agrarian community structures, the handwatering practice itself within farm resource endowments and constraints. Important structural variables of RW and children linked to level of living and technology were age, rice farming experience and education.

(b) RW's fertility determinants which support results of previous studies were: low occupational status, educational status and income. RW attributes in Luzon, however, tended to have different relationships. The higher the production and income, the higher the fertility rates.

(c) Decision-making is multi-structural and hierarchical. So many different perspectives come into play when deciding on technology design, extension and development. The utility of the tapak-tapak pump as a technology for handwatering was viewed in different ways. Tarlac and Pangasinan RW viewed the "tapak-tapak" as important to their domestic water needs especially for washing clothes. Tarlac farmers, on the other hand, considered the pump important to intensive handwatering of eggplants. The tobacco farmers did not consider it a priority technology in their farm business as their soil moisture and selection of drought-resistant plants were better strategies.

RW and children felt left out in the design of farming technology. They perceived the "tapak-tapak" pump as tailor-made for men.

Rural women and children contributed substantially to handwatering multicrop enterprises. Their inputs in crop diversification within rice farming system improvement should be accounted for. Crop diversification improved the employment situation of the family as labor may be said to be efficiently used.

The link of RW and children to the farming system technology improvement is via their key roles in household income augmentation and their marketing activities.

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Table 1. National profile of handwatering agriculture by region[a] as of December, 1985.

Region	No. of towns[b]	No. of Brgys.[c]	Crops	Month[d]	Source of water
1 Ilocos	58	645	Vegtables, legumes, grains tobacco, cotton	All year round; Jan.–June; Oct.-Dec.; July–Dec.	dugwell, creek, spring, brook river, lift pump (manualized/ motorized), deepwell, irrigation canal
2 Cagayan Valley	22	65	Vegetables, legumes, root crops, onions	All year round	dugwell, creek, spring, brook, river, lift pump (manualized/ motorized), irrigation canal
3 Central Luzon	35	127	Vegetables, legumes, root crops, tobacco	Jan.–April; Sept.–Dec. Jan.; May–July; Nov.–Dec.	dugwell, creek, river, earth dam, lift pump (manualized) run–off irrigation canal
4 Southern Tagalog	90	621	Vegetables, legumes, root crops, grains, tobacco, sugarcane, onions, garlic	All year round Oct.–May; Jan.–June; Jan–Sept.; Sept.-Dec.; Oct.-Dec.; Nov.-Dec.	dugwell, creek, spring, pond, river, lift pump (manualized/ motorized); artesian well, irrigation canal, faucet, Laguna Bay
5 Bicol	37	117	Vegetables, legumes, root crops, grains	All year round; Feb.–Sept. Jan.–Oct.	dugwell, creek, spring, river, liftpump (manualized); irrigation canal
6 Western Visayas	68	509	Vegetables, legumes, root crops, grains, tobacco, sugarcane, coffee, cacao	All year round; Dec.–May Jan.-May; May–Jan.; Mar.-April	dugwell, creek, river, lift pump (manualized)

Table 1 . . . (continued)

7 Central Visayas	25	107	Vegetables, legumes, root crops, onions	All year round; Mar.-June; Dec.-April; Aug.-Dec.	dugwell, creek, spring, river, lift pump (manualized); artesian well; deep well, irrigation canal, faucet
8 Eastern Mindanao	32	103	Vegetables, legumes, root crops, garlic	All year round; July-Oct.; Jan.-Oct.	dugwell, creek, spring, river, lift pump (manualized), irrigation canal
9 Western Mindanao	59	382	Vegetables, legumes, root crops, grains, onions, coffee, cacao	All year round, Jan. -June; Nov.-Dec.; Jan.-April; Oct.-Dec.; Apr.-Nov.	dugwell, creek, spring, river, earthdam, lift pump (manualized/ motorized) artesian well, deepwell, irrigation canal, faucet
10 Northern Mindanao	18	157	Vegetables, legumes, roots crops, onions, coffee, cacao	All year round, Feb-May	dugwell, creek, spring, brook, river, lift pump(manualized/ motorized), run-off, artesian well, deep well, irrigation
11 Southern Mindanao	27	34	Vegetables, legumes, grains	All year round; Oct.-Dec.; July-Oct.; April-June; March; June	Creek, spring, river, lift pump (manualized), run-off. deep well
Total	524	3127			

[a]Based on Ministry of Agriculture and Food Agricultural Officers (63 out of 76) report.

[b]No handwatering: Region IV - Aurora Sub-province; Region V - Albay, Legaspi City; Region VII - Negros Oriental; Region VIII - Northern Samar; Region X - Agusan del Norte and Surigao del Norte; and Region XII - Maguindanao and Sultan Kudarat.

[c]No report: Region I - Abra and Ilocos Norte; Region II - Batanes, Cagayan and Isabela; Region IV - Palawan; Region V - Masbate; Region VI - Guimaras; Region VIII - Biliran; Region IX - Bongao, Tawi-Tawi; Region X - Agusan del Sur, Bukidnon and Misamis Oriental.

[d]Some provinces have year round handwatering. some a few months each year, specially during the dry season.

Table 2. Important features of agroecosystem in research sites, Luzon, Philippines, 1983.

	Sta. Maria (Tarlac)	Macayo (Pangasinan)
People [a]		
Ethnical origin	Ilocos	Ilocos
Total population/No. of households	1509,268	1026, 164
Average household size	5 - 6	5 - 6
No. of rice farmers	231	154
No. of handwaterers	64	61
No. of landless	56	38
Climate		
Average rainfall [b]	1931.3	2248
No. of wet months	7(May-Nov)1803	7(May-Nov)2112
No. of dry months	5(Dec-Apr)128.3	5(Dec-Apr)136
Evaporation (mm/day):		
May - Nov.	5.8	5.8
Dec.- April	5.6	5.6
Soil Characteristics [c]		
Texture	heavy	heavy
Type	clay/sandy loam	clay/sand loam ("lapoc")
Color	gray	reddish brown
pH	6.09	5.5 - 6.8
Organic matter	0.5	0.5 - 1.5
Potassium	65	8 - 24
Phosphorus	35	135 - 168

Table 2 . . . (continued)

Crop	Eggplant	Native tobacco ("Batik")
Growth duration (days)[d]	100 - 140	
Water requirements (mm)	250 - 500	
Geographical location[b]	150°41 'N 120 25'E	16 03'N 120 20'E
Topography	flat, with a few hilly areas	flat
Ave. farm size (ha)	1.6	1.8
Water resources[a]		
Manualized lift pump	201	100
Dug wells	68	70
Piped water	20	0
Shallow pump	4	2
Excreta disposal[a]		
Water sealed	183	94
Pit privy	56	39
Without toilets	29	31

[a] Barangay census, Sta. Maria and Macayo (NBOO. 1982).

[b] IRRI Agroclimatic data bank; 1951—1970, Dagupan City; 1921—1932, Tarlac.

[C] Bureau of Soils, Tarlac, Tarlac; Dagupan City.

[d] FAO. 1975, 1979; no available data for native variety.

Table 3. Population growth rates and changes, Luzon, Philippines, 1903—1980.

Census Year	Camiling (Tarlac) TDiff[a]	TP	GR[b]	TDiff	Pop Ch %	Alcala (Pangasinan) TDiff[a]	TP	GR[b]	PDiff	Pop Ch
1903		25243					9008			
1918	15	23375	0.51	(1868)	(7.4)	15	9054	0.03	46	0.51
1939	21	25824	0.47	2449	10.5	21	12697	1.61	3643	40.23
1948	9	33935	3.03	8111	31.41	9	17064	3.28	4367	34.40
1960	12	40536	1.48	6601	19.45	12	20297	1.45	3233	18.95
1970	10	49156	1.93	8620	21.27	10	22208	0.90	1911	9.42
1975	5	52411	1.28	3255	6.62	5	24376	1.86	2168	9.76
1980	5	53860	0.5	1449	2.76	5	24993	0.5	617	2.53

Source: NCSO, 1980

Legend: TDiff = Time difference; GR = Growth rate; TP = Total population;
PDiff = Population difference; Pop Ch = Population change; ( ) means decrease

[a] Time difference is just an estimate as the census date was taken in different months of the year and varied year differences, e.g. 1975 census was taken in May 1 and the 1980 census, in May 6. From 1903 to 1970 the time difference of census year was 9 to 21 years, etc.

[b] $GR = \ln \frac{(Pn - Po)}{(tn - to)} \times 100$: where GR = growth rate; ln = log of population difference divided by the time difference multiplied by 100.

Table 4. Characteristics of dug wells and handwatering practice, Luzon, Philippines, 1983.

Descriptive Item	Handwatering communities	
	Sta. Maria (Tarlac)	Macayo (Pangasinan)
Average number of dug wells/farm	1	1
Wells		
Average diameter, m	0.93	0.88
Average depth, m	2.24	2.24
Discharge capacity, li/min[a]/	3.2	3.2
Number of wells/farm	1—2	1—2
Average service area/well/ha	.06	.81
Perceived number of wells/ha	3—4	2—3
Average area handwatered	.07	.81
Perceived adequate number of dug wells per hectare	3—4	2—3
Average number of months in which dug wells have water during regular season	4—5	5—7
Construction cost, mainly food items	₱5—10	₱5—10
Number of hours to construct (hrs.)	4—6	4-6
Pattern of labor use	Family (father, son)	Family (father, son)
Average number of other users of dug well	2—3	4—5
Number of times repaired, deepened	1—2	1

Table 5. Area planted by crops (Tarlac, 1983).*

Crop	Months	Area planted (sq.m.)	Mean area planted (sq.m.)	No. of observations	% area planted	% farmer planting
Rice	June–Oct.	158,500	14,409.09	11	100	100
Eggplant	Dec.–May	10,948	995.27	11	35	100
Tomato	Dec.–May	4,305	430.50	10	14	91
Ampalaya	Dec.–May	5,030	503	10	16	91
Squash	Dec.–May	1,183	169	7	4	64
Patola	Dec.–May	1,214	202.33	6	4	54
Sitao	Dec.–May	2,233	319	7	7	64
Okra	Dec.–May	434	72.33	6	1	54
Camote	–	435	217.50	2	1	18
Cotton	Dec.–May	2,640	2,640	1	8	9
Upo	Jan.–Dec.	143	143	1	0.45	19
Mungbean	Dec.–April	2,455	306.88	8	8	73
Corn	April–May	637	318.50	2	2	18

* Most of the farmers are planting more than one crop.

Table 6. Division of labor per farm in vegetable production (Tarlac, 1983).

ACTIVITIES	Mandays/Farm Operator	Wife	Children	Other Member	Hired	Total
TARLAC						
Eggplant (N=ll; Ave. Area = .09)						
Seedling/seedbed preparation	0.22	–	0.07	–	–	0.29
Plowing/Sagad/ Tudling	0.29	–	0.12	–	0.04	0.45
Planting	0.83	0.63	0.73	0.10	0.07	2.36
Pumping	0.05	–	–		0.26	0.31
Cultivating/ weeding	1.18	0.65	0.67	–	–	2.50
Fertilizing	0.82	0.31	0.07	0.07	–	1.27
Chemicals	1.08	0.11	0.39		–	1.58
Handwatering	5.87	3.54	2.55	0.04	–	12.0
Harvesting/hauling/ marketing	4.04	3.42	1.55	–	–	9.01
Total	14.38	8.66	6.15	0.21	0.37	29.77
Percent of participation	48.30	29.08	20.65	0.70	1.24	

Table 6-a. Division of labor per hectare in vegetable production (Tarlac, 1983)

ACTIVITIES	Mandays/Farm Operator	Wife	Children	Other Member	Hired	Total
Tarlac						
Eggplant (N=ll; Ave. Area = 0.09)						
Seedling/seedbed preparation	2.44	-	0.80	-	-	3.24
Plowing/sagad/ tudling	3.22	-	1.33	-	0.44	4.99
P1anting	9.22	7	8.11	1.11	0.80	26.24
Pumping	0.55	-	-	-	2.88	3.43
Cultivation/ weeding	13.11	7.22	7.44	-	-	27.77
Fertilizing	9.11	3.44	0.80	0.80	-	14.15
Chemicals	12	1.22	4.33	-	-	17.55
Handwatering	65.22	39.33	28.33	0.44	-	133.32
Harvesting/hauling/ marketing	44.8	38	17.22	-	-	100.10
Total	159.75	96.21	68.36	2.35	4.12	330.79
Percent of participation	48.29	29.08	20.66	0.71	1.24	

Table 7. Selected family attributes and fertility (Tarlac and Pangasinan, 1983).

Research Site	Income/Farm*	Ave. number of years in school		Family size	Fertility rate
		Father	Mother		
Tarlac	₱ 14,748	7.1	6.6	5.43	3.78
Pangasinan	₱ 15,553	6.3	5.8	7.02	5.16

*Includes income from all sources.

Table 8. Educational aspirations and achievement, (Tarlac and Pangasinan, 1983).

	Tarlac (N=51)			Pangasinan (N=46)			Total (N=97)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
In school	41	32	73	51	39	90	92	71	163
Out of school	34	25	59	23	27	50	57	52	109
Not of schoolage	13	18	31	23	27	50	36	45	81
College/vocational graduate	6	13	19	7	8	15	13	21	34
Total	94	88	182	104	101	205	198	189	387
	X2=7.6ns	1.53ns	9.13*	6.87ns	1.33ns	8.2*	14.47**	2.86ns	17.33**

Table 9. Tenurial status by parcel and farm size.

Tenurial status	TARLAC				PANGASINAN				TOTAL			
	No. of farm H-holds	No. of parcels	Farm size (ha.)	Percent	No. of farm H-holds	No. of parcels	Farm size [ha.)	Percent	No. of farm H-holds	No. of parcels	Farmsize (ha.)	Percent
Full owner	3	5	3.85	6.00	4	5	3.85	9.09	7	10	7.70	7.45
Lease	4	15	8.10	8.00	2	2	2.15	4.54	6	17	10.25	6.38
Tenant	7	19	7.99	14.00	20	37	24.01	45.45	27	56	32	28.72
Borrowed	2	3	1.75	4.00	-	-	-	-	2	3	1.75	2.13
Family	1	2	0.75	2.00	-	-	-	-	1	2	0.75	1.06
Combination:												
owner-amortizing	-	-	-	-	1	3	5.00	2.27	1	3	5.00	1.06
owner-leased	-	-	-	-	1	2	1.75	2.27	1	2	1.75	1.06
owner-tenant	12	40	17.14	24.00	3	6	4.03	6.82	15	46	21.17	15.96
owner-borrowed	3	8	4.58	6.00	-	-	-	-	3	8	4.58	3.19
owner-family	6	19	10.85	12.00	-	-	-	-	6	19	10.85	6.38
owner-mortgaged	2	4	3.31	4.00	3	17	13.63	6.82	5	21	16.94	5.32
tenant-borrowed	3	7	3.09	6.00	1	4	2.80	2.27	4	11	5.89	4.26
tenant-family	1	2	1.0	2.00	2	5	3.56	4.54	3	1	4.56	3.19
tenant-leased	-	-	-	-	2	8	8.10	4.54	2	0	8.10	2.13
tenant-mortgaged	-	-	-	-	1	3	2.15	2.27	1	3	2.15	1.06
leased-borrowed	-	-	-	-	1	2	0.45	2.27	1	2	0.45	1.06
borrowed-family	1	2	0.52	2.00	-	-	-	-	1	2	0.52	1.06
family-rented	1	3	2.20	2.00	-	-	-	-	1	3	2.20	1.06
owner-tenant-leased	-	-	-	-	2	7	4.05	4.54	2	7	4.05	2.13
owner-tenant-mortgaged	-	-	-	-	1	7	3.80	2.27	1	7	3.80	1.06
owner-tenant-family	2	8	3.60	4.00	-	-	-	-	2	8	3.60	2.13
tenant-borrowed-leased	1	3	1.0	2.00	-	-	-	-	1	3	1.0	1.06
owner-borrowed-family	1	4	1.25	2.00	-	-	-	-	1	4	1.25	1.06
Total	50	144	70.98	100	44	108	79.33	100	94	252	150.31	100

Table 10. Profiles of farm households.

Household attributes	Sta. Maria (Tarlac)					Macayo (Pangasinan)				
	No.	Mean	SD	Sum	Range	No.	Mean	SD	Sum	Range
Farm size	50	1.6	1.1	97.7	0.3—4.8	44	1.8	1.7	80.0	0.25—6.3
Parcel number	50	2.7	1.3	135	1—7	44	2.4	1.8	107	1—9
Household size	51	5.0	1.8	253	2—9	46	6.2	2.6	285	1—12
Farmer age	51	43.3	11.2	2209	22—74	46	43.6	13.8	2006	20—75
Wife age	51	39.9	11.6	2036	19—73	43	41.6	11.4	1787	21—70
Total children age*	51	58.7	50.8	2905	0—195	43	63.9	52.7	2683	0—190
Farmer school	51	7.1	2.9	363	0—14	46	6.3	2.6	289	0—11
Wife school	51	6.6	2.8	338	2—14	44	5.8	2.7	253	0—12
Total children school**	5	24.41	22.4	1245	0—85	42	25.3	24.7	1061	0—46
Farming experience	51	22	13.8	1126	2—64	46	21.3	12.7	981	1—53
Dependency ratio***	51	0.6	0.5	29.9	0—2.0	46	0.5	0.6	23.3	0—3.0
Level of living	51	9.2	4.2	469	2—20	46	8.0	4.7	370	2—20
Level of technology	51	1.9	1.4	94	0—6	46	1.8	1.1	84	0-5

* Summation of ages of all children in households.

** Summation of years in school of all children in households.

*** Ratio of children in households 10 to 10 years old.

Table 11. Labor input per farm/ha in handwatering vegetable in Tarlac (1983) as compared with rainfed rice in Central Luzon (1981).

Activities	Eggplant Mandays/ farm	Eggplant Mandays/ ha.	Rainfed rice Mandays/ ha.[c]
Seedbed/seedling preparation and care	0.29	3.22	7.20
Plowing/harrowing/furrowing	0.45	5	12.40
Transplanting[a]	2.36	26.22	20.40
Pumping	0.31	3.44	-
Weeding/replanting/cultivating	2.50	27.78	5.80
Fertilizing	1.27	14.11	0.90
Insecticide application	1.58	17.56	1.60
Handwatering	12.0	133.33	-
Harvesting/hauling/ marketing[b]	9.01	100.11	19.90
Total	29.77	330.77	68.20
Net Income (₱)	₱1013.00	₱10216.00	₱2092.34[d]
Ave. area (ha)	0.09		1.21
No. of monitored farmers	11		45

[a] Includes pulling and bundling seedlings for rainfed rice.

[b] Harvesting, threshing, weighing, drying and marketing labor are lumped for rainfed rice.

[c] Based on labor inputs by Cordova, 1981.

[d] Based on results of economic analysis of rainfed rice in Nueva Ecija (Rivera, et al. 1983).

Table 11—a. Labor input per farm/ha on handwatering tobacco in Pangasinan (1983) as compared with rainfed rice in Central Luzon (1981).

Activities	Tobacco Mandays/ farm	Mandays/ ha.	Rainfed rice Mandays/ ha.e
Seedbed/seedling preparation and care	2.99	2.96	7.20
Plowing	2.08	2.06	4.60
Harrowing/furrowing	2.80	2.78	7.80
Transplanting[a]/	16.10	15.98	20.40
Fertilizing	9.09	9.02	0.90
Insecticide application	3.43	3.41	1.60
Handwatering	6.63	6.58	-
Weeding and replanting	1.99	1.97	5.80
Pruning	6.33	6.29	-
Harvesting[b]/	20.59	20.41	18.30
"punglot" (1st 4—6 leaves)	1.10	1.09	-
"liso" (7th-12th leaves)	9.89	9.81	-
"batik" (top 4—6 leaves)	9.60	9.51	-
Hauling[c]//sorting	3.65	3.62	1.6
Sticking	11.79	11.69	-
Drying	1.55	1.54	-

Table 11—a . . . (continiued)

Total	89.02	88.31	68.20
Net Income (P)	12,650	12,552	2.092.34[d]
Ave. area (ha.)	1.01		1.21
No. of monitored farmers	14		45

[a] Includes pulling and bundling seedlings for rainfed rice.

[b] This includes both harvesting and threshing, labor for rainfed rice.

[c] Weighing, drying and marketing labor are lumped for rainfed rice.

[d] Based on results of econanic analysis of rainfed rice in Nueva Ecija (Rivera et al. 1983).

[e] Based on labor inputs by Cordova, 1981.

Table 12. Cost and return analysis of rice—vegetable cropping system. (Tarlac. 1983).

TARLAC	₱/farm	₱/ha.	Factor share
Rice (N=ll; Ave. area = 1.44)			
Total value of output	14009	9722	
Cost of production			
Labor cost	1820	1263	12.99
Material cost	1292	897	9.23
Pump cost	32	22	0.23
Power cost	113	78	0.80
Land use cost	1626	1129	11.61
Total cost	4883	3389	34.86
Returns on variable cost	9126	6333	65.14
Eggplant (N=ll; Ave. area = 0.09)			
Total value of output	1652	16669	

Table 12 . . . (continued)

Cost of Production			
Labor cost	410	4138	24.82
Fertilizers	82	826	4.96
Insecticides	108	1091	6.54
Pump cost	39	398	2.39
Total cost	639	6453	38.71
Returns on variable cost	1013	10216	61.29

Table 12—a. Cost and return analysis of rice—tobacco—corn cropping system, (Pangasinan, 1983).

PANGASINAN	₱/farm	₱/ha.	Factor share
Rice (N=14; Ave. area = 0.83)			
Total value of output	3041	3645	
Cost of production			
Labor cost	370	443	12.15
Material cost	764	915	25.10
Power cost	46	56	1.54
Land use cost	626	750	20.58
Total cost	1806	2164	59.37
Returns on variable cost	1235	1481	40.63
Tobacco (N—14: Ave. area = 1.01)			
Total value of output	17421	17285	

Table 12—a . . . (continued)

Cost of production			
Labor cost	1165	1156	6.69
Fertilizers	1593	1580	9.14
Chemicals	485	481	2.78
Power cost	172	170	0.98
Land use cost	1356	1346	7.79
Total cost	4771	4733	27.38
Return on variable cost	12650	12552	72.62
Corn (N=14; Ave. area = 0.67)			
Total value of output	1608	2407.49	
Cost of production			
Labor cost	119.36	178.71	7.42
Material cost	110.21	165.03	6.85
Power cost	43.29	64.81	2.69
Land use cost	389.21	582.78	24.21
Total cost	662.07	991.34	41.18
Returns on variable cost	946	1416.15	58.82

Table 13. Contribution of manual irrigation to farm household income.

LOCATION	No. of obser- vations	Months planted	Total area (ha.)	Ave. area planted (ha.)	Total value of crops planted/ farm (₱)	Total exp/ farm(P)	Ave. net income/ farm (₱)	% contri- butions
TARLAC								
Rice (IR-36) (IR-42)	11	June-Oct.	15.85	1.44	14009	4883	9126	62
Eggplant	11	Nov.-May	1.09	0.09	1652	639	1013	7
Off-farm	11	Jan.-Dec.	-	-		-	1187	8
Non-farm	11	Jan.-Dec.	-	-		-	3422	23
Total			16.94	1.53	15661	5522	14748	100
PANGASINAN								
Rice (IR-36) (IR-42)	14	June-Oct.	11.68	0.83	3041	1806	1235	8
Tobacco	14	Oct.-April	14.11	1.01	17421	14771	12650	81
Corn	14	April-May	9.35	0.67	1608	662	946	6
Off-farm	14	Jan.-Dec.	-	-	-	-	229	2
Non-farm	14	Jan.-Dec.	-	-	-	-	493	3
TOTAL			35.14	2.51	22070	-	15553	100

Table 14. Perceived benefits of hand watering multicrop enterprises.

Benefits	Tarlac (N = 51)		Pangasinan (N = 46)		Total (N = 97)	
	No.	%	No.	%	No.	%
Food improvement	31	59.61	30	65.21	61	62.24
Children's education	24	46.15	26	56.52	50	51.02
Material possession	21	40.38	22	47.32	43	43.37
Daily expenses	33	63.46	4	8.63	37	37.75
Rice farming inputs	4	7.63	19	41.30	23	23.46
Savings	5	9.61	1	2.17	6	6.12
Others: (purchase of land, backyard, piggery, can buy things you want, able to pay the loan, support the family)	5	9.61	2	4.34	7	7.14

Table 15. Perceived problem areas of farm families engaged in handwatering agriculture.

Problem areas	Tarlac (N = 51)		Pangasinan (N = 46)		Total (N = 97)	
	No.	%	No.	%	No.	%
Rigid marketing	45	98	19	37	64	66
No inadequate capital for generating additional income	17	37	34	67	51	53
Meager income and high cost of living	18	39	24	47	42	43
Not dependable water resources	21	46	16	31	37	38
Laborious	17	37	18	35	35	36
High cost of inputs	13	28	14	27	27	28
Insect infestation	12	26	8	16	20	21

$X^2 = 18.28$ .05 12.59*

.01 16.81**

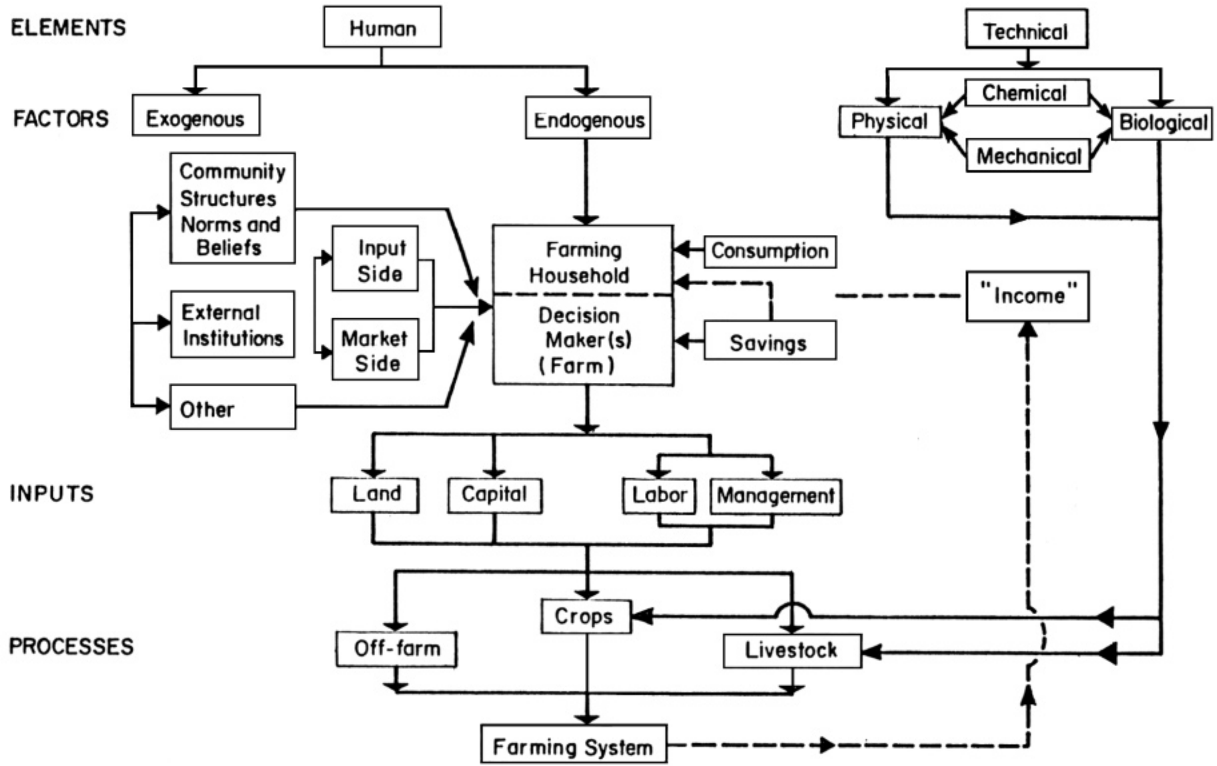

Fig. 1. Some determinants of rice farming systems and their interrelationships.

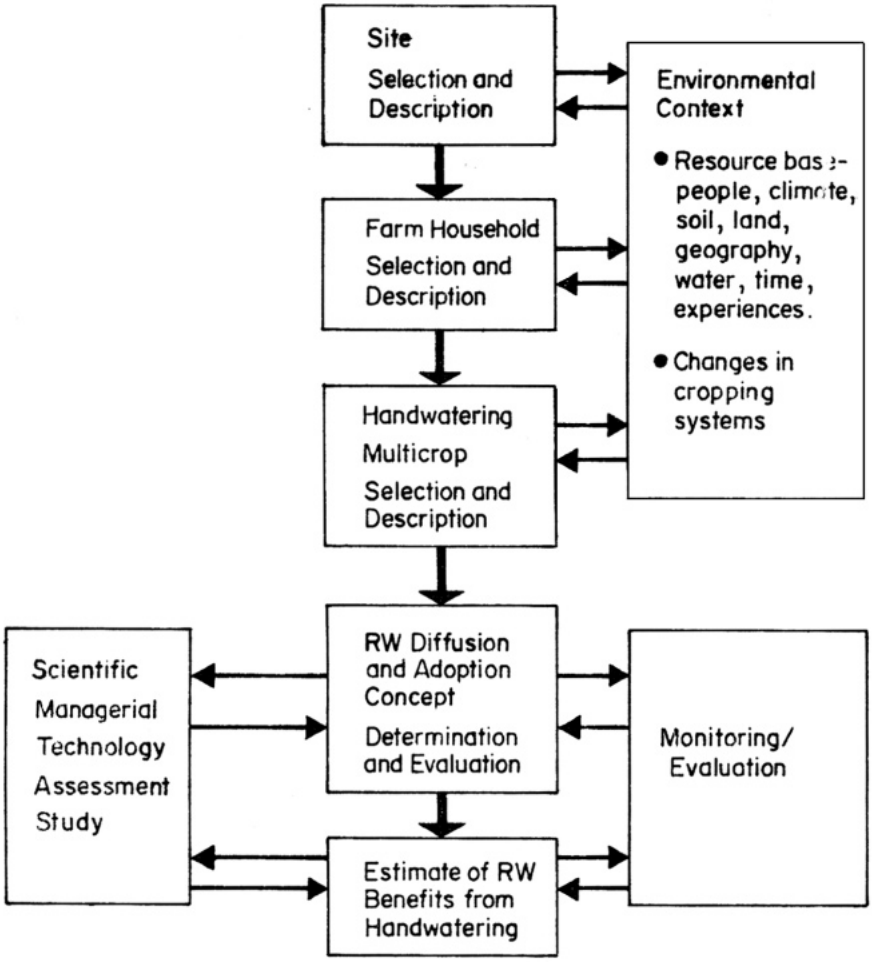

Fig. 2. Framework of studying handwatering agriculture with rice farming systems.

A pilot school on–the–air on Integrated Pest Management over radio DZLB for men and women rice farmers in the Philippines

Teresa Habito Stuart*

INTRODUCTION

A pilot school on-the-air (SOA) on Integrated Pest Management (IPM) was aired over radio station DZLB of the University of the Philippines at Los Baños from January 6 to March 7, 1986. Insights from this pilot SOA will be used in designing communication strategies that can better serve rice farmers' information needs on crop protection and in planning agricultural communication programs that integrate the role of rural women in the program development process. The SOA is a major component of a proposed communication strategy designed to help both men and women rice farmers to understand the concept and value of IPM technology.

Objectives
The general objective of the SOA was to systematically and progressively provide the participant-enrollees with knowledge on the concept, value and application of IPM in rice

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production over an eight-week period in order to find out to what extent they gained knowledge from this communication strategy.

The study focused on comparing the performance of the women rice farmers with that of the men to ascertain their potential as participants in the diffusion and adoption of the IPM technology.

The specific objectives were to:

1. pilot the school-on-the-air format as a broadcast communication support to IPM technology diffusion and adoption among men and women rice farmers in Laguna province;
2. determine the degree to which the enrollees gained knowledge on IPM from the SOA;
3. compare the performance of men and women enrollees in the SOA.

Research Hypothesis

It was hypothesized that there will be no difference in the performance of women participants from that of the men in the pretest, quizzes and post test.

It was also hypothesized that the women and men will not differ in terms of the degree of change in their level of knowledge on the subject matter.

Lastly, it was hypothesized that the school on-the-air format is an effective medium for increasing the participants' level of knowledge on IPM.

THE SCHOOL ON-THE-AIR METHODOLOGY

Pre-Broadcast Activities

Consultation Meetings. Consultations were held with the director of the Regional Crop Protection Center (RCPC), Region IV and with IRRI entomologists.

The RCPC agreed to assist the SOA by:

1. involving the Dev Com 160 students in the IPC training to provide them an overview of the IPM concept and the IPC training methodology for farmers;
2. identifying the field personnel who will be involved in the enlistment of SOA participants and who will help conduct follow-up (feed-back) activities while the school is in progress;
3. providing assistance in the development of ten-minute radio lectures in Pilipino in cooperation with the DZLB scriptwriters;
4. providing the school lecturer who shall deliver the lectures over the air and who shall answer feedback questions sent by the participants.

The IRRI entomologists agreed to assist the SOA by:

1. providing a three-hour briefing on IPM to the students and instructors of Dev Com 169 and Dev Com 160;
2. identifying topics to be included in the school on-the-air and verifying the technical accuracy of the lectures.

Class Training on IPM. The pilot school on-the-air on Integrated Pest Management was the project of the class in Educational Broadcasting (Dev Com 169) during the second semester of schoolyear 1985-86 at the UPLB. The course is taken by undergraduate and graduate students who are taking Community Broadcasting as their major field for the B.S. or M.S. degree in development communication.

The 14 students who were enrolled in DevCom 169 during that semester, together with the students taking Communication Campaigns and Programs (DevCom 160, a core course for all B.S. Devcom students) and their instructors, invited a senior entomologist from the International Rice Research Institute (IRRI) who is involved in IPM field research, to provide them with a three-hour overview of IPM.

On December 12 and 13, 1985, the 20 students who were enrolled in DevCom 160 attended the Integrated Pest Control (IPC) Training/Workshop together with province surveillance officers of Region IV at the Regional Crop Protection Center headquarters at Los Baños, Laguna. These IPM experiences enabled the students to understand the concept and importance of IPM and hence the necessity of communicating it to the farmers. The DevCom 160 students took part in the pre-broadcast activities of the SOA-IPM. They assisted the DevCom 169 students in the listenership campaign and in the administration of the audience survey and pretest instrument. These activities also served as their pre-planning field exposure for their class project on planning IPM communication campaigns.

Pre-broadcast activities were conducted from November 7, 1985 to January 14, 1986, as shown in the schedule below.

SCHEDULE OF PRE-BROADCAST ACTIVITIES

Activity	Date
1. Consultation Meetings	
1.1 IRRI	November 7,14,25, 1985
1.2 RCPC	November 19,29 and December 9, 1985
2. Class Training on IPM	
2.1 IPM Briefing by IRRI (DevCom 169 & 160)	November 15, 1985
2.2 IPC Training/ Workshop by RCPC (DevCom 160)	December 12 & 13, 1985
3. Preparation of	
3.1 Audience Research Instrument	November 18-22, 1985
3.2 Pre-test Instrument	November 26-29, 1985

4. Listenership/ Enrollment Campaign	November 30- December 7, 1985
5. Administration of	
5.1 Audience Survey	November 30 to December 21, 1985
5.2 Pre-test Instrument	November 30 to December 21, 1985
6. Preparation of IPM Lecture Text	December 2-28, 1985
7. Verification of Text for Technical Accuracy	December 21,1985 to January 6, 1986
8. Preparation of Lecture Scripts	December 21, 1985 to January 17, 1986
9. Taping of Lectures	January 7-14, 1986

Listenership Campaign

The first field visit was made on November 30,1985 to invite participants from the rice farming communities of Bay and Calauan, Laguna. The students and staff also took this first field visit as an opportunity to meet the two lady field technicians assigned in the two municipalities, with whom they will coordinate the audience survey and pretest as well as the monitoring and feedback activities.

During the period from November 30 to December 7, the SOA students and staff also began to introduce themselves to the formal and informal leaders of the pilot areas in the company of the technicians. At the same time, they monitored the DZLB signals to ascertain that the radio receivers in the areas were getting clear reception during the appointed time slot (7:00-7:30 pm).

A total of 103 prospective enrollees initially signed up for the SOA. They came from six rice producing villages in Bay and three villages from Calauan. These pilot areas were Dila, Hanggan I, Maitim, Poblacion, San Agustin and San Isidro in Bay and Balayhangin, Lamot I and Poblacion in Calauan.

The breakdown of initial enrollees for each barangay is as follows:

Bay, Laguna		Calauan, Laguna	
Dila	12	Balayhangin	24
Hanggan I	29	Lamot I	5
Maitim	1	Poblacion	4
Poblacion	2		
San Agustin	1	Total	33
San Isidro	25		
		Grand Total	103
Total	70		

Audience Survey and Pretest

The audience survey and pretest were conducted from November 30 to December 21, 1985. The two instruments were administered to enrollees immediately after they signed up during the listenership campaign. The pretest was a 28-item instrument which aimed to determine the enrollees' level of knowledge on IPM. The same instrument was used for the post test.

After finishing the pretest, the prospective student was given the SOA Course Schedule and Guidelines and enough copies of the feedback forms to last the entire course. These materials were written in the dialect, Tagalog. They were also reminded to tune in to DZLB for pre-broadcast announcements and reminders.

Preparation of SOA Lectures

As soon as the results of the audience survey and pretest questionnaire began coming in, the SOA writers started to plan the course outline and content in consultation with IPM specialists from IRRI, UPLB and RCPC. Draft lectures in English were verified with the specialists for technical accuracy before these were translated and rewritten into lecture scripts in Pilipino. The translated versions also went through a round of validation with the designated SOA lecturers from the RCPC, Region IV.

Preliminary Broadcasts
Preliminary broadcasts were aired from January 6-10, 1986. In these pre-SOA broadcasts, the enrollees heard their names over the air for the first time in the roll call. Henceforth, the broadcaster addressed the participants by their first names and locations, thus establishing a personalized and localized atmosphere for the school. The preparatory broadcasts also served to remind them of the guidelines and procedures for the SOA, particularly the mechanism for answering and sending the feedback forms. A musical request or two from the participants were usually interspersed in the program.

Broadcast Proper
Schedule. "Paaralan sa Himpapawid Ukol sa Pangangasiwa ng Salot-Palay" was broadcast every Monday, Wednesday and Friday for 30 minutes, from 7:00-7:30 p.m. over DZLB at 1210 Khz on the AM band. The entire course lasted from January 6-March 7, 1986.

The IPM Lessons. A total of 12 lessons or lectures was prepared and aired. The first lesson was aired on January 14, 1986 and the last one was aired on February 21, 1986. The titles of the 12 lessons were as follows:

1. Introduction: The IPM Concept
2. Signs of Insect Pest Incidence
3. Cultural Practices: Weeding and Intercropping
4. Cultural Practices: Controlling Insect Pests and Diseases
5. Use of Resistant Varieties
6. Biological Control
7. Chemical Control
8. Pest Surveillance and Monitoring Practices
9. Integrating Pest Control Practices
10. Biological Methods of Pest Management
11. Need-based Use of Insecticides
12. Rat Control Practices

Feedback Forms. The SOA program for Mondays and Wednesdays was devoted to the lessons while Fridays were spent on the following activities: 1) answering the feedback questions coming from the participants, 2) responding to comments and suggestions and 3) reviewing the lessons taken up during the week.

After every lesson, the lecturer gave one question for the enrollees to answer. They were instructed to write their answer on the feedback forms which were previously provided after the pretest. They were also encouraged to write in their comments, suggestions and/or questions about the lessons. The participants were then reminded to place the feedback forms into drop boxes which were strategically located - that is, at "sari-sari" or variety stores in the community. These feedback forms were then collected on weekends by the field technician who then delivered these to DZLB the following Monday.

The feedback forms were processed immediately, meaning on Monday afternoons when the DevCom 169 class regularly met. The forms also served as the basis for the SOA participants' "attendance" or listenership frequency. Answers to the quiz were then evaluated, the comments and suggestions were noted down for consideration and queries from the enrollees were referred to the IPM specialists.

Lecturers. The course had two lecturers: Mr. Oscar Deomano, director of the Regional Crop Protection Center, Region IV and Mr. Elpidio Villegas, crop protection specialist, also of RCPC.

A DZLB staff member served as the anchorperson for the program. He was assisted by DevCom 169 students who took turns in manning the lessons as part of their training in producing educational broadcasts.

Review for the Post Test. The last three broadcasts were devoted to the review in preparation for the final examination or post test which was administered by the DevCom 169 students from March 1-5, 1986. The results of the post test are discussed in a later section of this report.

Post Broadcast Activities

Graduation. The graduation rites for the IPM School on-the-air was held on March 7, 1986 over the air. Usually, the graduation is held at a function hall at UPLB but the majority of graduating participants indicated their preference for holding it over the air.

Sixty out of the 103 enrollees completed the course and received Certificates of Completion and a copy of the SOA manual. Ten participants graduated with honors. Each of them received a digital watch as their award. Seven participants received citations for being the "most reliable", "most optimistic", "most helpful", "most resourceful", "most industrious", "most motivated" and "most accommodating". They each received a flashlight as their prize.

SOA Manual. The manual on "Paaralan sa Himpapawid Ukol sa Pangangasiwa ng Salot-Palay" was prepared and printed in time for the graduation and distribution of certificates. The manual contained all the 12 formal lectures as well as other pertinent details about the SOA such as the list of successful enrollees, the 10 recipients of honors and seven outstanding citations, the SOA staff, and copies of the survey form, pre-test/post test and feedback forms.

RESULTS AND DISCUSSION

Audience Profile

The audience survey provided descriptive data on the prospective SOA participants who were all engaged in rice farming. As noted earlier, a total of 103 initial enrollees signified their intention to participate, consisting of 33 women and 70 men. The participants all came from the adjacent towns of Bay and Calauan, Laguna. Only one member per household was allowed to become a participant. Hence, no husband and wife team was involved to avoid any duplication in the benchmark data. However, out of the 103 enrollees, 43 (41%) dropped out (12 females and 31 males), and 60 (59%) completed the SOA course on Integrated Pest Management (See Table 1).

Demographic Characteristics. This part of the report describes the 60 participants who finished the eight-week course. Table 2 presents the demographic and some socio-economic characteristics of the respondents. Thirty nine (65%) of the participants were males, five of whom were single (13%) and 21 (35%) were females. Only two of the women (9%) were single at the time of the study.

The ages of the male participants ranged from 20-70 years with the mean at 44.1 years. Among the females, the youngest was 18 and the oldest, 55 years old. The mean age of the female participants was 39.7 years.

Eleven of the men (28%) and 6 of the women (29%) did not finish the elementary level of education. However, 9 men (23%) and 10 women (48%) finished the sixth grade. For the high school level, 7 males (18%) and two females (9%) reported having graduated from this level and 11 (28%) and 3 (14%), respectively, reached or finished college. Among the men, the average number of years spent in school was 7.8 while for the women, it was 6.8 years.

Farming Experience. The respondents were asked how long they had been farming. The women's farming experience ranged from 1-40 years with an average of 19.33 years while that of the men ranged from 1-54 years, with a mean of 22.87 years. The t-test indicated no significant difference in farming experience between the two groups.

Size of Farm. In terms of the size of their farms, the women reported that their families tended an average of 1.45 hectares (ranging from 0.5-2.5 ha.) while the men reported an average of 1.76 hectares tilled (ranging from .5-5 ha.). The difference between the two means was statistically significant at the 0.01 level.

Membership in Organizations. Majority of the male and female participants, 66 percent and 52 percent, respectively, indicated membership in at least one organization. The "Samahang Nayon" was the most frequently reported organization of which they were members.

Radio Ownership and Listenership. Ninety-one percent of the respondents owned a radio set and 90 percent claimed that they had been exposed to radio station DZLB. However, exposure was not an indication of listenership. While 90 percent were familiar with DZLB, only 71 percent said they listen to DZLB programs.

They preferred to listen to the following types of radio programs: agricultural, news, homemaking, musical, drama and variety.

Evaluation of Performance

A pretest-post test instrument with identical items served as the principal evaluation tool for this study. The perfect score was 30 points. The pretest was administered during the enrollment/ benchmark phase to determine the enrollees' level of knowledge of IPM before the radio lessons.

After the eight-week radio course, the post test was administered by student field coordinators. The post test was used as the basis for determining if and to what extent the participants gained knowledge from the SOA lessons on IPM. All 60 participants were able to take both the pretest and the post test.

The t-test for two independent samples was used to ascertain if there was any significant change in the knowledge level of the male and female groups. It was also used to determine significant differences if there is any, between the means of the two groups in the pretest, post test, quizzes and knowledge gain (post test minus pretest).

Pretest. Table 3 presents the results of the t-test of mean scores in the pretest, post test, knowledge gain and quizzes of the female and male participant groups.

For the pretest, the women's scores ranged from 3-16 and the men's from 2-18 points. The table shows that there was no significant difference between the pretest mean scores obtained by the two groups. This finding confirms the first research hypothesis that there will be no difference in the performance of the two groups in the pretest.

Quizzes. A total of 12 quizzes corresponding to the 12 lessons was given over the eight-week period. The questions asked were similar to those given in the pretest/post test and also had a total score of 30. As earlier discussed, feedback forms were distributed to the participants during the benchmark/pretest phase. These forms were used by the participants to answer the quizzes as well as to write down their reactions, comments and suggestions regarding the conduct and content of the radio course. The forms were collected every Saturday or Sunday by the student field coordinators. The answers to the quizzes were evaluated every Monday afternoon by the DevCom 169 students during their class laboratory meeting (1:00-4:00 pm Monday and Friday). The SOA participants in turn received feedback about their performance as well as responses to their comments or suggestions through the regular SOA broadcaster and the student broadcaster of the day.

Insights from feedback generated from participants are discussed in a later section of this report.

With regard to the participants' performance in the quizzes, Table 3 shows that the women's scores ranged from 2-24 and the men's scores varied from 1-26 points. The average scores obtained were 15.57 and 16.02, respectively.

The t-test indicated that the two group means were not significantly different. Again, this finding confirms the first hypothesis that there will be no difference in the two groups' performance in the quizzes.

Post Test. The post test scores of the female participants had a range of 8-29 (Table 5) while those of the males ranged from 14-28 (Table 6). Although the mean scores were almost the same, i.e., 20.14 for the women and 20.56 for the men, the t-test revealed a statistically significant difference at the .01 level in favor of the male group.

Therefore, the first hypothesis as it pertains to the post test was not confirmed in this study. It indicates that the male participants showed a better performance in the post test.

Knowledge Gain. Knowledge gain was determined by computing the difference between the post test and the pretest score of each respondent. As Table 3 shows, the two groups of participants manifested considerable gains in their knowledge of the subject matter after the course. The women farmers increased their scores in the post test by as much as 20 points, while the men had a maximum increase of 21 points.

Tables 5 and 6 present the individual scores of the female and male enrollees in the pretest, post test and in knowledge gain and their percentage increase from the pretest score. Only one member from each group did not show any gain in knowledge from the SOA intervention. No one obtained a post test score lower than his or her pretest. The average percentage increase in knowledge for the women's group was 147 percent and for the men's group, 159 percent.

The t-test results in Table 3 indicate that there was no significant difference in the mean knowledge gain score of the women (10.66) and the men (10.79). This finding confirms the second research hypotheses that the two groups will not differ in their ability to gain knowledge on the subject matter from the SOA.

Table 4 presents the result of the t-test for two related or dependent samples (pretest and post test averages for each group). It was meant to determine the significance of the SOA participants' change in level of knowledge.

The statistical test indicates that in both groups, a highly significant increase in knowledge on IPM was evident, thus confirming the third research hypothesis which states that the SOA format is an effective medium for increasing the participants' level of knowledge on IPM.

Feedback and Other Insights. In any course of study, there are students who tend to be more interested and motivated than others. The SOA on IPM was no exception. A common observation reported by student field coordinators was that it was the more motivated participants who regularly and voluntarily turned in their feedback forms to the designated contact persons in their area. It was also from these motivated participants that they gained insights about the participants' comments and gathered the following suggestions through the regular personal visits to the villages:

1. That rodent control be included and be comprehensively discussed in the SOA. It appeared to be a major rice pest problem commonly experienced in the Bay and Calauan areas which are near Laguna de Bay. This suggestion was accommodated. The topic on

rodent control was included and became the last (12th) lesson.

Since this SOA was designed as a pilot study for a bigger three-phase proposal, the initial plan was to introduce the enrollees to the IPM scheme in the context of cultural and biological control methods, through the introduction of concepts like natural enemies of insect pests, economic threshold level and need-based use of insecticides. The content of the subsequent phases of the SOA program was to be determined by the suggested needs and preference of the prospective enrollees who shall be identified on the basis of their (training) exposure/non-exposure to the IPM technology.

It was therefore envisioned that rodent control would take up one SOA course, considering the comprehensiveness of the topic. However, it would be contrary to the SOA's rural educational broadcasting philosophy to pass up this opportunity to take heed of the people's real interest and needs.

2. Some of the more motivated participants suggested that the SOA be aired five times a week or from Monday to Friday and not three times only or on MWFs, so that four lessons, and not two can be aired per week. Fridays were devoted to reviewing past lessons and on feedback to and from participants.
3. Some participants felt that the time devoted to the lessons was too short. During the 30-minute program only 10-15 minutes were devoted to the lesson proper to give way to motivators. Providing motivation involved mentioning enrollees' names, greeting enrollees who were celebrating their birthdays or anniversaries or thanking participants for their comments or assistance during the village visits. Other motivators included playing a requested song (usually, only one song could be accommodated in each program) and responding to questions, comments and suggestions. A few minutes were

also devoted to reminders and to the quiz which usually consisted of one question per lesson.

For the last three lessons of the SOA, it was inevitable to use the major part of the 30-minute time slot on lessons. Towards the last two weeks of the broadcast, it became apparent that the remaining time was inadequate, i.e., before the target date for the SOA graduation (one week before the last day of classes at UPLB). It will be recalled that the February Revolution coincided with the SOA period. During that eventful week (February 22-28, 1986) in Philippine history, the SOA participants, like the majority of other Filipinos, had their hearts, minds, eyes and ears focused on national events. For the SOA participants, this was confirmed by the personal visits we made to the villages. The course coordinators decided to suspend the broadcast of SOA lessons during that week. It was resumed on March 1, 1986.

CONCLUSIONS

The findings from this pilot study indicate that the school on-the-air can be an effective communication support to the diffusion and adoption of the IPM technology. This is confirmed by the finding that both female and male participants significantly gained knowledge about the course content after exposure to the SOA format.

The female participants in the SOA have shown that they can perform as well as the male participants in the evaluation instruments that were designed to measure any increase in knowledge level. The women have proven that they can equally tackle even the more technical agricultural information like integrated pest management which ordinarily is perceived to be solely the male farmer's cognitive and physical domain.

Implications and Recommendations

The major objective of this study was to compare the performance of the women rice farmers with that of the men in the SOA. The purpose of this comparison was to find out if women farmers are as capable as the men in increasing their level of knowledge and hence, in understanding a relatively complicated topic in rice production such as integrated pest management. The study has confirmed that indeed, the women can fare equally well, if not better than the men in an extension-communication strategy on a topic that is even outside the realm of homemaking, health, nutrition and child care.

Results of this study therefore imply that with a complex technology like IPM, rural women can be tapped to participate in the challenging task of diffusing the IPM technology and in encouraging its adoption. Their role in technology diffusion and adoption has in fact been recognized in a recent research synthesis reported in Development Communication Report (54:1986) which states that "Women are often the innovators and opinion leaders who have been responsible for successful diffusion of new practices in developing countries."

The study also proved that the SOA format can be a useful way of serving farmers' information needs on crop protection where extension services may not always be available. For those farmers that have attended training on IPM and/or have been participating in verification trials and cooperative research, the SOA can be a useful reinforcing channel to sustain their interest and awareness of the continuous need to practice IPM.

To further confirm these observations, it is recommended that the SOA format be further implemented on the other content areas of integrated pest management.

Further studies on the use of audio casette technology using taped SOA broadcasts may provide valuable insights as to how best we can maximize the effectiveness of the SOA. Performance of participants in group listening vs. individual listening approaches can also be compared.

Lastly, no communication intervention, no matter how effective in increasing the knowledge level of its participants, can be considered useful if it is not ultimately applied.

Follow-up studies are therefore needed to:

1. ascertain whether the participants actually operationalized what they learned and whether they developed a conviction of the new technology enough to incorporate it into their regular farm management activities;
2. determine whether they shared what they learned with other farmers and find out to what extent they were influential in persuading others to apply the new technology;
3. test other communication strategies and materials that they prefer to reinforce their conviction and sustain their adoption of IPM;
4. further probe into the role of farmers' wives and women farmers in IPM for rice and other crops.

Table 1. Frequency and percentage distribution by sex of initial enrollees, dropouts and participants from the nine Laguna Barangays covered by the SOA.

Location	Initial Enrollees (EN)				Dropouts (DN)				Participants (PN)			
	Male	Female	Total	% EN	Male	Female	Total	% DN	Male	Female	Total	% PN
Bay. Laguna												
1. Dila	8	4	12	11	5	1	6	14	3	3	6	10
2. Hanggan I	22	6	28	28	7	2	9	21	14	5	19	33
3. Maitim	1	0	1	1	0	0	0	0	1	0	1	1.5
4. Poblacion	2	0	2	2	1	0	1	2	1	0	1	1.5
5. San Agustin	1	0	1	1	0	0	0	0	1	0	1	1.5
6. San Isidro	23	3	26	26	13	1	14	33	10	2	12	20
Calauan, Laguna												
7. Balayhangin	11	13	24	24	5	3	8	19	6	10	16	26.5
8. Lamot I	3	2	5	4	1	2	3	7	2	0	2	3
9. Poblacion	3	1	4	3	2	0	2	4	1	1	2	3
TOTAL	74	29	103	100	34	9	43	100	39	21	60	100

Table 2. Demographic and socio—economic characteristics of SOA participants by sex.

Variable/	Female (N = 21)		Male (N = 39)		Total (N = 60)	
Category	Freq.	%	Freq.	%	Freq.	%
Age						
20 & below	1	5	1	3	2	3
21 - 30	2	10	4	10	6	10
31 - 40	9	43	14	36	23	38
41 - 50	6	28	7	18	13	22
51 - 60	3	14	9	23	12	20
61 - 70	0	0	4	10	4	7
TOTAL	21	100	39	100	60	100
Mean	39.1		44.1		42.5	
Civil Statu						
Single	2	10	5	13	7	12
Married	19	90	34	87	53	88
TOTAL	21	100	39	100	60	100
Education						
0 — none	0	0	1	3	1	2
1 - 5 elem.	6	29	11	28	17	28
6 - elem. grad	10	48	9	23	19	32
7 - 10 high sch	2	9	7	18	9	15
11 - 14 college	3	14	11	28	14	23
TOTAL	21	100	39	100	60	100

Table 2 . . . (continued)

Variable/ Category	Female IN = 21) Freq.	%	Male (N = 39) Freq.	%	Total (N = 60) Freq.	x
Years Farming						
4 & below	3	14	4	10	7	11
5 - 10	5	24	6	15	11	18
11 - 20	4	19	9	23	13	22
21 - 30	4	19	11	28	15	25
31 - 40	4	19	5	13	9	15
41 - 50	1	5	3	8	4	7
51 & above	0	0	1	3	1	2
TOTAL	21	100	39	100	60	100
Mean	19.33		22.87		21.63	
Size of Farm (hectares)						
Mean	1.45		1.76		1.66	
Radio Ownershie						
Owner	19	91	36	92	55	92
None	2	9	3	8	5	8
TOTAL	21	100	39	100	60	100

Table 2 . . . (continued)

Variable/ Category	Female (N = 21) Freq.	%	Male (N = 39) Freq.	%	Total (N = 60) Freq.	%
<u>Frequency of Listening</u>						
(5) everyday	14	67	26	67	40	67
(4) 4-6 times/wk	2	9	2	5	4	7
(3) 1-3 times/wk	2	9	3	8	5	8
(2) few times a month	3	15	7	18	10	17
(1) occasionally	0	0	1	2	1	1
TOTAL	21	100	39	100	60	100
<u>Exposure to DZLB</u>						
Exposed	18	86	35	90	53	88
Not exposed	3	14	4	10	7	12
TOTAL	21	100	39	100	60	100
<u>Listening to DZLB</u>						
Listening	15	71	28	72	43	72
Not listening	6	29	11	28	17	28
TOTAL	21	100	39	100	60	100

Table 3. T - test results of mean scores on the pretest, posttest, knowledge gain and quizzes among the female and male participants of the IPM school on-the-air.

Variable	Females N = 21	Males N = 39
1. Pretest		
Mean	9.47	9.76
Std. deviation	3.23	4.03
Std. error	0.705	0.646
Minimum	3.0	2.0
Maximum	16.0	18.0
T-Value	−0.306	−0.286ns
2. Quizzes		
Mean	15.57	16.02
Std. deviation	6.31	5.82
Std. error	1.37	0.93
Minimum	2.0	1.0
Maximum	24.0	26.0
T-Value	−0.273	−0.279ns
3. Post test		
Mean	20.14	20.56
Std. deviation	5.72	3.56
Std. error	1.24	0.57
Minimum	8.0	14.00
Maximum	29.0	28.0
T-Value	−0.306	−0.351**

Table 3 . . . (continued)

Variable	Females N = 21	Males N = 39
4. Knowledge gain		
Mean	10.66	10.79
Std. deviation	5.36	5.20
Std. error	1.16	0.83
Minimum	0	0
Maximum	20.0	21.0
T—Value	-0.089	-0.09ns

ns - not significant

**significant at p c .01 level

Table 4. Results of t-test to determine the significance of the participants change in knowledge level.

Group	T-value	P > T
Women	9.12	.01
Men	12.95	.01

Table 5. Female participants' pretest and post test scores, knowledge gain scores and percent improvement.

No.	10 No.	Pretest	Past test	Knowledge Gain (Past test-Pretest)	% Increase Diff. × 100 / Pretest
1	1	9	9	0	0
2	2	7	8	1	14
3	9	10	22	12	120
4	15	4	18	14	350
5	17	4	24	20	500
6	27	10	19	9	90
7	30	10	25	15	150
8	35	11	17	6	54
9	36	6	23	17	283
10	37	3	18	15	500
11	41	13	25	12	92
12	42	16	29	13	81
13	43	10	21	11	110
14	44	7	9	2	28
15	45	9	19	10	111
16	47	13	18	5	38
17	48	11	25	14	127
18	50	12	25	13	108
19	51	11	21	10	91
20	55	11	25	14	127
21	58	11	23	12	109
Mean:		9.47	20.14	10.66	147

Table 6. Male participants' pretest and post test scores. knowledge gain and percent improvement.

No.	ID No.	Pretest	Post test	Knowledge Gain	% Increase
1	3	8	25	17	212
2	4	13	20	7	53
3	5	13	20	7	53
4	6	10	19	9	90
5	7	18	27	9	50
6	8	17	24	7	41
7	10	10	23	13	130
8	11	8	24	16	200
9	12	11	24	13	118
10	13	18	19	1	5
11	14	10	24	14	140
12	16	12	19	7	58
13	18	8	17	9	112
14	19	6	25	19	316
15	20	9	18	9	100
16	21	5	24	19	380
17	22	11	21	10	91
18	23	11	18	7	63
19	24	12	15	3	25
20	25	7	28	21	300
21	26	12	14	2	16
22	28	7	14	7	100
23	29	8	14	6	75
24	31	10	20	10	100

Table 6 . . . (continued)

No.	ID No.	Pretest	Post test	Knowledge Gain	% Increase
25	32	8	20	12	150
26	33	6	20	14	233
27	34	9	26	17	188
28	38	2	19	17	850
29	39	6	20	14	233
30	40	5	18	13	160
31	46	7	23	16	228
32	49	10	17	7	70
33	52	13	24	11	85
34	53	5	21	16	320
35	54	10	19	9	90
36	56	3	18	15	500
37	57	18	18	0	0
38	59	17	22	5	29
39	60	8	21	13	162
	Mean:	9.76	20.56	10.79	159

Training the village non-traditional extension audiences on Integrated Pest Management

Blanda R. Sumayao *

INTRODUCTION

The purpose of this report is to review the activities and progress of the project entitled "Training the Village Non-Traditional Extension Audiences on Integrated Pest Management" vis-a-vis the project plans as conceptualized in August 1986. In order to do this, let me cite the rationale for the project.

Efforts to generate location specific thresholds and verify existing IPM recommendations are necessary for the shift from schedule-based to need-based insecticide use in order to cut costs and increase the farmer's profits. The technology becomes effective only when it extends all the way to its utilization and application by the farmers. To ensure successful technology utilization or technology transfer, an effective delivery system must be developed.

The complex nature of the IPM technology would require that not only the farmer who is directly involved in the farming operations should know about it but also the other household members. For instance, regular field monitoring in order to decide when insecticides are most economical to use may be difficult for the farmer to

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religiously accomplish but which would not be hard to do if other members of his household could pitch in. However, they could do so only when they know what, how, and where to look for. Hence, the extension delivery system would fall short of its requirements if it limited itself to the farmer as its clientele. The other members of the farmer's household particularly the wife and the older children who are not gainfully employed in farming or non-farming occupations, become indispensable targets of extension on IPM.

Objectives
The project was therefore conceived to:

(1) train the non-traditional extension audiences, i.e., the women and the youth, on the IPM technology necessary to undertake IPM-related decisions that will help solve pest problems and the consequent low yield;
(b) organize a cadre of youth trained as pest monitoring teams (PMTs) who could be tapped by farmers for pest monitoring activities; and
(c) work on the institutionalization of the PMTs.

The project targetted the wives and the out-of-school and/or unemployed children of the farmer cooperators in the Systematic Verification Strategies for the IPM Technology project based in Calamba, Laguna in 1986.

Major Activities
Three major activities were planned: These were the training of the wives and the youth, establishment of barangay resource centers, and organization of the youth into PMTs.

The project was officially started on October 4, 1986 when home visits with the IPM verification cooperators' wives were conducted. The visits were done for two reasons: (1) to meet the wives in their home environment; and (2) to invite them to an informal meeting where they can talk about the farming activities of their husbands, their involvement in the IPM project and how they (the women) could link themselves with the project. The visits were done together with Dr. Adalla and her IPM verification project staff. Unfortunately, the visits were made on Saturdays and most of the women were out of the house. They were either marketing or selling fish or vegetables in the market. Only a couple of wives were around to personally receive the invitation to the meeting. For the rest, the invitations were coursed through the husbands.

The first meeting with the women took place a month after the initial visits were done. It was held on November 8, 1986 in the elementary school in Looc, Calamba, Laguna, with eleven women attending.

I explained to the group why we were calling the meeting and very suavely hinted on the possible role of women in IPM. Then I threw to them the question "What can we do in this IPM involvement of our farmers?" The talks revolved around the farmers' IPM activities and problems in farming. But there was nothing definite about the roles that wives or the household members could play. Four women, however, were very vocal about having seminars on IPM. The rest remained silent all throughout the meeting which lasted for about two hours. Before the group disbanded, it was agreed that another meeting be held and they said they would expect more women to attend. The next meeting was scheduled for the following Saturday, November 15.

Verbal reminders were relayed by two of Dr. Adalla's project staff, Bessie Capunitan and Jing Realon two days before the scheduled meeting. Nevertheless, when Saturday came, only ten women came. The two male cooperators who were present in the first meeting came again. The women were quite apologetic about the poor attendance. They said it was really difficult for the other women to come because of home and family concerns.

Anyway, the women still talked about having seminars on IPM. When mention of their out-of-school children was made, there appeared to be an immediate resistance to the idea. According to them, there were not very many out-of-school youths in the barangay.

Cognizant of the small number of women coming to the meetings, the women suggested to tap the services of a certain Aling Baya, an illiterate resident in the barangay whose daily routine takes her around the barangay and thus barangay people most often make her a channel for messages they want to send to some residents in the barangay. Thus, she is virtually considered the barangay's message-carrier, bringing verbal messages from sources to intended receivers.

Another meeting was scheduled for November 29. This time it was suggested that the venue be changed since the women felt that the school might be too far for some of them. On that day, the women met in the residence of one of the regular participants. Aling Baya was there. She said she made the rounds of all the women the day before. Unable to read, she memorized the names of the women she was to contact. At the scheduled time, however, only seven women and two men attended.

The session turned out to be a question and answer type. The women asked questions which Fe Alzona and Esther Atienza, the other two of Dr. Adalla's research assistants, answered. The questions ran the gamut of problems they encountered in rice production. The problem of over seeding was the most mentioned. Farmers always need more seeds to sow because they give an allowance for seeds that might not germinate, although they grew certified seeds. Besides, they seem to be under the control of transplanters who would not transplant if there are not enough seedlings. This is because transplanters are paid on the basis of amount of seeds grown in seedbeds.

It was observed during this session that all the women, except for one, were actively participating in the discussions. They were so animated that the session lasted for three hours. The discussion however, was not purely on rice. The women also thought of holding some social activities like a Christmas party where there could be some singing, dancing, and eating. But the idea was dropped because they said they already have so many activities for Christmas. At this point someone suggested, "What about a field trip to Los Banos sometime next year? The reaction to the question was eagerness and excitement over the prospect of visiting IRRI which most of them have long been hearing about but which they have not yet seen.

Eight more meetings followed. In these sessions, the concept of IPM was introduced. The topics discussed were:

1. Life cycle of the rice plant
2. Characteristics of good seedlings
3. Seedling establishment

4. Germination requirement
5. Introduction to pests and natural enemies of rice pests
6. Nature of damage and control
7. Field monitoring

The next activities involved were planning for their monitoring activities. The number of participants dropped to three. In the last monitoring session, the three research assistants each had one woman to attend to. In a way, it was good because it turned out to be a very personalized manner of teaching the women the "friendly" and the "not so friendly" insects, how to recognize and look for them, how to record their observations, and how to decide on whether or not spraying should be done.

During the initial meetings with the women, as well as the men, a knowledge, attitude and practice or KAP survey was conducted to determine, among other things, their knowledge level, their attitudes and existing practices in so far as IPM is concerned. Copies of the findings of this KAP survey are available upon request.

Problems

This report will not be complete without a mention of the problems encountered in the implementation of the project. Let me therefore present to you the more salient ones.

Entry point. The poor attendance in the session particularly during the monitoring, could be attributed to the wrong entry point. The project came in through the wives of the IPM verification project cooperators. However, the survey showed that there was only one woman who was actually into rice farming herself. And this was the woman who consistently attended all the sessions and showed a great deal of interest and participation in the sessions. The rest of the women, though involved in rice farming, did not really have so much participation in farming as shown by the survey. The rice farming activities where the greater proportion of the women were involved were: care of seedlings (44 percent), seedbed preparation (31 percent), and threshing (17 percent). It appears that these women were busy with some other activities that take precedence over farming activities.

It may be useful to consider for future IPM projects involving women, that the participants should be properly identified to make sure that these are women who are really involved in rice farming. In Calamba, it was observed that women were more involved in vegetable farming rather than in rice production. Thus, the vegetable growers may be another viable entry point for IPM.

Technician for the project. Although Dr. Adalla's research assistants were very accommodating to my requests to assist in sessions with the women (and for this I acknowledge their significant contributions to the project), nevertheless, not having a technician of its own was a constraint to the project.

Time constraint. Although the project was for six months, the actual activities with the women ran for four months only. So much time was spent for preliminary activities. Project plans therefore should not be very ambitious as to think that projects could immediately take off. To rev up the engine takes more time than to make it run. This is also partly the reason why there was nothing done about the training of the out-of-school youth. The other reason for this sin of omission is the second problem mentioned above.

The rural Filipina as extension aide (RuFEA): A pilot project in the extension of crop protection in rice

Melanda M. Hoque, Blanda R. Sumayao, Vicente A. Martinez and Mariza M. Marzo *

INTRODUCTION

The shortage of trained extension personnel suggests an urgent need for a more effective application of an extension delivery system whereby small farmers, especially the more disadvantaged ones, could be reached by extension services. What is referred to is the use of local people as responsible representatives of the service. By trying the new techniques for themselves, the local leaders can thus demonstrate the validity of the techniques under local conditions. They can therefore multiply manifold the efforts of the professional workers.

In the Philippines, about 70% of the population is in the rural areas, of which 50% are women. These women represent not only users of basic services, bearers and socializers of children and keepers of the home but a productive potential and actually influential pressure group that is hardly being tapped. The project was an initial attempt to enlist the participation of this significant half of the rural population as extension aides for crop protection technologies. The main purpose of the project was to develop and conduct non-formal education programs in the extension of crop protection

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technology for rural women that shall serve as a pattern for a nationwide training program for the rural Filipina as an extension aide. More specifically, the project aimed to:

(1) Help the rural women learn the basic principles underlying existing crop protection technologies;
(2) Assist them develop the necessary skills in the use of crop protection practices;
(3) Develop in them the desirable attitudes toward the use of crop protection technologies as a means to higher farm productivity; and
(4) Train them to be effective partners of the extension service in influencing local farmers' adoption of crop protection technology.

The following is a report of the highlights of the activities undertaken during the conduct of the study from August 1984 to April 1986.

METHODOLOGY

The first phase of the project involved the gathering of information and insights into the agricultural, sociological and economic conditions of two selected rural communities through a survey. The socio-demographic characteristics of the people for both barangays were determined from the survey. Data gathered were: age, education, residency, number of children, occupation, organizational affiliation, attendance in training or seminars and time use. Only one set of questionnaire was used for the men and for the women.

FINDINGS

Socio-Demographic Characteristics

The women were a relatively young group of housewives being on the average, 48.13 years old. Only about 47% were over 50 years old. It appeared that the women have migrated from other places as shown by the average number of years of residence in the barangay which was 28.3 years. Majority of these women finished elementary schooling, while 10% did not have any schooling. The number of children reported by the married women was, on the average, about 6 per family. As expected, the majority of the women were fulltime housewives, and a minority (10%) worked as farmers or farm help. Most of the working wives have their jobs within the village and adjacent villages.

It is interesting to note that a great majority (83%) of the respondents were not affiliated with any organization in the barangay. Only 27% reported membership in some socio-civic and religious organizations in the community. A small percentage of women (21%) had attended training programs conducted in the barangay by government/or private agencies and 79% had not attended any training at all. The reasons given were basically unawareness or they had no time for such training.

With regard to their use of time, women who were gainfully employed work on the average, 7.58 hrs/day. In general, the average time spent for major household activities were: laundry, 3.22 hrs/day; travel time to work, 1 hr/day; and for recreation and leisure, 2.38 hrs/day. This indicates that if the women are to be tapped for other activities, it may disrupt their daily routine of household activities, including their major activity of working for income.

Part of the survey was to determine whether the women knew of the extension workers (EWs) and were aware of their presence in the barangay. Half of the women respondents knew while the rest did not know the EWs assigned in their area. Of those who indicated knowledge of the EWs, most of them were not very sure what agencies these EWs represented. The women were also asked if they would be willing to work with EWs. Almost all of those who knew the EWs said they were willing to work with them.

Self-perception and self-image were also determined from the survey. This information was sought because of the premise that how one looks at oneself in relation to a task at hand might determine, to a certain extent, how he would perform in a given task. A selected leader for instance, who cannot consider himself to get the rapport of the group, cannot expect to perform well as a leader. As far as the women respondents were concerned, only 46% perceived themselves as active in group affairs while the majority did not because they had many things to do in their homes.

Nevertheless, majority (77%) of them answered that they were at ease in group situations. The situation was different however, when it concerned their taking an active leadership role. Majority (51%) said they could not take an active part in community activities and a higher proportion (80%) said they could not take on active leadership responsibilities in community activities.

Their propensity to participate in a project was also determined. They were asked whether they were willing to serve as extension aides and if so, the amount of time they would have for activities related to work as extension aides. A little more than half of the women reported to have the interest and time to attend seminars on crop protection as well as do some extension activities. However, when asked about doing some record keeping in connection with their work as extension aide, only about one-third answered that they had the time and willingness to do so and are willing to record their activities as extension aides. It appears from this small proportion of women who expressed willingness to do record keeping would mean a reduction of whatever extra time they have for themselves.

Awareness of Crop Protection Practices

Questions about aspects of rice farming were posed to the women respondents to determine their awareness of rice pests, diseases and crop protection practices. Of the 70 respondents, only 49% knew of rice insect pests common in their community while less than 50% of the women knew of some ways to control the pests. However, the control measure they mentioned was limited to spraying of insecticide and they also exhibited knowledge of insecticide brands.

The women were more aware of the weed problem than the insect pests. Knowledge of weeds associated with rice was accompanied by knowledge of their control. Chemical control of weeds was the most frequently reported weed control measure they were aware of. Hand-weeding was also mentioned together with the use of a rotary weeder. Field rats were one of the most common pests mentioned by the women. Use of rodenticides was the most common control measure the women were aware of.

On rice diseases, the women respondents only knew about tungro. From the benchmark survey, the women cooperators were identified on the basis of their willingness and availability to attend the seminars on crop protection as well as their willingness to try the crop protection techniques to be taught to them. There were 23 women who signified their initial interest in the project, 15 from Lamot I and II and 8 from Balayhangin. Having identified the cooperators, the project staff met with the Department of Agriculture (DA) personnel in Calauan and the techniques assigned in the two barangays. The DA personnel were informed about the findings of the survey that were conducted in both barangays. They were also briefed on the project.

Crop Protection Training and Field Trips

On November 23 and December 8,1984, seminars were held in the two villages. Topics covered were: (1) disease control and prevention, (2) insect pest control (3) rat control and (4) weed control. The resource speakers all came from the NCPC, UPLB. Twenty three attended the first lecture/discussion but during the second lecture attendance dropped to a total of 14 for the two villages. All lectures were conducted at the health centers of Balayhangin and the community school in Lamot. The seminar was followed by home visits to all the women who attended the first seminar. These were done to motivate the women who were initially identified to participate in the project.

Field visits were also conducted because of the women's report of damages on their newly transplanted seedlings. The problems identified during the field visits included the damage caused by case worms, a rice disease known as bakanae, rats and some problems on nutrient deficiences. Three staff members from the NCPC gave the necessary recommendation to alleviate the problem except for the problem on bakanae which can be controlled by soaking the seeds in fungicide before planting or with the use of bakanae-free seeds.

On January 26 and February 9, 1985, group meetings and discussions with the women in both villages were again conducted. The project staff reiterated the objectives of the project. The discussions were geared towards the women's understanding of the need for more people who could be charged with the faster and more efficient dissemination of research results. Thus, the women were made to understand their role as disseminators of new technology if they would be trained on this. More importantly, the efforts of the EWs in the dissemination of information would be greatly multiplied through their involvement if they became knowledgeable.

A one-day field trip of the project participants to UPLB and IRRI was conducted on February 18, 1985. The field trip was designed to help the cooperators deepen their understanding of and see for themselves researches in the control of diseases, insect pests and the like. It also aimed to motivate the women to think more positively about their involvement in the project.

Evaluation of Activities

Activities undertaken were evaluated. For instance, the following were gathered from the participants: their expectations from the field trip, their assessment of time for each activity, subject matter and resource persons. Majority of the women had no idea of what to see or learn from the different places to be visited except for IRRI where they expected to see various crop varieties. Most of the women considered the time alloted for each of the places visited to be just right as indicated by the following reasons: (1) the project staff arranged the time so that all topics were adequately covered; (2) the resource speakers were able to discuss their topics well; and (3) they (the participants) were able to ask questions they wanted to ask. Most of the topics presented were new to the women, e. g. bookeeping at the UPLB Department of Entomology, the use of resistant varieties at IRRI, and visits to the entomology greenhouse and the Farming Systems Soil and Resources Institute (FSSRI). In general, the women found the field trip very informative and enlightening. They said that they learned so much from the activity.

The impact of the NCPC training on weeds, insects, rats and disease control was evaluated through an informal interview with the women cooperators for the two barangays. Based on the interview, the training did not have much impact on the women. All of them (18 women) mentioned that even before the training, they already knew the different types of weeds and insects and ways of controlling them.

However, they said that the training was still beneficial in the sense that they now knew that they were doing the recommended practices of controlling insect pests. The training served only to confirm what they already knew and practiced. They also mentioned that they enjoyed the lecture on rat control and have adopted the use of coconut husks as bait container.

Sustaining the Interest of Project Participants

The interest of the women in the project decreased rapidly as shown by the poor attendance in the meetings that were scheduled. To sustain the waning interest among the project participants, two separate meetings with the Lamot and Balayhangin women were again held to find out what productive activities they would really like to do whereby their knowledge on crop protection could be applied. The Lamot women's idea was to put up a communal garden which the Balayhangin group also agreed to do.

The women participants from both villages put up a communal garden planted to mungbean and cowpea. The seeds were obtained from UPLB Institute of Plant Breeding (IPB). At Barangay Lamot, only one of the women cooperators persisted in attending to the garden, with the other later dropping out. She harvested the dried seeds alone. The women at Barangay Balayhangin replanted some of the seeds that were harvested from the communal garden. After this activity, the women, one after another, were looking for excuses not to participate in the project anymore.

TRAINING ON IPM IN RICE

Just before the dry season rice crop of 1985-86, the project team again visited the women cooperators and tried to convince them to attend an intensive 5-day seminar. Only those who persistently attended the previous activities showed up during the seminar except for two.

Training

A seminar-workshop on integrated pest management (IPM) in rice was held on October 21-25, 1985 at the MAF, Calauan, Laguna. The objectives of the seminar were to: (1) Re-orient the women on the objective of the project and the important role they would play as extension aides in their respective villages; (2) Provide the women with up-to-date information regarding pest and disease control; and (3) Develop the women's skills on IPM related practices. Nine trainees, all women of Lamot and Balayhangin, attended the training. The project staff and two MAF technicians conducted the seminar.

The topics discussed, accompanied by field work and, demonstrations were as follows:

1. Benchmark evaluation on knowledge of pests, diseases and beneficial insects. (The specimen were freshly prepared).
2. Major pests of rice, their characteristics, extent of damage and control measures
3. Beneficial insects, their characteristics, field collection of these different species of insect pests and natural enemies
4. Major weeds in rice, together with control measures. (The women were asked to collect these major weeds.)
5. Pest monitoring
6. Rat control
7. Fertilizers and rate of application

At the end of the seminars, a post evaluation on the participants was conducted by the modified ballot box method. Trainees were given certificates. Gifts were given to those with perfect attendance and to those who were outstanding trainees, based on scores only.

Workshop on Record Keeping

On November 8, 1985 the RuFEA staff met with the women cooperators to work on their farm plan and schedule of activities. Only 6 of the 9 trainees showed up. Included in the discussions were: (a) scheduling of farm activities, (b) record keeping (c) azolla production (d) fertilizer application, and (f) land preparation. The output from this workshop was a calendar of farm activities.

Another meeting on December 12, 1985 was conducted with the women cooperators. They were encouraged to participate in the school on the air (SOA) IPM program over Radio DZLB, the UPLB rural educational station. A series of lectures were aired on Mondays, Wednesdays and Fridays from 7:00 to 7:30 in the evening. The IPM-SOA started on January 9,1986 and all the RuFEA cooperators were enrolled.

Follow-up Visits

The women were visited regularly to monitor their progress in the project and to provide them with technical assistance when needed. They were also asked to keep a record of their activities observations. These were collated and results were fed back to them during a seminar. Conspicuous placards were installed on individual plots of the women cooperators, indicating that these were RuFEA participant plots. This was intentionally done to attract the attention and create a multiplier effect on neighboring farmers. Together with this, a one-page question-and-answer sheet was constructed for the cooperators to accomplish should people ask them about their IPM plots and questions related to pest and disease control.

Findings and Observations

Table 1 shows the performance of the participants before and after the training course based on the examination given to them. As expected, there was an increase in the level of knowledge of the trainees as shown by the increase in their scores.

Of the nine participants during the IPC training workshop, only six diligently kept their records, two dropped out, and one did not keep records. Her reason was that she could not visit their field regularly. One of the women, Mrs. Padilla, a widow who tended her field during the past cropping seasons had given it to someone to care for while she went into a small trade business. She attributed her high production cost to her not being able to closely supervise farm activities herself.

The average total cost of production per hectare was quite high, P/9,626 per season. The percentage distribution of inputs was as follows: land rental, 28.4%; harvester's share, 23.3%; land preparation, 16.2%; fertilizer, 11.5%; labor, 9.3%; irrigation fee, 5.2%; insecticides, 3.1%; and seeds, 3% (Table 2).

It is interesting to note that the inputs on insecticides were lower compared to other farmers which was 5.63 of the total cost of production while it was only 3.1% during that crop season.

The cooperators were asked if the amount spent on insecticides that season represented their previous input on this item. Their answers and reasons were varied. Most of them said that there was a low population of insect pests the past season compared with previous seasons. One cooperator who spent the highest input on insecticides on a per hectare basis, claimed that there was a high population of stemborer in her ricefields. Apparently, she did not do any sampling to determine the pest population since her husband sprayed insecticides without her knowledge. Only one of the women, a widow, did not apply insecticides. She did her monitoring for several times and on two occasions she did it with the project staff.

It was observed that the women were very much involved in decision making such as in land preparation, purchase of seeds, and hiring of laborers. On the other hand, it was evident that the women's involvement in the project was influenced by their husbands. This was evident in the case where a cooperator from Lamot seldom visited their farm because her husband was not interested in IPM and the project itself. This is in contrast with the cooperators from Balayhangin whose husbands showed enthusiasm and even encouraged their wives to attend the trainings and workshops. Evidently, while the women participate in decision making for the farm, the final decision still rests on their husband especially when it comes to the application of pesticides on their rice crop.

There is an important observation and lesson gathered from this study in the extension of IPM technology. It is important that husband and wife should attend the training courses on IPM inasmuch as the two are teammates in making decisions with respect to farm activities. The wife can complement her husband especially in the monitoring of pests in the farm.

The results of the 5-day training and workshop with the women showed that they quickly learned the concept of IPM, including its application, e.g. monitoring of pests. Yet, full implementation of the technology was restricted by their husbands. For instance, their husbands sprayed insecticides even if the wives felt it was not yet needed. It seems that the husbands were reluctant to take the risks of not applying pesticides even against the wives' discretion. The wives could not impose their decision against their husbands' will. The husbands perceived the risks of completely adopting the IPM technology as advocated and learned by their wives. Had the farmers been assured of their harvest, perhaps, the women cooperators might have asserted themselves much stronger.

During the last meeting with the women on May 5, 1986, the women were asked if they would still want to continue their record keeping and use IPM. All of them answered positively saying that it will be for their own good because they can compare their expenses, profit and harvest for every cropping season. They even mentioned their plans of encouraging other farmers to use IPM. Since April 1986, no follow-up activities have been conducted to find out if they had really continued with their intentions.

CONCLUSION AND RECOMMENDATION

It is too early to make conclusions with regard to the attainment of the overall objective of the project, i.e. to train the rural Filipina as an extension aide (RuFEA) to the government extension worker. The women cooperators have been closely followed up only for one season. A longer period is needed, perhaps a minimum of two seasons where they could be closely supervised in the implementation of the technology, and another season where they would be left on their own. After this, an evaluation may then be made to assess their viability as extension aides to the extension workers.

It seems that the women cooperators have shown much interest to practice IPM. However, it is not certain up to what extent they could serve as aides to the extension workers. For instance, none of them were able to accomplish the question and answer sheets which to our belief could have indicated their ability to become extension aides. The placards in their rice fields aroused curiosity among the neighboring farmers, yet no questions were asked related to IPM or other farm problems. Most of the inquirers were just interested to know if the rice plots were planted to new varieties so that they might try the varieties too.

Nevertheless this was an indication that women farmers are good entry points in the extension of IPM technology. Moreover, they can learn the IPM technology as quickly as their husbands. One problem is how to have these trained women continuously use what they have learned during the process. Another is how to sustain the interest of the cooperators. The use of Radio DZLB for the school on-the-air on IPM during the conduct of the project seemed to have reinforced their knowledge and interest in IPM. For instance, one of the women cooperators enrolled in this course received an award for excellent performance.

As a whole, the women felt privileged to have been tapped for the project. Generally, there was a sense of achievement on their part and were quite happy about it. According to them, the knowledge acquired has widened their horizon from mere housewives to that of active teamates with their husbands with respect to making decisions for their farm particularly on crop protection.

Table 1. Pre and post evaluation results on the knowledge of women on pests, diseases, their control and natural enemies of insect pests.

Women's Color Code	Percentage of Correct Answer		Percent Increase
	Pre-training	Post-training	
Red	90	100	10
Green	55	90	35
Blue	60	80	20
Violet	35	100	65
Pink	50	80	30
Yellow	60	100	40
Fusha	a	-	-
Brown	45	a	-
White	a	-	
Mean	56.4	91.7	33.3

a - Attended the training but missed the examination.

Table 2. Production costs and returns of ricefields tended by women cooperators in Calauan, Laguna during the dry season crop of January to April, 1986.

FACTORS	WOMEN COOPERATORS[a] 1	2	3	4	5	6	Averageper Hectare (₱)	Percentage Total Cost
Variablecosts (₱)								
Fertilizer	835	600	780	1900	380	825	1108	11.5
Land Preparation	1040	500	1066	3300	911	650	1556	16.2
Labor	537	456	1500	437	994	370	895	9.3
Insecticides	362	196	323	360	0	170	294	3.1
Seeds	196	150	300	420	140	168	286	3.0
Harvesters' share & related labor during harvest	1053	1000	2000	4378	1070	1260	2242	23.3
Fixedcosts (₱)								
Rental of land	1053	985	3420	4650	1368	1680	2741	28.4
Irrigation fee	479	97	604	747	200	294	504	5.2
Total costs (₱)	5555	3984	9993	14292	5063	5417	9626	
farmsize (ha)	0.7	0.5	1	1.5	0.5	0.6		
Totalharvest (kg)	4224	2064	6960	8688	2880	2736	5740	
Estimated value @ P2.85/kg. (₱)	12038	5882	19836	24761	8208	7798	16359	
Profit (₱)	6483	1898	9843	10469	3145	2381	7129	

[a] 1-C. Alcantara, 2-T. Manalaysay, 3-E. Salise, 4-Latayan, 5-N. Salise, 6-R. Padilla.

The role of women in cooperatives

Mimosa C. Ocampo*

INTRODUCTION

This workshop provides an opportune time to review the efforts made in connection with studies on women in rice farming systems in the Philippines. The research project on women in cooperatives in particular, provides some contributions to the network's concern of contributing to the overall picture of women in development. Significant findings have been generated, summarized and discussed by cooperatives, in consideration of the many particularities and differences among the study cooperatives with respect to the area location, features and performance of the women members. Correspondingly, recommendations were also forwarded on a per cooperative basis.

Background Information
Our contract with the Mission Administered Fund (MAF) Program of the Canadian Government stipulated:

> "The broad objective is to determine the role of women in cooperatives and evolve program strategies. The project will start with a review of existing literature and a study of historical movements within the

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cooperatives sector. Interviews will be conducted with women members of cooperatives to determine:

- who the women are with respect to demographic or socio-economic factors;
- factors constraining or facilitating their participation;
- their perceptions and attitudes.

There will be an in-depth case study of a cooperative and other data gathering through questionnaires. The study will involve both government and non-government cooperatives with a focus on Region IV. Within the NGO sector, the findings will be broken down into NATCCO (National Association of Training Centers for Cooperatives) and non-NATCCO members, in order to arrive at a product that MAF can present to NATCCO as a basis for discussion".

The above research considerations have guided the project in the conduct of the studies in purposively selected successful cooperatives in Region IV. Both government organization (GO) and non-government organization (NGO) assisted/organized cooperatives were considered for the study.

Objectives

Specifically, the study attempted to:

1. determine demographic and socio-economic characteristics of women who were involved in cooperatives;
2. determine how women became involved or were mobilized in cooperatives;
3. determine the extent, nature and dynamics of women's involvement in cooperatives;
4. identify perceptions, attitudes and values on women's participation in cooperatives, from the male and female member's viewpoints;
5. determine the factors which constrained or facilitated the participation of women in cooperatives; and,

6. evolve strategies by which women could more effectively benefit from, and contribute to, cooperative growth and development.

CONCEPTUAL FRAMEWORK

The General Focus

This study focused on women in successful cooperatives. It explicitly identified who the women participants were, quantified the magnitude of their involvement, traced the history of participation and identified relevant variables which may have influenced women's participation in cooperatives.

The choice of successful cooperatives as focus of the study was deliberate. Amidst so many reports on the failures of cooperatives, this study chose to dwell on some of the few successes. It was perceived that perhaps, in the conduct of the study, a relationship would shape up and that certain directions in this regard can be established.

The general framework under which the study was undertaken consisted of two levels:

1. the cooperative as a social and economic system, and
2. the role of women in this system.

The Cooperative as a System

As a system, the cooperative evolves objectives, plans, and programs. It also has its own set of methods, rules and procedures. It conducts its affairs in accordance with its generally accepted and time-tested principles. There is a given "bureaucracy" under which levels of authority and lines of responsibilities are defined. The management authority stems from the Board of Directors who have been vested the responsibility by the general membership. A cooperative manager becomes answerable to a Board of Directors while the latter is answerable to the general membership. Hence, final authority rests on the members of the cooperative. Rewards are provided for good behaviour, and sanctions are imposed on poor behaviour. If a member patronizes and avails of the services of the cooperative and performs his responsibilities as a member, he stands to get more savings, profits and dividends in the process. He also becomes a member in good standing. On the other hand, a "delinquent" member does not only lose his good standing in the cooperative but also deprives himself of certain privileges. As a system, the cooperative undertakes continuing/periodic reviews of its objectives as well as its methods and rules, and accomplishments. Different types of cooperatives - credit, consumers, marketing, producer, multi-purpose or development - while bound by some common principles of volunteerism, democratic control, and sharing of economic benefits on the basis of participation and patronage to meet members' common needs (Sandoval, 1986), will have its own particular objectives, methods and rules.

It is within this system that the members operate.

A cooperative, in general, is geared towards social and economic development. Cooperatives are business enterprises or economic institutions and yet at the same time, are social development, non-profit and service-oriented organizations. Social development carries with it a people-orientation - the promotion of knowledge and skills, more positive attitudes and values, the fostering of harmonious and meaningful relationship among its members, their increasing degree of participation and assumption of responsibility in the cooperative. This applies to members as well as the directors, staff as well as managers within the cooperative. This applies to both men and women in the cooperative. It also applies to the integration of the cooperative into the life of a community in particular, and of the nation, in general.

Economic development carries with it increased incomes, additional value to goods sold and possibly a share in the over-all profits of the cooperative. Such financial benefits in the same apply to all members of the cooperative, irrespective of roles and responsibilities, and irrespective of sex. Cooperatives, to continuously serve the needs of its members and play a meaningful economic role in the community, should be able to operate profitably and efficiently.

But generally, however, the performance of a cooperative is judged mainly on the basis of business viability. Hence, a cooperative which continues to survive, come up with positive profit and loss statements and register increased assets over time, is considered successful. Success has often been measured, in strict economic terms such as assets and the cooperative's ability to service its members' material needs. In turn, the thrust of cooperative education has been often to increase the technical and managerial skills of the organization and enable the cooperative leaders to focus their energies on coping with organizational problems such as inefficient accounting and budgeting system, poor keeping of records, delinquency in loan repayments, poor attendance in meetings or lack of implementing mechanisms to ensure safety of members' investments.

For many cooperative leaders and managers, the basic concern is still how to gain the villagers' trust and loyalty to the cooperative. To them, organizational difficulties only point to a more basic question: "How do members think of the cooperative"? Do they really need or at least feel they need the services of their cooperative? How much do they identify with the cooperative as being their own organization?

That cooperatives are both economic as well as social development institutions, but are generally judged on the basis of its business performance, has resulted to a "dilemma of dualism" (Ledesma et al, 1982).

To find, therefore, a cooperative manager who is both a "businessman" and a "social engineer" is an admittedly difficult but major task for the cooperative. Just how the "successful" cooperatives under study were managed and participated in by women are interesting points to study. Are women capable of being both "businessmen" and "social engineers" at the same time?

In the choice of a study locus, the viability of the cooperative and women's participation were among the criteria considered.

Women in Cooperatives

After chosing the cooperatives for the study, our next step was to look at women in these successful cooperatives.

It was necessary to view women from several perspectives in the attempt to understand her role in cooperatives.

First, we looked at her personal, family and social features. Many studies have already established that these characteristics influence behaviour of both men and women.

There are limited studies which directly address the characteristics of women in cooperatives but it can be hypothesized that the same determinants for behaviour which influence women in other aspects of life may apply also in cooperatives. A number of studies have been reported relating such traits as age, civil status, education, number of children, occupation, income, and the like, to social participation not necessarily on cooperatives. It would be interesting to find out which of these characteristics will also apply to women participating in cooperatives.

Second, one should look at the history by which she became involved. The shift from traditional roles of a housewife to "new" roles as leader, facilitator, or participant outside the home must have followed a chronological sequence of decisions made, evaluated and implemented; of external factors which constrained or facilitated the decision process. Of particular importance here is the role of husband as encourager, discourager or passive party to this role change. What have the husbands got to do with women’s participation in the cooperative?

Rafales (1961) pointed out how women have participated in cooperatives even before they became members, in a deceptively simple but actually important way of representing their husbands in meetings and acting as their effective public relations agent with credit and marketing association like the FACOMAs of the ’60s. Rafales also implied in his study that women learned about cooperatives from their husbands. In another feature story citing the UN-FAO review of women's participation in the cooperative movement in Southeast Asia, it was pointed out that women were still largely outside the cooperative movement and its benefits. It was usually the men who became members. And even if women became members, in many cases, women were not entitled to avail of loans without the written permission of their husbands (Carreon, 1984).

But other factors that motivate women to join cooperatives have also been reported. Foremost was inflation which had caused economic problems especially among those in the middle and lower groups. In the face of rising prices and the need to supplement and make the most from family incomes, large numbers of women joined consumer and credit societies hopefully to generate small savings and obtain financial help in reasonable terms (Cruz, 1975).

The same reason was also given by Valmonte (1975) with regard to why women as well as men join cooperatives . . . . "women join cooperative credit unions for the same reasons that - they need the services of a financing agency where rates of interest are much lower than elsewhere, and they appreciate the boon or dividends and patronage refunds". The men's need for credit also applies to women: to increase family's income through expanded production and investment and to improve the family's welfare through increased consumption (Buvinic, 1979).

Having isolated the features which characterize the women in cooperatives and having traced the historical development by which they became involved in cooperatives, the study tried to determine exactly what the women do in the cooperative: their positions and other roles. In other words, an assessment of the degree of the women's participation is critical to the study. Aspects like activities participated in, roles and position, business and non-business relationship with the cooperative are important. Do men and women have equal access to productive resources and experiences such as in technology use, credit, and trainings in the cooperatives? What opportunities accessible in the cooperative have been missed by women because of male-oriented approaches or inappropriate ways to reach women?

Geron (1979) reported that women cooperative members participated in all activities like meetings, voting, borrowing, input-purchases, office holdings, coop-education/trainings, conducting publicity/ research works and issuing literature, inspecting and examining books of accounts, etc. What is the impact of these activities among women participants? Likewise what is the impact of women's participation in these activities to the cooperative?

As the woman becomes involved in the cooperative, she develops her own perceptions and attitudes about herself, other members and the cooperative. Corollarily, she is also the object of perceptions and attitudes of others. These two-way perceptions and attitudes influence the degree and quality of social relationships of the women in the cooperatives. This aspect is of particular importance because, as discussed, the involvement of women in roles outside the home may still be a "radical" idea for many people. As of late, rural women still encounter difficulties such as lack of experience, inadequate business knowledge, poor or faulty management, inadequacies in finance, marketing and training, and insufficient support. Even as members of the cooperative, they rarely attend meetings and remain passive and find it hard to make their views heard. The women's voices were both low and rarely heard. Gaerlan (1975) earlier cited specific problems which had been recorded to limit women's participation in cooperatives. These are lack of women organizers and leaders who have time, sincere belief and zeal in cooperation; lack of just compensation for women leaders; travel and transportation facilities; big families preventing women's active participation, indifference and negative attitudes of members and funding problems for projects.

Considering all of the above, projections towards the future may be made. Recent literature argue for greater women participation in almost all aspects of social, economic and political life. The cooperatives as an organization can provide a venue for women's greater involvement and participation in all these areas of life. Cooperatives may be able to create work opportunities for women members, as well as raise their income-earning capacity and provide them with educational and social facilities. Further, Lamming (1983) reported that almost all collected data with regard to women have been encouraging. For one, ample participation by women in agricultural cooperatives may help to promote the better utilization of the capabilities and initiatives of all human resources in the agri- sector, facilitate a broader and more realistically based dialogue between the authorities concerned with planning and implementing agricultural development programmes and those who actually till the soil, contribute to raising food production and hopefully contribute to improving the standard of life among farming women and those dependent on them. Cooperative membership also gives them a platform from which they could be heard more effectively and in their coming together, decide and share in the use of the means of production and marketing.

METHODOLOGY

Initial Activities
The research project was initially undertaken through what could be called an "immersion" in the world of cooperatives with the different agencies, organizations and people involved in the movement. This was done through a review of literature, reports, inter personal interviews, written communications and attendance in workshops/ conferences.

The immersion process was designed to enable the researcher to be thoroughly familiar with the status, operations and problems of cooperatives as a general background for the study. In the process, a comprehensive view of the cooperative movement was obtained; basic guidelines for selection of the 'sample' cooperatives were formulated and the support and cooperation of the different institutions and individuals were solicited.

Selection of Geographic Area for Study
Region IV was purposively selected as the geographic site for the study. Several factors influenced this choice. One was that Region IV had the most number of registered cooperatives in the country. Out of the national total of 3,279 full-pledged cooperatives, thirty-one percent were in Region IV (MAF, 1984). Hence, it was deemed that conducting the study in Region IV would allow for a wider base to choose cooperatives to be studied.

Another consideration was proximity to Los Banos. This has convenience and funding implications. The study group, (Women in the Rice Farming System Network) under which the research was conducted, and the Researcher were based in Los Banos. Consequently, more frequent visits to and consultations between the study base and the field could be done. Since the study sites were relatively close by, travel cost was minimized.

Selection of Cooperatives for the Study
The criteria for choosing the specific cooperatives were already determined as early as when the research proposal was

submitted for funding. These criteria included:

1. *Viability.* This referred to the business viability of the cooperative as indicated by continuing operation, positive income statements, increasing assets and patronage and support by members.
2. *Size of general membership.* The cooperative(s) to be studied should have a membership of at least 100.
3. *Size of women membership.* At least 50 percent of the overall membership should be women.
4. *Accessibility.* The cooperative should be in a community that is easily accessible by land transportation, without undue inconveniences and where transport costs are reasonable.
5. *Barangay-based.* The cooperative should be based in the barangay, serving the needs of people within and nearby this barangay.

These were the original criteria used. As the proposal was being reviewed for funding, it was suggested that in the choice of the cooperatives for study, there should be an assurance that both government and non-government organized/affiliated cooperatives be studied, and that for the latter, a cooperative supported by the NATCCO should be included. Hence, these additional criteria were considered in the final selection.

Ultimately, three cooperatives met the above criteria and thus were chosen for this study.

Data Gathering

Four data gathering methods were used: a) the structured interview schedule; b) participant observation; c) key informant interview; and d) secondary data-gathering and analysis.

Structured interview. Interview schedules were designed and administered to women and men respondents in each of the cooperatives. For each cooperative, fifty female and twenty male members were randomly selected from the roster of active members of each cooperative studied. These respondents were then interviewed. Interviews with female members covered information on their personal characteristics, the extent, nature and dynamics of their involvements; some constraining and/or facilitating factors to their involvement, and their perceptions and attitudes on women's participation in cooperatives. The same considerations applied in the interview of the male members.

Key informant interview. Some members of the Board of Directors, business staff and other knowledgeable members were also interviewed. For each of them, a set of guide questions (not necessarily structured schedules) were prepared. Data gathered from them were mostly on the historical developments; opinions and perceptions on certain activities; problems and needs and other aspects of the cooperative necessary to more fully understand and report on each of the cooperative as a case. The intention was for the case studies/information on the cooperatives to serve as a backdrop against which the women-members could be viewed.

Participant observation. Complementing the interviews were the visits, actual residence in the area and day-to-day observations of the cooperative in its operations and of the officers and members as they interacted with one another. Observations were recorded in a diary/logbook.

Secondary data gathering. Correspondingly, records of the cooperatives in terms of membership growth, business activities, financial aspects and other relevant matters were also looked into to gain further insight into the workings of the cooperatives, and the role of women in them. Secondary data gathering also included an exhaustive literature review specifically with respect to the history of cooperatives, which was also an expected output of the research project.

Data Processing, Analysis and Presentation. The data gathered through the different methods were collated and analyzed at U.P. Los Banos.

Responses were pre-listed, coded and fed to the computer for tabulation, frequency counting, percentage computations and relationship analysis. For analysis of correlations, the chi-square test was used where applicable.

Secondary data and those gathered from key informant interviews/participant observations were organized and categorized. Where applicable, tables were drawn, frequencies and percentages computed and analysis subsequently done. Percentages were computed based either on the number of respondents (n, N) or the times that responses were mentioned (frequency).

Data were classified into three categories: government-organized/ assisted cooperative (GO), non-government organized/assisted and NATCCO affiliated cooperative (NGO-N), and non-government organized/assisted and not affiliated with NATCCO (NGO-NN).

LIMITATIONS OF THE STUDY

All three cooperatives covered by the study were credit cooperatives. Hence, the generalizations offered by this study may apply only to credit-type cooperatives. It would have been ideal if other types of cooperatives were covered but time (and funding) constraint obviated this from being done.

However, inspite of the limited coverage, it should be mentioned that on a national scale, credit cooperatives accounted for sixty percent (60%) of the total 995 registered cooperatives in 1984 (MAF, 1984). Hence, the findings of this study would be largely applicable. Furthermore, it was a common observation that credit cooperatives were among the more stable cooperatives in the Philippines. A closer look at what these credit cooperatives had undertaken would reveal that in reality, they were actually more than credit cooperatives. Their operations included paving the way for the establishment of consumers cooperatives, actual production and marketing of some commodities and even conducting trainings for other cooperatives. In other words, they were more of "multi-purpose" or development cooperatives.

Related to this limitation to credit cooperative was the suggestion by the funding agency to include a NATCCO-affiliated cooperative in the study. Almost all NATCCO-affiliated cooperatives which met the criteria of viability, barangay-based and high women membership were credit-types.

Correspondingly, in the presentation and analysis of the study findings, the classifications of GO, NGO-N and NGO-NN were used. It must be stated, however, that there is hardly any cooperative today that would neatly fit into any one of these categories. In one way or another, cooperatives have been touched by, or have interacted with, a number of cooperative-linked organizations, both government and non-government. Time, degree, extent and nature of interactions differ and the study could not really quantify these differences. Hence, the categories used were mainly for heuristic purposes.

Another limitation was the inability to correctly name and identify the cooperatives studied. The names of the cooperatives, places and persons mentioned in the study were disguised following the practice in business case writing. This was done to assure the confidentiality of the information gathered, to protect the informants and researchers, and to make the study more widely circulated for instruction and research purposes.

Finally, like most preliminary studies, there is the need for replication to substantiate the generalizations made. The study was done in only one region, on only one-type of Cooperative. On this basis, conclusions were made. How valid they are with respect to other regions, other types of cooperatives may have to be addressed by a bigger study.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

The findings of this study are summarized and discussed by cooperative in consideration of the many particularities and differences among the study cooperatives with respect to the area location, features and performance of the women members. Correspondingly, recommendations are also forwarded on a per cooperative basis.

The GO Cooperative

The Study Area. The area where the GO cooperative was situated appeared to be more developed or less rural. Livelihood involvements were more diverse: farming, fishing, services, employment, etc.; population density was 2.3

households per hectare; transportation was readily available since the barangay was located along the national highway. Electricity was available; there were private medical practitioners aside from a rural health unit. Elementary, secondary and even a specialized vocational institution were present in the barangay.

The Cooperative. Although considered the youngest of the three cooperatives studied established only in 1981, it was apparently the most stable and viable. Its business performance is quite impressive. In 1986, its net income was P101,711.91, patronage refunds were P41,096.69, dividends were P26,308.40, and a total of P802,238 was released as loans to the members.

Membership, which was 137 at organization had grown to 255 as of 1986 and has been consistently growing. However, only the original members have been provided formal pre-membership seminars. All the other subsequent members were "informally" trained/oriented by the Business Manager herself.

Still another notable feature of this cooperative was that from the very beginning, up to the conduct of the study (1986), it only had one set of Board of Directors and the same Manager. No elections for Board of Directors had been held. This same set of officers/Board of Directors also run another consumer cooperative.

While some complaints had been aired regarding officers perpetuating themselves, by and large, the members were satisfied especially in the light of impressive business performance of the cooperative.

The Women in the GO Cooperative.
Demographic and Socio-Economic Features. The women-members of the DCCI were, on the average, 47 years old, married, had attended 10 years of schooling, had 10 members in their households and were engaged in a major occupation which was mainly the practice of a profession. Farming is no longer a major occupation for majority (56%) of them.

Their mean household income of P57,635 is more than twice the national average for rural households. They perceived themselves to be adequate in terms of food, clothing, shelter and educational needs.

How They Became Involved. They learned of their cooperative within a year from its organization mostly from relatives. Even before their formal affiliation with the cooperative, majority (63.26%) had been involved with cooperative activities like meetings, social affairs, seminars. Such involvements were voluntarily motivated by curiosity or by request by other members. They joined mainly to avail of loans and material benefits.

Nature/Extent and Quality of Involvement. On the average, a DCCI member was a member of two or more organizations, i.e. political, religious, professional etc. In most of these, the GO women assumed the leadership position.

According to majority of them, their primary transaction with the cooperative was securing loans (56%), paying them back (56%) and patronizing goods and services offered by the cooperative (54%). Eight of ten women-members availed of loans which were mostly for productive (68.3%) rather than providential (53.7%) purposes. On the average the women-members had secured loans from the cooperative more than once (1.21).

Significantly, not all of the respondents had participated in pre-membership seminars. However, many of them had participated in skills-oriented or livelihood seminars sponsored by their cooperative in cooperation with other agencies.

Facilitators and Constraints. Almost all (96%) women-members were satisfied with their cooperatives. Only a little over one-third (38%) had problems mainly in terms of getting loans, management policies and attitudes of management staff.

Majority alleged that they were aware of their responsibilities with their cooperatives. This included paying back their loans (86.05%), attending meetings (81.39%) and participating in other cooperative activities/affairs (37.21%). Almost all of those who claimed that they were aware of their responsibilities performed accordingly. The very few who were not able to perform their responsibilities cited lack of time and money as reasons.

In terms of benefits derived from the cooperatives 30 percent of the women respondents claimed that they had not yet received benefits such as dividends, rebates and bonuses.

Specific Recommendations for the DCCI.

1. The business performance was most impressive and should be sustained. Loans were provided regularly, loan amortizations were very regular, control systems were in place and documentation of loans and other financial transactions were complete and readily accessible.
2. The matter of additional loan funds for the cooperative must be addressed. There were some (minor) complaints about lack of loan funds. It is likely that this was true since Management deferred releases of patronage refunds and interest earnings for five-years as part of the capital build-up schemes. While this meant increased fixed deposits to the members, and more loanable funds from the cooperative, it also meant deferred benefits. And the decision on how to use his own earnings had been pre-empted for him by the cooperative. While it was a move calculated to ensure cooperative's viability at the start and enable more members to be served, it also underscored the need for continuing information dissemination and education among members.
3. The absence of election for members of the Board of Directors must be corrected. Five years from its inception, no election had been held. This was clearly a violation of cooperative principles. The need for "stability" may have been the major

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* An election was held on its sixth year, immediately after the data gathering activities in connection with this study. It is surmised that the project, in a way, had been able to sensitize the leaders to set the stage for another election and conform to the prescribed cooperative procedures.

concern hence no changes were effected. But since the business had already stabilized, systems and procedures in place, an election of the Board of Directors should have been called in the next general assembly. The need was for a more enlightened and vigilant membership who will actually exercise their power to decide as expressed in: a) the general assembly when they can elect their own representatives and approve/disapprove the cooperatives policies and general plans and b) their continuing inquiries/ interest into the business and related operations of the cooperative.

Enlightened and vigilant membership could only stem from an education and information program, oriented specifically to the members as to their rights, privileges and responsibilities. This should be the centerpiece of the plan for this GO cooperative. And this should start with "formal" and more systematically conducted pre-membership seminars. This has not been done in recent years.

4. The matter of management staff is different, altogether. The manager occupies the position at the discretion of the BOD. Considering the effective business performance of the present Manager, it is likely that she shall continue to be appointed as such. However, the business acumen of the manager should be tempered with values consistent with the democratic nature of cooperatives and the human development concerns of the organization.
5. The management, despite its success in making the cooperative a viable credit operation and in providing loans to members, should perhaps bother to keep members updated with its financial status, business policies in a pleasant, cordial and collegial manner. Aside from the general assembly meetings, other avenues should be explored to keep the members informed.

The Manager's philosophy of sacrificing popularity over business success has valid points. But popularity and business success need not be an "either or" proposition. Popularity and business success would be more consistent with cooperative management.

6. The Manager's influence was widely felt. Furthermore, the employment of her son as a staff of management and the presence of the husband as a member of the board, while both may be the most qualified to assume said positions, had precipitated some uncalled for remarks from some members; more so, by the fact that the office building of the cooperative was owned by the mother of the manager and was located right next to the residence of the Manager.

   Talks about the cooperative becoming an exclusive organization of this family were extant. There were, of course, reasons behind why this situation came about. However, the negative perceptions must be corrected as they may not be conducive to "healthy" relationships. It is suggested that the policy on the limits by which kinship could be allowed within and perhaps, between the board and the management be seriously looked into by the BOD for possible implementation in the cooperative.

7. In terms of women's participation in the cooperative, the study has established their active and intensive involvements. In fact, they dominated in many aspects of the cooperative: Board, management, general membership, loan availments, etc. The need is simply to build upon these, perhaps in terms of training courses pospecifically oriented for homemakers to improve their respective "crafts" or business in addition to whatever roles and vocations they have, to make them more enlightened and interested participants in cooperative activities.

8. There are discriminatory rules or practices against women. Hence, the status should be maintained including the provision of education and training for both men and women members.

The NGO-N Cooperative

The Study Area. The area of the NGO-N cooperative was the most rural. Agriculture was the dominant occupation; population density was 1.04 households per hectare; road systems were poor; water was provided by pumps, rivers, and creeks; only one elementary school was in place; no health services or recreational facilities were locally available and many houses were made of semi-permanent or temporary materials. The area was extremely dependent on sugarcane.

The Cooperative. This was the oldest among the three cooperatives studied having been established in 1972. Its major feature was the growth of its capital assets from P1,745 in 1972 to P1,335,806.75 in 1986. This was accomplished through several schemes e.g. retained cash dividends and patronage refunds, percent retention on loans, voluntary subscriptions and collections by its extension worker.

Business performance was also impressive. In 1986, total loans released was P1,222,442.75. Net savings was P76,132. Patronage refunds were not, of course, released to members but instead credited to the fixed deposits of members and retained by the cooperative as part of its capital build-up scheme.

Membership which was 35 at its organization grew erratically with periodic increases and decreases, and with minors accepted as members. In 1986, membership was 467 including adults and minors.

Since the beginning, the cooperative had hired two managers, both female. Both had resigned. However, while there were staff turnover, the membership on the board of directors had been quite stable. In fact, only one Board Chairman had served from the very beginning. The Board's influence was strongly felt in management. Since the chairman of the Board was also the president, his influence was felt even in day-to-day operations.

Training for management staff were continuing, mainly provided by the NATTCO; so with skills-oriented training for members. However, training on cooperatives for the general membership had not been continuing.

The Women in the NGO-N Cooperative.

Demographic, Socio-Economic Features. The women of PCCU were, on the average, 45 years old, had 8 years of schooling, with an average of eight members in their household and the majority (60%) had crop and livestock farming as their major occupation.

Household incomes at an annual average of P38,776 were less than those in the GO, but this was also higher than the over-all average income for rural households. They too, perceived themselves adequate in terms of their basic needs for food, clothing and shelter and education. But in numbers, they constituted less than those in the GO cooperatives.

How They Became Involved. The manner by which they became involved with their cooperative was similar to that of the GO group. There was early awareness of the cooperative. "Curiousity" and "being requested" by others prompted them to be initially involved. Their main reason for joining was to avail of loans and majority (68%) joined voluntarily. However, a lesser number of women respondents were involved in their cooperative before they formally joined.

Nature/Extent and Quality of Involvements. The perceived main objective of the cooperative was to help the residents and the community. Almost all of the respondents felt that this and the other objectives of their cooperative were met. By and large, the women of the NGO-N were less involved in other organizations: only 1.5 organization/women respondent with most of them being only members of these other organizations.

Majority of the women (62%) did not have pre-membership seminars. But almost all had training on skills at livelihood-based aspects. As with the GO, securing of loans (90%), payment of loans (40%) and patronage of cooperative store (32%) were the most common reported transactions with the cooperative. Almost all (98%) of the women had availed of loans, mostly for providential purposes. Each of the women had, on the average, 1.17 loans from the cooperative.

Facilitators/Constraints. All of the women were satisfied with their cooperative but about three-fourths (72%) of the respondents claimed that they have problems. These problems revolved on payment of loans, availment and/or securing of loans and others based on specific cooperative positions assumed by these women.

All of the women said they were aware of their responsibilities. Attendance in meetings (98%), loan payment (94%) and helping in capital formation (60%) were considered the more important responsibilities. Almost all claimed that they actually performed these responsibilities.

Benefits perceived were mostly loans (70%). A generalized perception that their cooperative helped improve the living standards of residents and the community was cited by 36 percent of the women respondents.

Only 12 percent of the women claimed having unreceived benefits. But this was in terms of "scholarship", a benefit not really provided by the credit cooperative but by a group which affiliated itself with the cooperative.

As with the GO, no awareness about the national cooperative structure was observed among the women of the NGO-N.

Specific Recommendations for PCCU.

1. The business performance of this cooperative was impressive. Members were provided loans, repayment rates were good, control system, documentation of loans and financial transactions were complete. This must be carried on.
2. The cooperative had built up its capital funds through several innovative schemes and consequently had the most impressive capital formation performance among all the three cooperatives studied. It had successfully used internally generated funds.

   The capital formation schemes, however, meant deferred benefits to members. Patronage refunds, dividends, rebates and other financial benefits due to members had not been released but were instead credited to the individual fixed deposits of the members and were used as loan funds. This had been true for the past 15 years.

These retention schemes should be re-studied if the need for loan funds had been the motivation behind these schemes. Perhaps other schemes should now be explored. Certainly there is no shortage of funds which could be loaned to a cooperative as big and stable as the PCCU for its credit operations. Loans to members could be provided without retaining wholly the benefits due them. The matter of perhaps "higher" interest rates if loan funds were derived from external instead of internal sources should be decided on not only on the basis of financial but also social consideration.

3. This "conflict" in the interest of the member and his cooperative's capital build-up scheme is best reflected in the retention of part of loan proceeds. Depending on the shares subscribed, the PCCU retains a certain percent of the loan proceeds due the borrowers. Therefore, the borrower does not get the full amount of the loan he had applied for. When a borrower specifies an amount in his loan application, it is assumed on the basis of a projected need which the loan is expected to maximally meet. By not granting the full amount, the loan does not fully or at least, maximally serve the need.

   When the member borrows again, he would then specify an amount beyond what he really needs to give allowance to what his cooperative will withhold. He thus "overborrows" and the practice gets reinforced, maybe not only in his dealings with the cooperative but in other areas of relationships as well.

   More seriously perhaps is that the practice is so much like other credit schemes characterized by high deductions and interest rates; so much unlike an organization of by and for members that which is a cooperative.

The above comments on retention schemes are mere suggestions. Any scheme or practice may be employed by any cooperative provided the schemes are discussed comprehensively and agreed on by majority of the general membership.

4. With respect to the general membership, the same observation as with the GO cooperative applies: a lack of cooperative education for the people who had become members already. One is struck by the reality that while a lot of efforts seems to be exerted to inform, motivate non-members to join and to provide pre-membership seminars to those on the verge of joining, no systematic effort to educate them when they are already members seem to be in place. This is true not only with the GO and NGO-NN but also with many other cooperatives.

5. The key officials of the PCCU had remained basically the same since its inception 15 years ago. Again, this is not undesirable per se. It makes for stability and given the fact that annual elections are held and the same people are elected, validates this arrangement.

However, observed pattern of kinship spills over to the management staff. Almost all in the management group are relatives of one or some of the directors. Considering the cooperative's creditable business performance, there may be nothing wrong in the arrangement. However, a policy on the limits by which kinship could be allowed within and perhaps, between and among the officers and staff should be looked into for ethical purposes.

6. The latest staff turn-over may be an eye-opener. The reason for the manager's resignation was "conflict" with the board over implementation of certain loaning policies and hence, has a direct consequence on business operations. In this case, resignation of the manager was inevitable.

This resignation incident indicates the spread of influence of the Board, through its chairman and president. Comments about the centralized decision-making on the cooperative may have some validity. The distinctions between being chairman of the board for policy formulation and president of the cooperative for policy and plan implementation may be too fine if one sees one and the same person. Granted that this arrangement continues, efforts to explain these distinctions must be seriously undertaken.

7. The issue of dominance may have sex (gender) underpinnings. There were seven males and only two females in the board. The incorporators were males. And it was in this area where more females signified to being "mere housewives" compared with the other two cooperatives. Perhaps it is this area particularly which explains the dominance of the males.

    Dominance of course is not by numbers alone. The management staff of the PCCU was mainly female: five females against one male. But the president was a male with a "strong" personality; hence, the dominance by virtue of position and personality.

8. The turn-over of managers may be addressed in another light. None of the managers have had training on management. There were training courses on bookkeeping and accounting but none on cooperative management.

9. Another particularity of this cooperative was its having accepted minors as legitimate members. True enough, minors should preferably be involved in cooperatives and cooperativism. They are, after all, the future doers. But to accept them as full-fledged members, coming from the same households where their adult counterparts came from is fraught with certain ethical questions. A household with 10 members will have 10 votes. One with only 5 can only have five. In a way, this may contravene the principle of one man (or one woman), one vote. Carried to extremes, one can increase his voting share by enjoining the "minor" members of his household

to join. The other consideration is that of what the credit cooperative really is all about. It is service in the form of loans to members. Households, therefore, with more members, including minors, could avail of more credit services. And the credit needs of minors are much less (considering their economic and social status) than their adult counterparts.

10. The study also identified a sex-based constraint to a woman being a manager. The last manager became pregnant in her term and consequently had to take a leave of absence. Even when she was not yet on leave, certain particularities of pregnancy e.g. dizzy spells, vomiting, made her less efficient in her task.

    This, most certainly, will not apply with men as managers.

The NGO-NN Cooperative

The Study Area. The area of the NGO-NN was within the legal boundary of a city. It was a barangay in a city where possibilities for employment, services and business abound. There were much more livelihood opportunities and dependence on the primary industries of agriculture and fishery was much less. Population density was still high with 2.3 households per hectare. There was electricity and piped-in water. There were no rural health service and barangay roads were poor. But while amenities viz movie houses, parks, recreational centers, schools from kindergarten to tertiary levels, medical and other professional services appeared wanting in the barangay itself, these were only "a tricycle away". Hence, while these were lacking in the barangay itself, access to them was very easy.

The Cooperative. This cooperative was established in 1975 and appeared to be the least viable. In 1986, a loan volume of only P28,712 was extended to 25 members. Net savings was only P4,473. Patronage refund totalled P4,917; dividends were P8,317. Furthermore, until 1982, its records had not been properly kept.

When organized, it had only 27 members but membership increased to 133 in 1986.

Another notable feature of this cooperative was its fast turn-over of management and Board of Directors. Since its inception the board have had eight presidents, all, except one, having been males. The management staff received no salaries. And no managers had been hired since it started.

From the beginning, two families dominated the board and the general membership. In 1986, SMCCU had for its president, an "outsider", a male who was instrumental in initiating many projects. Among these new projects were papaya commercial farming, floating fish cage, swine dispersal, cattle fattening, etc. These projects were in addition to a consumer cooperative store, which was put up in 1986. Hence, the SMCCU appeared to be not only a credit but a multi-purpose cooperative.

Between 1983-1986, members had been provided a total of eight training courses on social awareness and livelihood-based projects.

It is to be noted also that while the business appeared least viable in comparison with the two other cooperatives, the membership of the SMCCU had exhibited the highest degree of social awareness as to what cooperatives can do to the members and the community.

The Women in the NGO-NN.

Demographic and Socio-Economic Features. Compared with the other two cooperatives, the women in the NGO-NN were younger (average age, 38 years), had less schooling (7 years), less number of household members (6) and of the 74 percent with major occupation, business was the common job. The women in this cooperative were also no longer mainly pre-occupied with farming.

Household incomes were also much lower; only P21,957 per annum which was just about the national average for rural households. Correspondingly, perceptions on adequacy with respect to basic needs was relatively less. In fact, majority perceived themselves inadequate with respect to housing needs.

How They Became Involved. The pattern in women's involvement was the same as with the other two cooperatives: early awareness, relatives as source of initial information, curiosity and requests as basis for involvement, material motivation (loans) as reason for joining. "Community welfare" was also cited as a reason for joining. Likewise, women joined voluntarily - neither persuaded nor coerced.

Nature/Extent and Quality of Involvement. The women in this group shared the same understanding of the objectives of their cooperatives as those of their counterparts in the GO and NGO-N: To help residents and the community primarily through loans. All of them agreed that their cooperative was accomplishing this objective.

Most of the women were also involved in organizations other than their own cooperative. On the average, each of the women was a member of 1 or 2 other organizations. Unlike the other two cooperatives, all the women-respondents have had pre-membership seminars. Like the others, most of them have participated in livelihood/skills oriented training courses.

In terms of transactions with their cooperative, earnings (24%) and goods on credit basis (20%), half of the women-respondents claimed they did not receive some benefits and these were with respect to dividends, patronage refunds and disapproved loans.

Specific Recommendations for SMCCU.

1. Among the three cooperatives, the SMCCU certainly was the "poorest". Records, until 1982 were improperly kept, if at all. Since then, recording systems have improved but far from being adequate to meet the needs for effective control system and documentation.
2. It was also the least professionally managed. There were given positions for the Board and for the management staff. But the board meets irregularly. Management is by "paki-suyo" or based on "sacrifice" since no salaries are paid. Even their office spaces were not rented but were instead availed of through the goodwill of the treasurer and lately, the project officer of the SPFCG. In other words, no payments for the board, the management staff, or the people who worked for the cooperative.

While this "paki-suyo" arrangement or non-payment for efforts are particularities of newly organized cooperatives, this certainly is no justification for a cooperative as old as SMCCU.

Since it was organized, there have been no full time or hired manager. The officers themselves handled the management of the business of the cooperatives.

3. The SMCCU was the most socially aware. It was only from among its members that the objective of cooperatives to serve as a mechanism for the improvement of the members and the community's life was mentioned. It had the most number of "social awareness" seminars, a result perhaps of the bias of its proponent agency, the PBSP. By itself, this is not wrong. What appears inadequate is the balance of social awareness and cooperatives itself. Too much social awareness, too little on cooperatives as to structures, operations and possibilities.

4. The SMCCU was also the one with the most diversified projects. But the projects were not really those of the cooperative as a whole but of certain groups within the cooperative. While there was communal papaya farming, for example, this project was communal only to five members; even non-members were involved.

What SMCCU needs are those which are quite basic to credit cooperatives: Credit funds, membership, seminar, cooperative-related training and education; professional management, active and enlightened BOD. This is, if SMCCU is to be viewed and is to continue as a credit cooperative.

The manner by which SMCCU operates is almost like a multi-purpose enterprise (not necessarily a cooperative). There are many projects which were instituted by the new manager, who came into the organization as an entrepreneur. Hence, the projects came along with him. But credit operations continued as-slowly-as-before. Projects institution and organization were contingent on an individual.

5. The linking of the SMCCU with the Christian Children's Fund, a charitable institution, while resulting in benefits to members may have a negative note in that members may (and some already have) associate their cooperative as a charitable, not a business operation.
6. Among all the three cooperatives studied, woman's participation in this cooperative appeared to be much less. The Board consisted of three males, and two females; working committees with a total of 17 members had only six female. Overall membership was 55.6 percent female. Still, there was no apparent discrimination whether in membership, officers, etc. If ever, perhaps, women were less involved, perhaps these were a matter of choice.

The Perception on Role of Women by Men and Women Respondents (All Cooperatives)

Both men and women endorsed women's participation in the cooperatives. However, their perceptions differed. For the men, female associated traits of patience, industry, greater sense of responsibility was most predominantly cited. The women on the other hand, felt they should be involved in cooperatives to prove women's equality with men. The women-bound traits, cited by males, was hardly mentioned by the females. Women actually, participated in the cooperatives to avail of loans which was perceived to be the most central benefit by both men and women.

Non-participation by women was due to lack of knowledge about cooperatives, lack of interest and lack of money. These were the major views expressed by both the men and women.

In terms of women's roles in the cooperative, only a small minority (20.7% males and 16.7% of females) would relegate women to being "plain members". The greater majority foresaw officer/management roles for them.

Only a minority viewed that these were roles not well-performed by women. And from both the males and females, these roles/responsibilities were attending meetings at night. Paying of loans, officer roles, management positions and certain jobs suited to men only were cited more predominantly by men than female respondents.

Women's performance in their cooperative could be further enhanced through education and training programs. Other suggestions were the provision of more responsibility, incentives and awards to acknowledge women's contributions and more income generating activities. These were suggested by both male and female respondents. A significant suggestion made by men but not mentioned by women was to adjust cooperative schedules to suit women better.

The major suggestion on how to attract more women was also through information campaigns such as lectures, seminars and other education campaign strategies on the benefits of cooperatives.

General Recommendations

The foregoing recommendations were specific. They recognized the distinct particularities of each of the cooperatives studied. Certain recommendations, however, have general applications.

The general recommendation of this study is to strengthen the education program of all the cooperatives. While all the cooperatives have their own programs, certain inadequacies were observed. This is particularly with pre and actual membership training and education. Cooperatives education start before actual membership. Before membership, training is designed to recruit and orient members on the benefits of cooperativism, explain what cooperatives are all about and the roles, responsibilities and privileges of members. Education for members are designed to build upon these pre-membership initiatives and make the members more enthusiastic and effective participants of their own cooperative and of the over-all cooperative movement. Hence, complementary to skills/livelihood-oriented seminars, continuing information and education on cooperatives are necessary.

The cooperative education and training program, therefore, must be tailor-made for each of the study cooperatives in terms of specific areas to be emphasized, methodologies and expected results. But the premise is that additional knowledge, more positive attitudes and values are basic outputs of training and education among the members which would make for more effective and efficient cooperatives, in its truest sense. This is true with all cooperatives.

Consistent with this study's focus, such a program should be oriented principally to women - not to make them more superior to men but to substantiate the premise of equality between the sexes.

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Table 1. Cooperatives in Region IV,* 1986.

Province	Types of Cooperative						
	Credit	Consumer	Producer	Marketing	Service	Integrated	Total
Laguna	2	4	1	-	-	-	7
Batangas	3	12	2	1	2	-	20
Cavite	2	4	-	-	-	-	6
Rizal	2	4	-	-	-	-	6
Quezon	-	6	-	-	-	-	6
Palawan	-	5	3	-	-	-	8
Mindoro	2	2	1	-	-	-	5
Marinduque	-	1	-	-	-	-	1
TOTAL	11	38	7	1	2		59

* From Basic Data Provided by the Cooperative Union Of Southern Tagalog Inc. (CUSTI) Executive Director.

Table 2. Cooperatives in Region IV affiliated with Tagalog Cooperative Development Center. Inc., (TAGCOTEC)/NATCCO), 1986.

Province	Types of Cooperative						
	Credit	Consumer	Producer	Marketing	Service	Credit and Development	Total
Laguna	4	–	–	1	–	–	5
Batangas	27	–	–	–	–	–	27
Cavite	6	–	–	–	1	–	7
Rizal	1	–	–	–	–	1	2
Quezon	21	1		1	–	4	27
Palawan	–	–	–	–	–	–	–
Mindoro	–	–	–	–	–	–	–
Marinduque	1	1	–	–	–	–	2
Aurora	2	–	–	1	–	–	3
TOTAL	62	2		3	1	5	73

* From Basic Data Provided by the TAGCOTEC Program Analyst. TAGCOTEC is one of the five training centers forming the National Alliance of Training Centers for Cooperatives (NATCCO). TAGCOTEC covers Regions III and IV.

Table 3. Cooperatives in Region IV *

Province	Credit	Consumer	Producer	Marketing	Service	Integrated	Total
	Types of Cooperative						
Laguna	29	3	2	3	5	-	42
Batangas	34	6	1	3	4	-	48
Cavite	17	3	3	1	3	1	28
Rizal	9	2	-	-	-	-	11
Quezon	33	2	-	3	1	-	39
Palawan	4	3	-	3	4	1	14
Mindoro	6	-	-	1	2	1	10
Marinduque	4	1	-	-	-	-	5
Aurora	4	-	1	-	-	-	5
Romblon	3	-	-	-	-	-	3
TOTAL	143	19	6	15	19	3	205**

*From Basic Data provided by the Cooperative Union of Philippines (CUP) through CUSTI Executive Director, 1986. (Appendix C).

**Not included in this count were 4 secondary and tertiary cooperatives, i.e. CRBs, AMCs, and Unions; 3 Farms Associations that were unclassified.

Table 4. Status of TAGCOTEC affiliated cooperatives.

Type of Cooperative	COVERAGE STATUS OF COOPERATIVE						
	BARANGAY			MUNICIPALITY			
	Viable	Not Viable	Total	Viable	Not Viable	Total	GRAND TOTAL
Credit	6	5	(11)	33	18	(51)	62
Consumer	-	-	(0)	2	-	(2)	2
Producer	-	-	(0)	-	-	(0)	0
Marketing	-	-	(0)	1	2	(3)	3
Service	-	-	(0)	-	1	(1)	1
Credit & Development		-	(0)	5	-	(5)	5
TOTAL	6	5	(11)	41	21	(62)	73

* Some cooperatives were not appraised for viability.

The value and the allocation of time in favorable and unfavorable areas

Leonardo Lanzona, Jr.*

INTRODUCTION

The purpose of this paper is to examine the possible effects of technology on the value and on the allocation of time by rural households in favorable and unfavorable villages. By definition, an area is favorable if it is fully irrigated either by gravity or pump, and technology refers to the use of modern varieties, irrigation, and mechanization. It has been noted in various studies (Barker and Cordova, 1978; Goldman and Squire, 1981) that labor market conditions are greatly affected by the use of modern technology.

Two observations have been cited: First, there is a moderate decline in total labor use per hectare due to a large decrease in labor use in "area-based" activities such as land preparation and planting. Second, there is an offsetting increase in labor use in "output-based" activities like harvesting and threshing.

The reduction in labor use in area-based activities is partly attributed to a rise in the wage rate relative to output price and other factor prices and to the adoption of labor-saving machineries. The increase in labor use in output-based activities is a result of the large increase in crop yield due to the adoption of modern seed-fertilizer technology.

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The main problem to be considered here is to explore how labor market conditions are affected by the modern technology. This is particularly important because market opportunities are major determinants of income levels and income distribution in the village economy. Specifically, this study tries to estimate how the level of wage rates and the allocation of time of household members are affected by the adoption of modern technology.

The theory to be used is the theory of household behavior as pioneered by Becker (1965) and subsequently developed by Gronau (1973). Within this framework, two important issues are addressed.

The first issue is the effect of economic and environmental factors on time use patterns. In the unfavorable areas, which is generally characterized by sparse and uncertain water supply and mountainous topography, the potential for rice production is limited. However, time use in economic work can be so arranged as to earn income comparable to favorable rice growing areas if households are able to engage in other income-generating activities such as livestock raising and non-rice crop production.

The second issue is concerned with the role of women in intra-family allocation of time. It is important to understand the effect of modern rice technology on the labor demand for women in order to evaluate its welfare implications for the family, particularly in the areas where the job opportunities for women were limited.

In rural agricultural areas, employment opportunities may be usefully categorized into (1) self-employment (mainly on small farms); (2) work for wages on other farms; and (3) work for wages in non-agricultural activities. The major hypothesis of this paper is that the adoption of modern seed-fertilizer technology raises job opportunities for all individuals, most particularly the landless and the women. This increases the probability of raising household income and the welfare of the family as a whole.

The paper is organized as follows: Section II discusses the survey and sampling method used and Section III identifies the important household characteristics of the sample households and presents the basic findings on time use. Section IV provides the general labor market characteristics which indicate the appropriate empirical framework for the study. Section V features the model specification which shall be used for testing the hypotheses. Section VI presents the regression results. Finally, Section VII presents the conclusions.

SURVEY AND SAMPLING METHOD

The time allocation survey is part of a much larger project which aims to analyze the differential effects of modern technology between favorable and unfavorable areas. The main purpose of the time allocation survey is to provide a more comprehensive and systematic study of the preferences and decisions of individual household members (specifically with regard to labor utilization) given differences in technological environments. For this purpose, the survey sought to collect detailed time allocation data, which permit the role of value of time in individual labor supply decisions.

The favorable areas are those where irrigation water is available throughout the year. The favorable areas chosen were Maragol in Nueva Ecija and Pandan in Iloilo. Gabaldon, a rainfed area and a neighboring village of Maragol, is classified as semi-favorable because a part of the area is irrigated by pump. Unfavorable areas are those locations which mainly depend on rainwater. The areas chosen were Rizal and Signe in Iloilo. Of these two, Signe is considered to be more unfavorable.

The survey was divided into three main parts. First, the one-day-recall time allocation survey aimed to gather data on the daily activities of farm members ranging from rice production activities to food consumption for a period of 12 months. The survey in Nueva Ecija started in August 1985 and in Iloilo, in October of the same year. In order to provide the same reference point, the analysis in this paper started in the month when care of crop and harvesting activities were being done in both provinces. This was the month of September in Nueva Ecija and October in Iloilo.

Second, a one-day recall wage and other income-generating employment survey was conducted in order to examine the factors which affected the time allocation recorded in the first part.

Third is the one-month recall survey gathered data on each member's wage and income during the previous month as well as other information which measured the family's income level.

The sample chosen for the survey was a stratified random sample of households for the five villages. The stratification criteria were tenure status (landless and farmers) and household size, and the population was stratified into five groups. The landless worker households were divided into three groups, i.e., those with household size with less than six persons and those with household size exceeding five. Farm operators were divided into three groups -- those that operated less than one hectare, between one and two hectares, and more than 2 hectares. Table 1 shows the distribution of households based on the above stratification procedure. The sample frequency was approximately proportional to population proportion.

HOUSEHOLD CHARACTERISTICS AND TIME USE

The close relationship between household characteristics and time use has long been recognized. In most empirical studies of time allocation, individuals or households have been categorized in terms of their differences in ability, skill and work. In effect, there are different sub-markets existing for different kinds of labor. Furthermore, though there is mobility of workers between submarkets, this is observed to be limited. Some group of workers compete, but others are separated by household and individual characteristics. For example, differences in land ownership and schooling are seen to divide individuals into non-competing groups. In short, there is a series of markets, each with its own demand and supply curves. In this sense, wage differentials in rural labor markets can also be explained.

The household characteristics of the survey sample, categorized by sex, farm group and location, are given in Table 2. Though the average age is almost identical for all individuals in all villages, important differences in these characteristics can be observed. First, individuals in Pandan, except for the male landless group, are more educated than the individuals in other areas. For all villages, the landless are also seen to be less educated than the farm household members. Second, the percentage of landless males who reported that farming is their primary occupation is greater in favorable than in unfavorable villages. However, the male members of farm operator households have roughly the same percentage in all the villages. In the case of females, the percentage of persons who have chosen farming as their primary occupation is greater in unfavorable areas. Third, the number of dependents of the landless individuals is on the average higher in favorable areas. Fourth, the area cultivated in Nueva Ecija is greater than the area in Iloilo. It can be seen that Signe, the more unfavorable area, had the lowest land area cultivated.

These differences in household characteristics should then imply corresponding differences in time allocation. Table 3 shows the average hours per day spent in selected activities classified by sex, farm group and location. The significant findings are the following: First, in unfavorable areas, the amount of time individuals devote to rice wage labor activities is shorter than in favorable areas. Second, landless workers in favorable areas seem to spend more time in rice labor activities than in other income-generating activities. Third, all individuals in unfavorable areas are observed to spend more time in non-rice income-generating activities. Fourth, females in unfavorable areas spend more time in other income-generating activities than in rice. Moreover, in Signe, the amount of time the landless females spend in all income-generating activities are greater than that of the landless males. In Rizal, the landless females also spend as much time in other non-rice wage labor activities as their male counterparts.

These observations are the basic findings of the survey. The important conclusion is that the technological factors along with household characteristics such as education, sex and landownership are significant determinants of time allocation. What cannot be captured by the above analysis however is the role which markets perform in the allocation of time. The importance of wage rates as determined by labor market characteristics cannot be gleaned from these simple tables.

OVERVIEW OF LABOR MARKET CHARACTERISTICS

According to the time allocation survey, market activity in each village is affected heavily by the seasonality of rice production. Figures 1 and 4 show the average hours spent in all wage and income-generating activities by all individuals in each of the five villages. Income-generating activities refer to own rice farm production activities, wage labor activities in rice outside the farm, and all other non-rice production activities where incomes can be earned, which include animal husbandry, non-rice crop production, wage labor in upland crops, regular non-farm employment as well as trading, processing and vending.

Figure 1 shows the hours spent per day in economic work in Nueva Ecija. The chronology of activities can be described as follows: The months of September to December were spent on crop management and harvesting during the 1985 wet season. November is the peak harvesting month for both villages. January to June 1986 comprise the dry season, with May as the peak harvesting month. July to August 1986 were the months when land preparation and crop establishment were done for the coming wet season.

From September to November 1986, there was only a slight difference in hours per day in market activities in the two villages. Data show that during the wet season, work hours spent in crop care and harvesting were roughly identical for the two villages. Since output levels for Maragol and Gabaldon are comparable and crop care and harvesting are output-based activities, the time devoted to these activities were also similar. In December, a land preparation month during the dry season, a significant decrease in work hours was observed in Maragol. The high degree of tractor use in Maragol is likely to have reduced the amount of labor required for this activity. Working hours in the succeeding months increased and became identical in Maragol and Gabaldon. In January to February, both villages had a smaller percentage of farms adopting direct seeding, and the consequence of such a process is an increase in the level of crop care labor requirements. However, in April and May, the hours spent in economic work in Maragol significantly rose and became greater than that of Gabaldon. This can be explained by the wide divergence of yields and cropping intensity in the two villages during the dry season.

A deeper insight into the seasonality of economic work can be gained by classifying labor use by sex. Figures 2 and 3 feature the hours spent in economic activity in Nueva Ecija by males and females, respectively. In these figures, only members of the family in the labor force were considered.

In general, the pattern of seasonality found in Figures 2 and 3 is similar to Figure 1, but some differences were found in the months of September, February, June, July and August. In September, the hours of work by males were greater in Maragol. However, in the same month, females in Gabaldon spent longer work hours. Being a crop care month, labor markets were slack during this period. Females in Gabaldon spent much of their time in non-farm wage labor activities while the males working time in rice labor markets decreased.

In both villages, from January to February, the rate of increase in female work hours was observed to be much higher than the rate of increase in males' work time. During these transplanting months, the amount of female wage labor hours in rice production activities was observed to be almost the same as the male labor hours. The importance of transplanting, the common planting process in Nueva Ecija, cannot be ignored. During these activities, wage labor contracts are activated.

Women's Labor Allocation in Income Generating Activities

The observation for the three months under consideration also provided an indication of labor substitution among the members of the family. Since postharvest activities are done in June, both males and females were observed to decrease labor hours. However, females in Maragol were seen to provide greater hours of work in other income-generating activities such as livestock raising. Males, on the other hand, spent more time at home during this period. In the case of Gabaldon, the rate of increase in labor hours of the females rose further in July. July is generally a land preparation month, which normally means a slack month for males given the use of tractors. However, non-farm activities may still be done. Women were then observed to offset this general slackness in the market by looking for alternative work.

Hence, after the dry season harvesting in Gabaldon, women provide much of the labor activity in the village.

Figure 4 shows the average work hours per day of all individuals for income generating activities in Iloilo. The production process in this province is staggered; thus, a fine distinction of activities as seen in Nueva Ecija may be difficult to identify.

The following observations can nonetheless be made. First, the peak months in Pandan are indicative of the three cropping patterns found in the village. Moreover, hours spent in work in Pandan during harvesting months, such as November, February to March, and May to June, are always greater than the two other villages.

Second, the importance of non-rice and non-farm activities is evident in Signe. In April and May, a significant increase in work time is reported in this village. This is due to an increase in harvesting and selling activities of upland crops as well as animal husbandry. These months, however, were followed by a sharp decline in work hours.

Third, Pandan in general is characterized by a higher work time. One reason for this is that the care of crop activities is more intensive in this village due to some weeding problems in the area. Nonetheless, the high intensity of rice activities throughout the year seems evident.

Fourth, the high labor requirements in land preparation can be observed in both Rizal and Signe. In February and March, Rizal has a relatively high level of work hours because of this activity. Moreover, in July, both Signe and Rizal exhibit a higher degree of labor use primarily because the land preparation activities in both villages used a lower percentage of tractors.

In order to make a detailed examination of labor supply among the family members, the work hours were segregated by sex. Figures 5 and 6 feature the time spent in economic activities by males and females, respectively. Essentially, the pattern of the seasonalities shown in these figures is similar to Figure 4. However, in Signe, it can be observed that in July, the hours of work done by women rose to a significant level. The activities during these months are primarily non-rice activities, particularly upland crop production. What is interesting is that this month is followed by a slack month for both males and females. This implies that family income during this month is low. Males spend most of their time in land preparation while women perform various activities in non-rice production.

It is clear from the above analysis that seasonality in rice production is a major determinant of work hours in all of these villages.

Wage Structure

Correspondingly, similar seasonality can be observed in the wage structure of these villages. Tables 4a to 4c show the reported wage rates in each of these villages by month, by activity and by labor contract. The following observations can be made. First, the wage rates are heavily affected by the dominant activities and labor contracts in rice as well as the yield levels in the village. Apparently, wage rates on the average tend to be higher in favorable areas, particularly those wage rates found in permanent and other contractual arrangements.

Second, wage rates particularly in Nueva Ecija are generally equalized especially in casual and daily wage contracts, which suggests that some degree of labor mobility exists in these areas. It is expected that in more favorable areas higher demand for labor will raise wage rates. However, if labor supply from other villages were increased, the wage may not increase significantly. In this sense, labor mobility may represent adjustments of labor markets across villages.

Third, wage rates in Iloilo tend to be more diverse. This may be due to the pervasive slackness in the rice market in unfavorable areas. Nevertheless, wage rates in non-rice activities in the unfavorable villages are observed to be almost the same as the wage rates in Pandan. Again, in this case, the possibility of labor mobility can be cited as a factor for the regional equality of wage rates.

The above analysis indicated that the labor markets in these villages are characterized strongly by both wage and labor supply variability. Moreover, market activities by males and females appear to be heterogenous in the sense that women engage frequently in the outside labor market. Further, wage rates within the same categories of activities do not appear to vary significantly across villages because of high labor mobility. Hence, rural labor markets in these areas may be viewed as highly competitive. This may make the application of the standard time allocation model more appropriate (see Becker, 1965).

MODEL SPECIFICATION

The theory underlying the empirical study of time allocation among different activities simply postulates that an individual chooses to allocate his time among different activities based on the potential wage or earnings so as to maximize his utility. The higher the expected wage rate in one labor market, ceteris paribus, the more likely is the person to enter that labor market and the higher the expected earnings in owned rice production or other non-farm activities, the less likely is the person to work in the hired labor market. In short, the hours spent in one activity is largely determined by the factors affecting the value of time.

The change in technology which reduces time intensity of work also has important consequences on time allocation. Assuming other things constant, a fall in the wage rate in rice production increases the amount of time for domestic and leisure activities since opportunity costs are reduced. This can arise from a pervasive use of tractors in land preparation or direct seeding in crop establishment. Assuming that domestic work or leisure activities are normal goods, the adoption of modern technology will lead to an increase in time spent for domestic and leisure activities to the extent that it increases the income of households. Nevertheless, participation in rice related activities may not be reduced, if wage rates in those activities are improved.

The problem in estimating time allocation however is how to define the appropriate wage rate as an independent variable. Two sources of difficulties may arise. First, there is a serious problem that those who did not work at all did not report a wage rate though the wage rate they may potentially face in the market is positive. This is known as the truncation problem. Second, some biases in estimation occur if the amount of time spent on a particular activity and the reported wage rates are jointly determined by the same set of factors. In the literature, this bias is known as the simultaneity bias.

A serious consequence occurs from these problems if those who did not report wages arc housewives who devote all their time in domestic work. In such a case, those who reported wages will constitute only a fraction of the population, i.e., mostly the male wage earners. A sample selectivity bias may become serious. Bardhan (1981) tried to solve this problem by estimating a market wage rate function for the workers who reported wages, and from this equation, obtained a predicted wage for persons who did not report a wage. However, as Heckman (1974) points out, Bardhan's method does not solve the truncation problem. At the same time, given the presence of contractual arrangements, the wage rate is affected by the hours of work devoted by the person. Hence, the problem of simultaneity bias needs to be considered.

Another consequence arising from these difficulties is that, in considering hours spent in one activity, net labor supply in the market may be bounded at zero and may thus be censored and concentrated at that bound. This then causes some inefficiency in the ordinary least squares regression results. In other words, the factors affecting participation or non-participation may not be considered, thereby leading to some misspecification. Tobin (1958) suggested that instead of using ordinary least squares (OLS), the proper method for estimation is to use a limited dependent variable estimation. In any case, Rosenzweig (1980) noted that OLS regressions will still be efficient for earners who spend negative time on some labor activities, as in the case where they are net employers of laborers. Intra-family labor allocation may also fall in such a case since family members are expected to substitute labor hours for other members.

Keeping these statistical problems in mind, the reduced form equations based on the existence of structural relationships between time allocation and wage rates shall be estimated in this study. This empirical specification can be regarded basically as an extension of the studies done by Rosenzweig (1978) and Sumner (1981).

Finally, a regression analysis of the determinants of time use for the wage and income earners was done. Five categories of activities considered in the estimation were: (1) all wage and income-generating activities, (2) economic work other than wage labor activities in rice, (3) wage-labor activities in rice, (4) domestic activities, and (5) leisure and consumption activities including school. By estimating the linear model for each activity, the substitutions between various activities can be broadly identified.

ESTIMATION RESULTS OF THE REGRESSION ANALYSIS

The estimation results of the reduced form wage rate regressions for the sample of workers reporting wage earnings are shown in Table 6. In the first column, the dependent variable is the average wage rate of non-rice and non-farm activities. In the second column, the dependent variable is the market wage rate in production.

Two major findings can be made from this table. First, the level of wage in rice as well as in other income-generating activities is heavily dependent on the characteristics of the individual and household. Area cultivated and farm group variables in the first column have negative signs, implying that individuals with ownership or cultivation rights of lands will tend to face lower rates outside their own rice production. This may be due to the fact that participation in these activities is much lower for farm operators, who would prefer to work in their own lands. The landless and the small farm owners may be viewed by employers to have more specialized skills since their experience in hired labor activity is greater.

The age variable has a negative coefficient in the first equation but a positive coefficient in the second equation. This signifies that aging limits production capability in non-farm and non-rice activities while the same increases rice labor activities.

In the case of gender, it can be observed that women tend to have a higher earning capacity in non-rice and non-farm activities. This supports the observation that women are more engaged in non-rice and non-farm activities.

We have obtained somewhat perplexing estimation results with respect to the coefficients of education and non-labor earnings variables. Contrary to the theoretical expectation, education is shown to have negative effects on the wage rate. This may have arisen from the fact that those who are educated tend to have permanent jobs and, hence, work only temporarily in the casual labor markets analyzed here. Similar to the large farm owners, they are seen by employers to lack appropriate skills. The positive signs of the coefficients of non-labor earnings suggest that the market wage rates are higher for those who have larger non-labor income. The possible explanation of this result may be that individuals whose non-labor earnings are high will participate in the labor markets only if they can get high wages. This is due to their high reservation wage associated with income effect of non-labor earnings.

The second major finding is that in favorable areas, the wage rate tends to be lower in non-rice and non-farm activities but higher in rice labor markets. In Gabaldon, however, it can be observed that non-rice and non-farm wage rates are slightly higher than Signe. These findings are consistent with the observation that, in unfavorable or semi-favorable areas, the percentage of non-rice and non-farm incomes in individual earnings is greater than in the favorable areas. This also suggests that the demand for labor in non-rice and non-farm activities is greater in unfavorable areas than in favorable areas. This also suggests that the demand for labor in non-rice and non-farm activities is greater in unfavorable areas than in favorable areas. Hence, females, who are more specialized in non-rice and non-farm activities, receive higher wages than males in unfavorable areas.

Table 7 shows that in favorable areas, the probability of participating in a labor market in all income-generating activities is higher. This suggests that individuals in favorable areas have a greater tendency for work in labor markets since wages offered in these markets tend to be greater than their reservation wages, i.e., the value of their time in own farm or home activities. This finding is significant for the analysis of income distribution among villages because it is observed that personal income in favorable areas is much higher than in the unfavorable areas. This may be due to the increased demand for labor in rice production.

Several estimated coefficients in this table deserve some mention. First, the value of the peak seasons in the individual's decision to participate in the rice labor markets is significant, indicating the importance of seasonality in the study of labor supply and wages. Second, the coefficient of education is positive and more significant in all income-generating activities than in the rice labor market activities. This suggests that schooling leads to greater participation in more permanent regular employment rather than in casual employment usually found in rice. Third, non-labor earnings are significant but take different signs in the two columns. This implies that an increase in non-labor earnings induces individuals to participate in all income-generating activities but reduces participation in rice market activities via an income effect. It can be observed that the effects of household size also show the same pattern. Finally, of all the village dummies, it is Maragol and Gabaldon which had the significant contribution to the probability of working. This may be due to transplanting which raises labor demand especially in rice.

Tables 8, 9 and 10 show the estimation results of the time allocation function among five different groups of activities. Table 8 considers all individuals, aged 7 and above, who had participated in any of the income-generating activities. Tables 9 and 10 categorize these individuals by female and male, respectively.

The following important observations can be made: First, personal characteristics remain as significant factors. Note that in the case of all individuals (Table 8), the coefficients for farm group, education, sex, household size and non-labor earnings are significant determinants of time allocation. However, in the case of males (Table 10), education, household size and non-labor earnings are not significant in determining time use. In the case of women (Table 9), household size and skill as measured by education restrict working time in rice production.

Second, the importance of technology is confirmed by the fact that the amount of time spent in rice labor market activities by all individuals is higher in favorable areas particularly in Maragol. This is particularly advantageous to landless rice workers who are actively engaged in rice labor markets. Another finding is the suggestion found in Table 8 that domestic activities tend to be greater in favorable areas. This may be due to the income effect brought about by high wages in rice labor activities.

Third, an interesting difference is found in the use of time between Pandan and Maragol. In Pandan, the value of time appears to have increased as individuals are observed to have devoted more time to non-rice as well as rice production activities. In Maragol, significantly high rice wage labor hours appear as activities in the rice labor market which seem to have been done at the expense of other activities, particularly in non-farm and non-rice activities. This can be explained by the fact that Pandan has smaller farm sizes. At the same time, persons in Pandan are more educated, thus increasing the probability of working in non-farm regular employment.

Finally, Table 9 shows that female wage labor hours in rice are higher in favorable areas. In Nueva Ecija, female wage labor hours are significantly higher than in the unfavorable areas. In Gabaldon, it is even suggested that it is more likely that the males are performing other non-rice activities (Table 10). In Signe, the opposite may be true. The importance of market wage rates seems to be highlighted by this finding. In favorable or unfavorable areas, household decisions on time allocation and labor force participation are observed to be based heavily on the potential market wage rates.

CONCLUSION

Our analysis provides some indication that technology factors are significant in enhancing labor supply decisions, particularly in the rice market. More precisely, the study confirms the idea that an improvement in technology, which is associated with irrigation, raises the demand for labor and increases the level of wages in rice production. As a result, in rice labor hours have increased for both males and females.

This study also confirmed, through logit analysis, that participation in all income-generating activities throughout the whole year can be raised by technology. The increase in wage rates for hired labor in rice production has resulted in greater labor market participation throughout the year on the part of households in favorable areas. The importance of seasonality, especially in areas where transplanting is used, is also seen to be a significant factor in labor participation.

The final result of the analysis is that given all of these factors, the probability of raising incomes is higher in favorable than in unfavorable areas. The significance of labor activities in rice production as a major source of earnings is viewed to be an important feature of favorable areas. Though individuals in unfavorable areas may allocate more of their time to non-rice and non-farm activities, profitable opportunities remain low.

For the landless in unfavorable areas, this implies significantly lower incomes especially if their human capital assets are not enough to allow them to engage in more lucrative income generating activities. If incomes are seen to have been significantly different between these areas, the presence of economic opportunities seem to be a major reason for this eventuality.

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Table 1. Distribution of households in villages and time allocation survey.

I. Nueva Ecija

	Maragol		Gabaldon	
	Census	Time Allocation Survey	Census	Time Allocation Survey
1. Farm household	209	9	130	9
No. of hectares owned:				
less than 1.0		2		2
1.0 - 1.9		3		2
more than 1.0		4		3
2. Landless households	48	7		7
No. of children:				
less than 6		4		4
more than 6		3		3

Table 1 . . . (continued)

11. Iloilo

	Pandan		Rizal		Signe	
	Census	Time Allocation Survey	Census	Time Allocation Survey	Census	Time Allocation Survey
1. Farm households	84	6	146	7	111	6
No. of hectares owned:						
less than 1.0		3		3		3
1.0 - 1.9		2		2		2
more than 1.0		1		2		1
2. Landless households	63	4	27	2	11	2
No. of children:						
less than 6		2		1		1
more than 6		2		1		1

Table 2. Mean household characteristics by sex, farm group and location.

	Maragol	Pandan	Gabaldon	Rizal	Signe
MALES					
Landless: N	16	9	10	4	4
Age	32.1	35.1	34.9	29.3	35.5
Education (yrs. in school)	5.0	3.7	4.0	6.0	3.8
Percentage reporting farming as primary occupation	64.6	36.6	78.5	23.7	33.3
Number of households	4.3	1.8	3.4	3.7	1.5
Farmer: N	20	17	16	20	13
Area cultivated (ha)	3.3	1.3	2.0	1.6	0.5
Age	33.6	34.4	33.3	37.3	36.5
Education (yrs. in school)	7.2	8.3	7.8	5.8	5.1
Percentage reporting farming as primary occupation	50.4	40.7	46.6	41.7	46.4
Number of dependents	1.2	0.2	1.8	3.8	3.3

Table 2 . . . (continued)

	Maragol	Pandan	Gabaldon	Rizal	Signe
FEMALES					
<u>Landless</u>: N	12	7	8	2	3
Age	32.4	38.7	35.6	34.8	37.4
Education (yrs. in school)	5.4	6.2	5.1	7.3	5.9
Percentage reporting farming as primary occupation	10.6	18.7	45.7	8.7	30.6
Number of dependents	4.8	1.9	3.5	2.6	3.4
<u>Farmer</u>: N	24	10	13	17	12
Area cultivated	3.2	1.3	2.0	1.6	0.5
Age	33.5	36.7	35.5	37.5	38.1
Education (yrs. in school)	7.2	8.9	6.0	7.4	6.2
Percentage reporting farming as primary occupation	0.0	10.4	0.0	12.8	2.0
Number of dependents	1.2	1.2	0.8	3.6	3.6

Table 3. Mean hours spent per day in selected activities by sex, farm group and location.

	Maragol	Pandan	Gabaldon	Rizal	Signe
MALES					
<u>Landless</u>:					
All income-generating activities	3.92	7.82	4.74	2.32	2.00
Economic work other than rice wage labor activities	0.73	5.82	1.94	1.16	1.90
Wage labor activities in rice	3.18	2.00	2.80	1.16	0.10
Domestic activities	1.16	1.82	3.44	2.41	4.50
<u>Farm Operator</u>					
All income-generating activities	5.00	5.62	5.87	6.19	5.13
Economic work other than rice wage labor activities	3.27	5.55	4.81	5.60	5.13
Wage labor activities in rice	1.73	0.07	1.06	0.59	0.oo
Domestic activities	3.04	2.54	2.55	1.50	2.49

Table 3 . . . (continued)

	Maragol	Pandan	Gabaldon	Rizal	Signe
<u>FEMALES</u>					
<u>Landless</u>:					
All income-generating activities	2.08	1.42	2.25	1.42	2.50
Economic work other than rice wage labor activities	0.65	1.15	0.02	1.15	2.50
Wage labor activities in rice	1.43	0.27	2.23	0.27	0.00
Domestic activities	4.44	2.54	6.77	9.60	4.13
<u>Farm Operators:</u>					
All income-generating activities	4.54	4.55	4.23	4.55	4.92
Economic work other than wage labor activities	4.49	4.48	2.96	4.48	4.92
Wage labor activities in rice	0.05	0.06	1.27	0.06	0.00
Domestic activities	3.72	3.72	4.40	3.72	4.53

Table 4a. Reported wages[a], one-day and one-month recall, time allocation survey, Nueva Ecija.

		Season	Major Activity in rice prodn.	Rice Production: Casual, Fixed rate	Rice Production: Casual, Share rate	Rice Production: Permanent, Fixed rate	Rice Production: Permanent, Share rate	Post harvest activ.	Regular emlym.	Wages in Non-rice and Non-Farm Activities
				P/mandays						
Maragol										
1985	Sept	Wet	Care of Crop	30.00		40.00	34.80		30.00	60.00
	Oct		Harvesting	15.00		40.00	34.80	30.00	30.00	26.45
	Nov		Harvesting	18.00	23.50	40.00	34.80	15.00	30.00	58.75
	Dec	Dry	Land preparation	40.00					30.00	33.75
1986	Jan		Crop establishment	16.75		44.00	30.00		30.00	31.50
	Feb		Crop establishment	15.00		44.00	30.00		33.00	55.80
	Mar		Care of crop	21.50		44.00	30.00		44.00	30.75
	Apr		Harvesting	15.00		44.00	30.00	30.00	36.00	40.00
	May		Harvesting	18.00	22.50	44.00	30.00	36.00	33.00	82.00
	June	Wet	Land preparation	50.00				21.75	40.00	70.00
	July		Crop establishment	15.00		30.00			31.33	19.00
	Aug		Care of crop	22.00		30.00			30.00	30.00
Gabaldon										
1985	Sept	Wet	Care of crop	24.00		15.00			30.00	15.00
	Oct		Harvesting	15.00		15.00		25.50	30.00	32.00
	Nov		Harvesting	20.00	24.00	15.00		20.00	30.00	26.00
	Dec	Dry	Land preparation	58.00				18.00	30.00	66.70
1986	Jan		Crop establishment	15.00		15.00			30.00	38.50
	Feb		Crop establishment	18.00		15.00			30.00	56.25
	Mar		Crop establishment	15.00		15.00			30.00	20.00
	Apr		Care of crop	30.00		15.00			30.00	40.00
	May		Harvesting	15.00	25.00	15.00		33.50	30.00	60.00
	June	Wet	Land preparation	51.00				20.00	30.00	16.00
	July		Crop establishment	18.00		15.00			30.00	20.00
	Aug		Care of crop	23.00		15.00			30.00	20.00

[a] Based on the total wages divided by total mandays.

Table 4b. Reported wages,[a] one-day and one-manth recall, time allocation survey, Pandan and Rizal.

		Season	Major Activity in rice prodn.[b]	Rice Production: Casual: Fixed rate	Rice Production: Casual: Share rate	Rice Production: Contractual: Sagod	Rice Production: Contractual: Pakyaw	Rice Production: Contractual: Pasapar	Post harvest activ.	Regular emplym.	Wages in Non-rice and Non-Farm Activities
				₱/mandays							
	Pandan										
1985	Oct	Wet	Harvesting	15.00		28.00				40.00	30.00
	Nov		Harvesting	20.00	26.50	28.00	17.00	20.88	16.00	40.00	100.00
	Dec	Dry	Land preparation	41.00			17.00			40.00	81.00
1986	Jan		Land preparation/ care of crop	38.00						40.00	50.00
	Feb		Care of crop	25.00		23.40				45.00	54.50
	Mar		Harvesting	17.00	15.50	23.40	15.00	18.00	39.20	45.00	12.50
	Apr		Care of crop	30.00						45.00	18.00
	May		Harvesting	20.00						37.00	91.60
	June		Care of crop/ Harvesting	27.00						37.00	69.16
	July	Wet	Land preparation	60.00						38.00	60.00
	Aug		Care of crop	37.50						38.00	21.50
	Sept		Care of crop	44.00						38.00	25.00
	Rizal										
1985	Oct	Wet	Care of crop	36.00						30.00	21.50
	Nov		Harvesting	20.00	27.50					30.00	21.50
	Dec		Harvesting	24.00			25.50	45.00	15.00	30.00	20.50
1986	Jan		Harvesting	20.00	39.76		25.50		10.00	30.00	33.00
	Feb		Harvesting	20.00	33.15					30.00	28.22
	Mar	Dry	Slack							30.00	20.00
	Apr		Slack							30.00	15.00
	May		Slack							30.00	31.65
	June		Harvesting	15.00	21.00		38.00		15.00	30.00	35.00
	July	Wet	Land preparation	40.00						30.00	28.50
	Aug		Care of crop	28.00						30.00	24.00
	Sept		Care of crop	28.00						30.00	70.00

[a]Wages are based on total wages divided by total mandays.

[b]Production in Iloilo is staggered. High standard deviations are noted.

Table 4c. Reported wages,[a] one day and one-month recall, time allocation survey, Signe.

		Season	Major Activity in rice prodn.	Rice Production			Post harvest activ.	Regular emplym.	Wages in Non-rice and Non-Farm Activities
				Casual		Contractual			
				Fixed rate	Share rate	Pakyaw			
				₱/per manday					
	Signe								
1985	Oct	Wet	Harvesting	20.00	43.74	26.24	21.60	22.50	35.00
	Nov		Harvesting	16.00	40.50	18.00		22.50	35.00
	Dec	Dry	Land preparation			72.80		22.50	30.00
1986	Jan		Slack					22.50	46.67
	Feb		Slack					22.50	20.00
	Mar		Slack					22.50	59.50
	Apr		Harvesting	20.00	35.00			22.50	73.00
	May		Harvesting	20.00				35.00	25.00
	June	Wet	Slack					35.00	24.00
	July		Land preparation	52.50				35.00	18.00
	Aug		Slack					35.00	20.00
	Sept		Care of crop	24.70				35.00	18.00

[a]Wages are based on total wages divided by total mandays.

Table 5. Mean characteristics of households by farm group and sex.

	MALE		FEMALE	
	Mean	Std. dev.	Mean	Std. dev.
LANDLESS				
Area	-		-	
L Age	6.48	1.12	6.73	1.03
Education	5.48	3.36	5.40	3.26
Nonlabor earnings	1684.6	3120.5	508.4	1008.1
Primary occupation	0.62	0.49	0.26	0.26
Household size	3.61	3.14	4.60	3.38
Wage (A11 income-generating activ)	65.02	70.09	45.04	46.04
All Cp[a] (Hrs/day)	4.12	4.28	2.21	3.31
CPH[b] (Hrs/day)	2.78	3.99	1.53	3.18
FARM				
Area	2.37	1.91	2.14	1.66
L age	6.84	0.89	6.98	0.92
Education	8.09	3.29	8.11	3.18
Nonlabor earnings	3302.2	5317.6	2537.0	3667.1
Primary occupation	0.54	0.49	0.003	0.05
Household size	1.64	2.73	1.18	2.34
Wage (A11 income-generating activ)	77.21	146.95	70.06	103.02
All CP[a] (Hrs/day)	6.22	4.17	3.50	3.57
CPH[b] (Hrs/day)	0.77	2.38	0.53	2.02

[a] Hours per day spent in all income-generating activities.

[b] Hours per day spent in rice labor market.

Table 6. Reduced form wage regression on the sample of workers[a] reporting wages and incomes.

Variables	Average wage rate in non−rice and non−farm activities	Average market wage rate in rice production
Intercept	4.1108**	3.4496**
	(14.478)[b]	(5.103)
Area cultivated	−0.1214*	−0.0232
	(1.899)	(0.343)
Farm group	−0.5647**	0.0762
	(2.503)	(0.489)
L Age	−0.8793**	0.2366**
	(3.762)	(2.199)
Sex	1.6359**	−0.7753**
	(7.489)	(6.404)
Education	−0.0585**	−0.0358*
	(2.158)	(2.157)
Household size	0.04119	0.0008
	(1.353)	(0.042)
Nonlabor earnings	0.0003**	0.00005**
	(12.442)	(2.989)
Primary occupation	−0.0861	−0.2937**
	(0.401)	(2.458)

Table 6 . . . (continued)

Variables	Average wage rate in non-rice and non-farm activities	Average market wage rate in rice production
Maragol	−0.5717	1.4823**
	(1.618)	(4.359)
Gabaldon	1.4227**	0.9373**
	(3.684)	(2.640)
Pandan	−0.8083**	0.5334
	(2.021)	(1.480)
Rizal	−0.0858	0.5815
	(0.208)	(1.640)
Peak Season	0.1050	−0.0213
	(0.662)	(0.194)
R^2	.4521	.3104
F−test	24.673	10.14
N	373	264

[a] Excludes workers in regular employment.

[b] Figures in parentheses are t−values.

** and * = significant at 1% and 5% levels, respectively.

Table 7. Reduced form logit analysis of participation in market work.

	D WORKER [a]	R'	DF WORKER [a]	R'
Intercept	-5.2236**		-2.6022**	
	110.874) [b]		(4.207)	
Area cultivated	-0.0871**	0.029	-0.2184**	0.062
	(2.276)		(3.060)	
Farm group	-0.2447*	0.017	-1.2770**	0.144
	(1.753)		(6.466)	
L Age	0.5205**	0.716	0.3044**	0.107
	(10.754)		(4.913)	
Sex	-0.2512**	0.029	-0.8766**	0.118
	(2.248)		(5.378)	
Education	0.0280*	0.022	0.0122	0.000
	(1.937)		(0.641)	
Household size	0.0051	0.000	-0.0639**	0.054
	(0.284)		(2.757)	
Nonwage earnings	0.0002**	0.168	-0.0002**	0.096
	(10.304)		(4.458)	
Primary occupation	-0.5690**	0.067	0.0183	0.000
	(4.317)		(0.111)	

Table 7 . . . (continued)

	D WORKER[a]	R'	DF WORKER[a]	R'
	**		**	
Maragol	2.9742	0.212	1.9435	0.121
	(12.901)		(5.481)	
Gabaldon	2.4292**	0.172	1.5850**	0.094
	(10.537)		(4.368)	
Pandan	0.3258	0.000	0.5829	0.013
	(1.360)		(1.526)	
Rizal	0.4358*	0.022	0.9288**	0.045
	(1.933)		(2.415)	
Peak season	0.1590*	0.000	0.6502**	0.097
	(1.381)		(4.476)	
R−statistic	0.517		0.423	
N	2733		2733	

[a] Dependent variable DWorker = 1 if worker works for wages in wage and income−generating activities and DFWorker = 1 if participant in rice labor market.

[b] Figures in parentheses are standard errors.

** and * = significant at 1% and 5% levels, respectively.

Table 8. Determinants of individual time use: all individuals aged 7 and above (reduced form regressions).

Variables	All income-generating activities	Economic work other than wage labor activities in rice	Wage labor activities in rice	Oomestic activities	Leisure lncl. school
	**		**	**	**
Intercept	6.2394	0.7678	5.4715	−3.5631	21.4442
	(3.647)	(0.527)	(4.228)	(3.008)	(14.295)
Area cultivated	0.0963	0.2016*	−0.1053	0.0200	−0.1095
	(0.850)	(2.091)	(1.229)	(0.254)	(1.102)
Farm group	0.9150**	2.2234**	−1.3084**	−1.10721**	0.4682
	(2.206)	(6.248)	(4.170)	(3.732)	(1.287)
L age	0.8206**	0.9819**	−0.1613	1.4304**	-2.3402**
	(2.326)	(3.268)	(0.604)	(5.852)	(7.561)
Sex	−2.5828**	−1.6844**	−0.8985**	2.6276**	−0.1760
	(7.163)	(5.489)	(3.295)	(10.525)	(0.557)
Education	−0.0836"	−0.0024	−0.0812**	−0.0268	0.0801*
	(1.647)	(0.056)	(2.114)	(0.763)	(1.798)
Household size	−0.0759	0.0376	−0.1135**	−0.1635**	0.2528**
	(1.461)	(0.852)	(2.890)	(4.547)	(5.552)
Nonlabor earnings	0.00003	0.0002**	−0.001**	−0.00007**	0.00001
	(0.903)	(4.388)	(3.744)	(2.342)	(0.354)
Primary occupation	−0.3950	−0.3294	−0.0656	−0.1965	0.4407
	(1.046)	(1.025)	(0.230)	(0.751)	(1.331)

Table 8 . . . (continued)

Variables	All income-generating activities	Economic work other than wage labor activities in rice	Wage labor activities in rice	Domestic activities	Leisure incl. school
		**	**		
Maragol	−0.6121	-1.8657	1.2536	0.8491	−0.4729
	(0.755)	(2.706)	(2.046)	(1.513)	(0.666)
Gabaldon	0.1780	−0.6714	0.8494	0.8973	−1.2912*
	(0.217)	(0.964)	(1.372)	(1.583)	(1.799)
Pandan	1.2161	0.4328	0.7832	0.8018	-1.8866**
	(1.321)	(0.557)	(1.133)	(1.267)	(2.355)
Rizal	−0.2988	−0.8248	0.5260	0.8992	−0.4935
	(0.335)	(1.088)	(0.781)	(1.458)	(0.632)
Peak season	1.3998**	0.7949**	0.6049**	−0.5482**	-0.6693**
	(4.498)	(3.001)	(2.570)	(2.544)	(2.453)
R^2	0.1471	0.3045	0.1485	0.2699	0.1603
F−test	12.317	29.724	12.439	25.255	13.525
N	853	853	853	853	853

Figures in parentheses are t−Values.

** and * = significant at 1%, and 5% levels, respectively.

Table 9. Determinants of individual time use: Females aged 7 and above (reduced form regressions).

Variables	All income-generating activities	Economic work other than wage labor activities in rice	Wage labor activities in rice	Domestic activities	Leisure incl. school
Intercept	4.1990*	0.4644	4.6634**	−1.0793	21.1427**
	(1.692)	(0.238)	(2.546)	(0.512)	(9.501)
Area cultivated	0.1505	0.2724**	−0.1218	0.1461	−0.3021*
	(0.936)	(2.155)	(1.027)	(1.070)	(2.096)
Farm group	0.5416	1.2988**	−0.7572*	−1.3796**	1.2057*
	(0.863)	(2.634)	(1.636)	(2.590)	(2.144)
L age	0.5308	0.8873**	−0.3564	2.2453**	-2.6947**
	(1.108)	(2.356)	(1.009)	(5.521)	(6.277)
Education	−0.2733**	−0.0882	−0.1851**	1.1752**	−0.0359
	(3.769)	(1.548)	(3.460)	(2.845)	(0.554)
Household size	−0.0407	0.0760	−0.1167*	−0.2827**	0.3165**
	(0.573)	(1.363)	(2.230)	(4.693)	(4.979)
Nonlabor earnings	0.0002**	0.0002**	−0.000002	−0.0004**	0.00012*
	(2.655)	(3.429)	(0.055)	(6.139)	(1.889)
Primary occupation	−1.3534*	−0.4896	−0.8637	0.6547	0.7811
	(1.666)	(0.766)	(1.441)	(0.949)	(1.086)

Table 9 . . . (continued)

Variables	All income—generating activities	Economic work other than wage labor activities in rice	Wage labor activities in rice	Oomstic activities	Leisure incl. school
	*	**		*	
Maragol	-1.7205	-2.7141	0.9935	1.5504	0.1086
	(1.656)	(3.322)	(1.296)	(1.757)	(0.117)
Gabaldon	-0.8691	-2.4266**	1.5575*	0.7591	-0.5224
	(0.836)	(2.969)	(2.030)	(0.860)	(0.560)
Pandan	0.4103	-0.8397	1.2500	0.6293	-0.2784
	(0.349)	(0.909)	(1.441)	(0.631)	(0.264)
Rizal	-1.0080	-1.6727	0.6647	1.8221	-0.4712
	(0.276)	(0.582)	(0.247)	(0.587)	(0.144)
Peak season	0.8081*	0.7304*	0.0777	-0.4234	0.0783
	(1.911)	(2.196)	(0.249)	(1.179)	(0.206)
R^2	0.1145	0.2828	0.1143	0.1739	0.1907
F—test	5.065	13.353	5.044	7.596	8.382
N	376	376	376	376	376

Figures in parentheses are t—values.

** and * = significant at 1% and 5% levels, respectively.

Table 10. Determinants of individual time use: males aged 7 and above.

Variables	All income-generating activities	Economic work other than wage labor activities in rice	Wage labor activities in rice	Domestic activities	Leisure lncl. school
		*	**		**
Intercept	1.3592	−3.8116	5.1707	0.7250	21.8976
	(0.565)	(1.796)	(2.831)	(0.553)	(10.491)
Area cultivated	−0.0170	0.1113	−0.1283	0.0419	0.0010
	(0.103)	(0.766)	(1.026)	(0.467)	(0.067)
Farm group	1.0913*	2.8165**	−1.7252**	−0.8966**	−0.0131
	(1.843)	(5.391)	(3.837)	(2.778)	(0.026)
L age	0.3112	0.6533**	−0.3421**	0.4940**	−0.9973**
	(1.111)	(2.645)	(1.609)	(3.237)	(4.105)
Education	0.0548	0.0413	0.0135	−0.1244**	0.1293*
	(0.745)	(0.637)	(0.241)	(3.104)	(2.026)
Household size	−0.0780	0.0261	−0.1041*	−0.0577	0.1750**
	(1.007)	(0.381)	(1.770)	(1.366)	(2.604)
Nonlabor earnings	−0.00009	0.0001**	−0.00012**	0.00004	−0.00007
	(0.160)	(2.336)	(2.925)	(1.336)	(0.164)
Primary occupation	0.2638	−0.2635	0.5274	−0.3692	0.2237
	(0.510)	(0.577)	(1.342)	(1.309)	(0.498)

Table 10 . . . (continued)

Variables	All income-generating activities	Economic work other than wage labor activities in rice	Wage labor activities in rice	Domestic activities	Leisure incl. school
			*		
Maragol	1.0603	−0.6420	1.7023	−0.4641	−1.0282
	(0.837)	(0.575)	(1.770)	(0.672)	(0.936)
Gabaldon	1.9187	1.2502	0.6685	0.1537	−2.2063*
	(1.483)	(1.095)	(0.681)	(0.218)	(1.965)
Pandan	2.9869*	2.1993*	0.7877	−0.0415	−3.2507**
	(2.095)	(1.748)	(0.728)	(0.053)	(2.627)
Rizal	1.4265	0.5898	0.8367	−0.4360	−1.0490
	(1.123)	(0.528)	(0.868)	(0.630)	(0.952)
Peak season	1.8697**	0.8344*	1.0353**	−0.6427**	−1.2492**
	(4.237)	(2.143)	(3.090)	(2.672)	(3.262)
R^2	0.0855	0.3013	0.1835	0.1012	0.1453
F-test	4.710	18.108	9.913	5.464	7.743
N	476	476	476	476	476

Figures in parentheses are t−values.

** and * = significant at 1% and 5% levels, respectively.

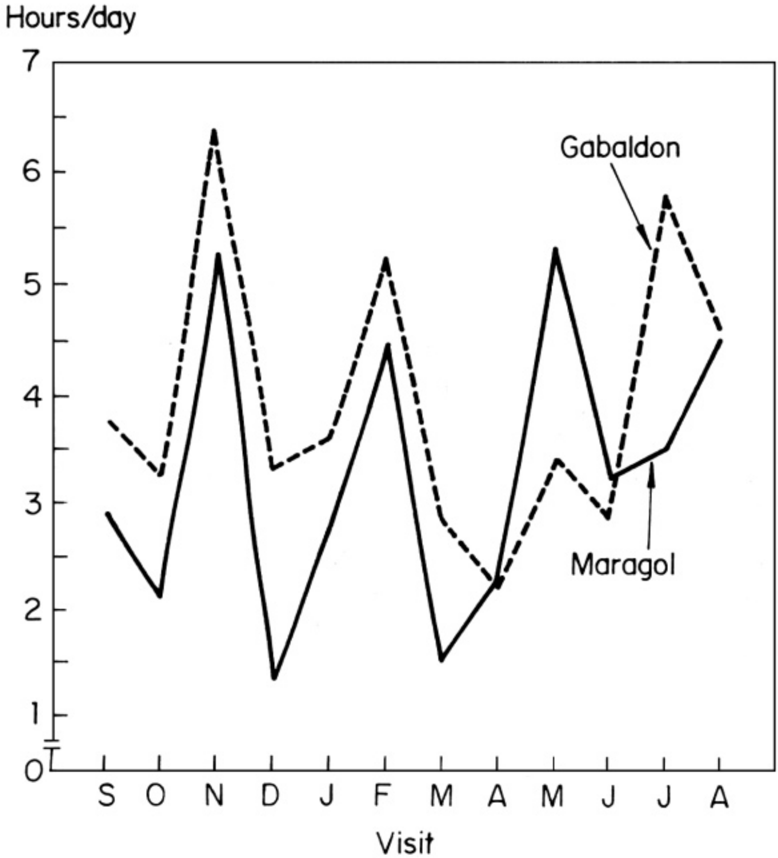

Fig. 1. Seasonality of hours spent in income-generating activities: Average hours per individual in Nueva Ecija.

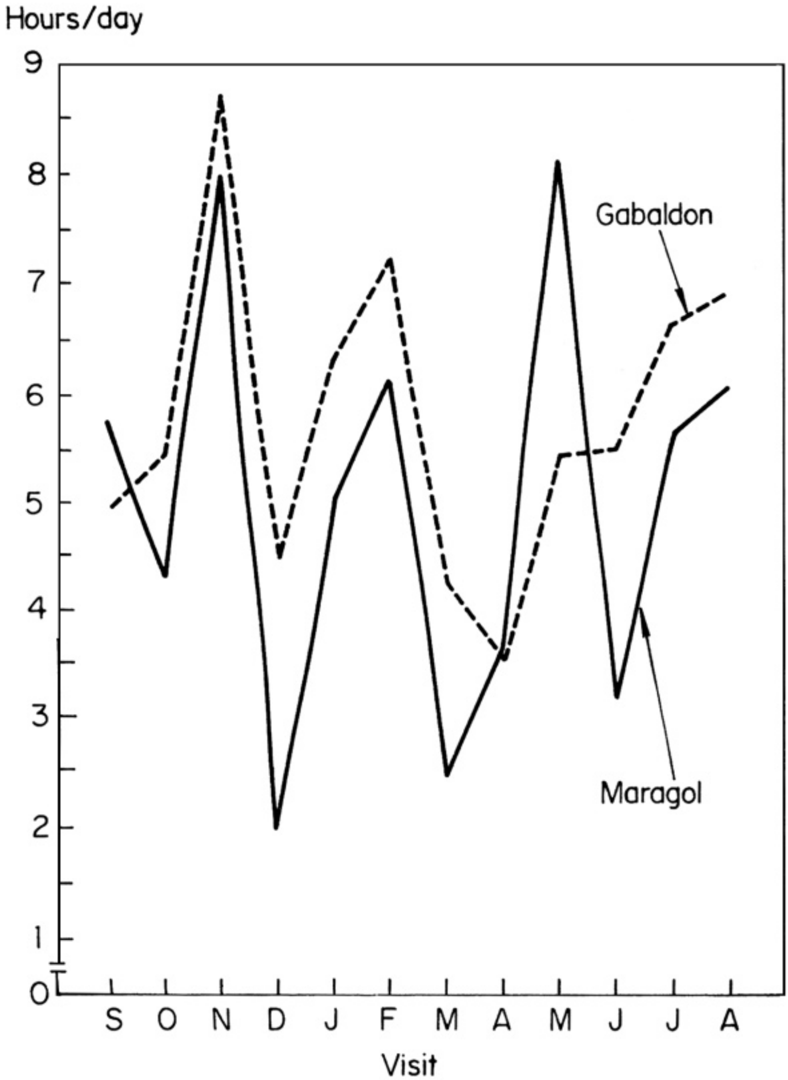

Fig. 2. Seasonality of hours spent in income-generating activities: Average hours per mole person (aged 15 and above) in Nueva Ecija.

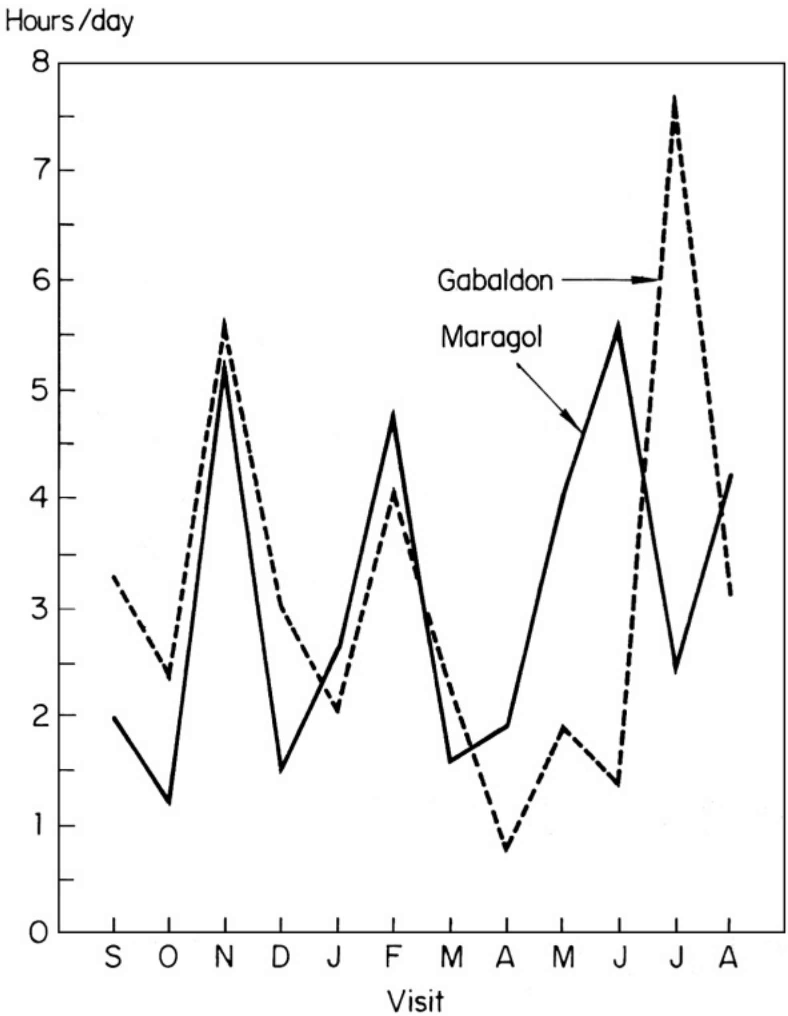

Fig. 3. Seasonality of hours spent in income-generating activities: Average hours per female (aged 15 and above) in Nueva Ecija.

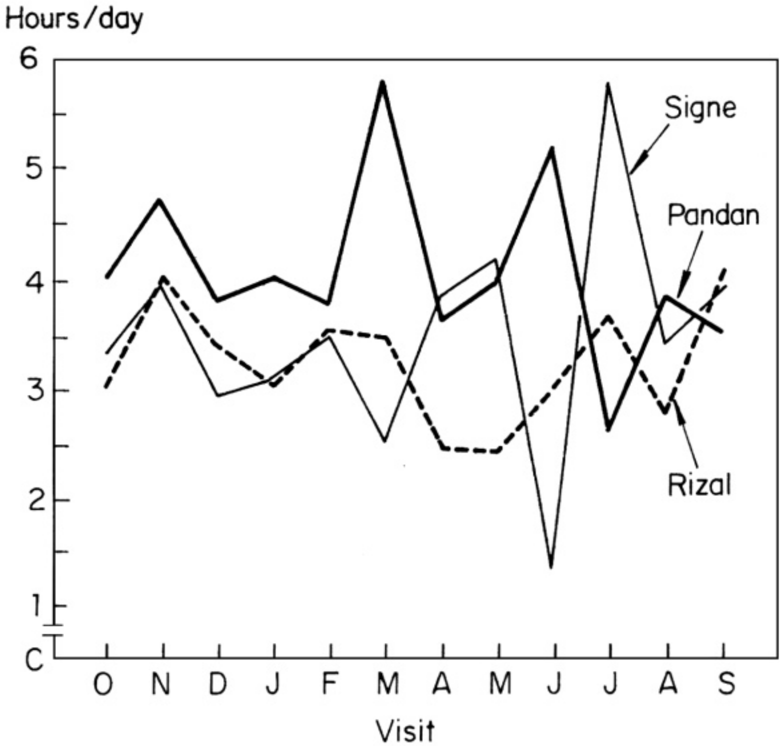

Fig. 4. Seasonality of hours spent in income-generating activities: Average hours per individual in Iloilo.

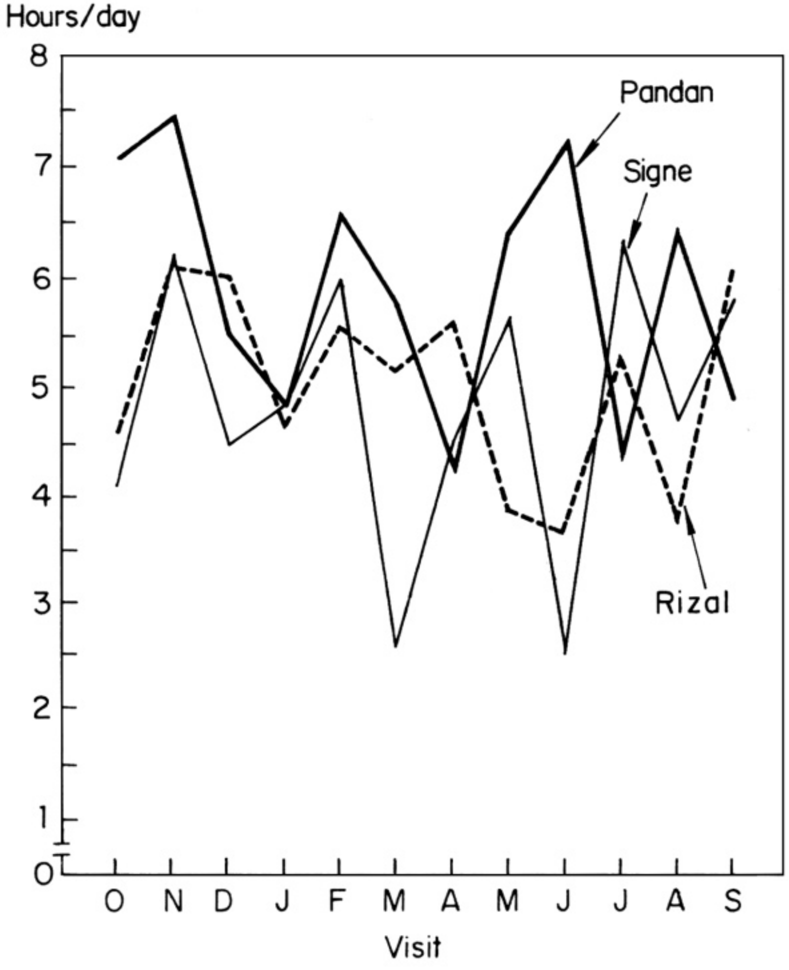

Fig. 5. Seasonality of hours spent in income-generating activities: Average hours per male person (aged 15 and above) in Iloilo.

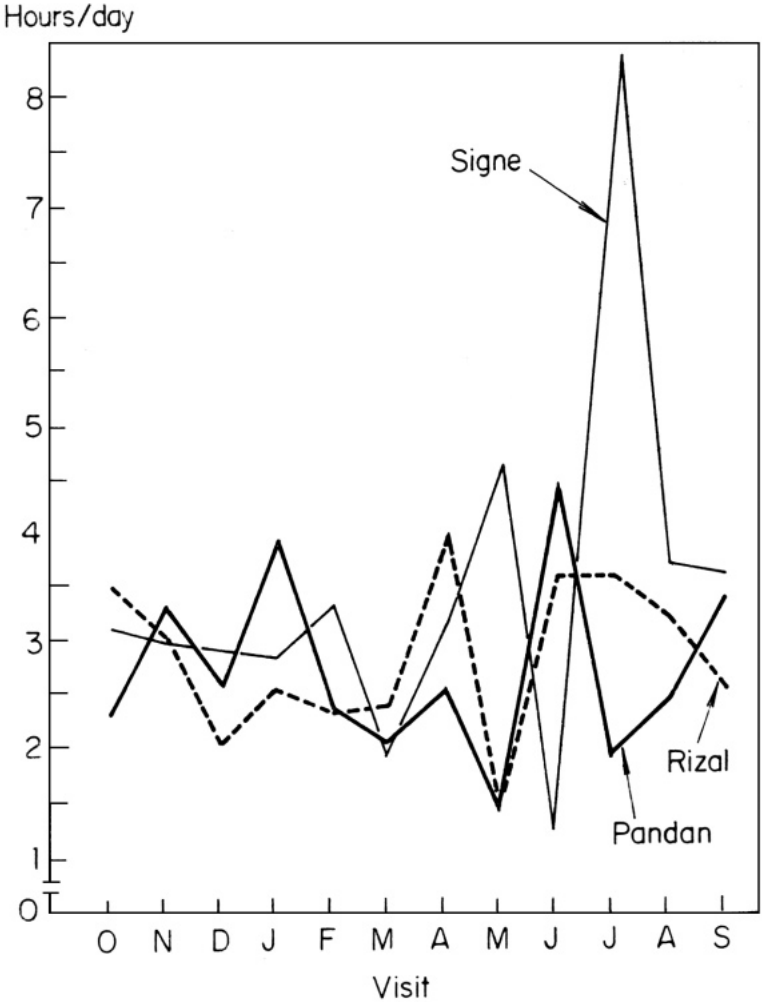

Fig. 6. Seasonality of hours spent in income-generating activities: Females(aged 15 and above) in Iloilo

APPENDIX

All income-generating activities:

- All owned rice-production activities
- Wage labor activity in rice
- Vegetable, crop production
- Animal husbandry
- Trading/Vending/Processing

All domestic activities:

- Household chores
- Food acquisition
- Child, Family Care
- Fetching water/Getting firewood
- House repair, Maintenance

Leisure and consumption activities:

- Schooling
- Illness
- Socials, Meetings
- Eating
- Leisure
- Personal activities
- Sleep/Rest

CLOSING REMARKS

Mr. Bart Duff*

The results reported at the conference are strong evidences that pragmatic, on-the-ground action research can be planned and implemented successfully. It is equally clear that WIRFS is moving rapidly away from rhetoric to field activities which will enhance the livelihood and welfare of rural women in particular and rice farming households in general.

Observations

The scope and variety of projects described at the meeting are clear evidence of growing support for WIRFS-type activities. Funding agencies such as the Food and Agriculture Organization (FAO), United Nations International Children's Educational Fund (UNICEF), United Nations Development Programme (UNDP), United States Agency for International Development (USAID), Ford Foundation (FF), Rockefeller Foundation (RF), and Asian Development Bank (ADB) are all interested in supporting these efforts.

The manner in which the projects have been planned and implemented show clearly that successful projects/programs for women in agriculture cannot be conceived in New York, Oxford or Tokyo. The best results are obtained where rural women are made direct participants

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at the conceptual stage of WIRFS projects, not as passive recipients of someone else's choice of technology.

There is reduced cynicism among scientists about what can be done to address the needs of women in agriculture. This receptiveness must be utilized to integrate these needs into agricultural research strategies.

To be successful, projects must have a strong economic justification. New initiatives must increase income/welfare to be accepted and multiplied. Rural women are very rational optimizers and decision-makers who allocate these labor and meager resources carefully.

Five Major Themes

1. Efficient and cost-effective survey methods are emerging to accurately identify the activities and needs of women in rural households. The streamlined, time saving nature of this abbreviated approach lends itself to resource-scarce research.

2. Many of the results from projects reported at the conference show success in implementing prototype projects which impact positively on the income generating activities of women.

3. Innovative methods can be developed to successfully communicate and extend new technology specifically to women.

4. There is growing recognition of the need to provide organizational inputs to institutionalize women's activities for long term success.

5. The distribution of attention and resources between technological intervention versus research has sharply shifted to the former.

Each of the first four elements are necessary but not sufficient conditions for project success. At the minimum we must be able to identify women's roles, quantify constraints, have economically profitable and culturally viable technological options and provide a means to introduce and sustain these.

Recommendations

1. Develop a handbook which provides ample, generalizable guidelines for:

   a. identifying the needs of rural women;
   b. assessing the economic viability of alternative technologies;
   c. evaluating the necessary organizational support to institutionalize activities which impact on rural women.

2. Assemble information which is relevant to the needs of rural women. Such knowledge currently is extremely diffused, fragmented and largely inaccessible.

3. Assemble and reproduce as case studies selected components of the present conference.

4. Continue exchange of ideas on potential technologies for women like IPM, root crop production and processing, mushroom production, etc.

   - o Integrated pest management involving women.
   - o Document successful examples of integrated WIRFS efforts involving biological, social scientists, and engineers.
   - o Involve non-government organizations in the development and dissemination of technology to meet the needs of women. The groups are pervasive in nearly all countries, but are not well integrated with formal WIRFS-type programs.

Questions

1) Where do we go from here?

   - WIRFS at IRRI
   - WIRFS in national programs
   - WIRFS in international centers

2) How do we translate results from the seminar into knowledge which is accessible to other potential users? Publications? Trainings? Exchanges?

3) How can we strengthen linkages and improve understanding of women's needs among scientists? Administrators? The Policy Community?

4) What is the proper mix between research and technology development-diffusion activities? Many aspects of women's roles in rural society remain unclear and require further research.

To paraphrase Gelia Castillo's remarks: "Too often, conferences on women in agriculture talk too much on gender issues, little technology and no development."

The present seminar has minimized the gender issue -- we all know why it is important and the discussion has focused more on technology for women, its development, diffusion and institutionalization.

Finally, I congratulate all of you and encourage you to continue your enthusiastic and dedicated endeavor to enhance the lives of rural women.

DISCUSSIONS (Morning Session)

Moderator: Dr. Luzviminda B. Cornista

Bustrillos: Dr. Adalla mentioned that rice is a women's crop. Can you validate what is meant by women's crops, men's crops or family crops under Philippine conditions? In Africa, for example, subsistence crops are definitely women's crops because women, who are responsible for feeding the children, by necessity have to take charge of the subsistence crops.

Adalla: I wish to clarify that the frame of reference is rice IPM. When we refer to rice as a women's crop, we are thinking in terms of their major role in decision-making. While the man does all the physical aspects of IPM, the woman is influential when it comes to decisions on what chemicals to buy, because they are the ones who: go to the market; decide on who to hire for spraying; when and what to spray, and so on. Even in vegetable crops, we noted that in Calamba, the man takes care of the physical aspect of land preparation. But after planting, it is the woman who supervises the farm operation.

Bustrillos: It would be useful to look into the policy implications of these referrals to women's crops, men's crops, etcetera. For extension, this classification can help in the efficient flow of services, resources and information to the right clientele in various farming systems.

Ms. Paris, how much would it cost for the technologies you were proposing?

Paris: As of now, we do not yet have an accurate cost estimate of the small gadgets. To keep cost at a minimum, the agricultural engineers who went to the site did not think of changing but rather improving the existing gadgets such as the small drier for the glutinous rice and the tapak-tapak or foot treadle water pump.

Torreta: Dr. Adalla mentioned in her report that the children and the other members of the household appear to be potential IPM workers. Would you say then that it could involve the entire household rather than just the adult men and women in the household?

Adalla: For the rice IPM, our experience showed that the men attend to the technology's physical aspects such as monitoring, spraying, and so on. But as far as decision-making is concerned, it is a shared activity between the man and the woman. After visiting the field, the farmer tells his wife, "I saw a lot of insects, I need to spray." Then the woman will say, "Okay, since I am going to market tomorrow, I might as well buy a bottle of this or that pesticide." We also identified the children as potential IPM workers because they fit snugly into what the father has difficulty in doing, i.e., in looking for the insects, due to his failing eyesight. Sensing their willingness to do the task, we tried to encourage the young boys, aged 10-12 years, to look for the insects, especially for whorl maggots whose eggs are very minute. The idea then dawned on us that this task could provide additional income for the children. They could be trained to become qualified monitoring scouts and could later be hired on a per hour basis. We realize, however, that some effort is needed in instilling in the children a sense of responsibility and accountability in performing the monitoring task. We are trying to develop a scheme to train these children not only to serve the family's field but also those of other farmers who would like to hire them if they (the farmers) cannot do the monitoring themselves.

Duff: I'd like to ask Dr. Adalla three questions. First, in your analysis, did you use any statistical test to see whether there are significant differences between the farmer's field and the IPM field in terms of profitability?

Adalla: Using the Wilcoxon's paired test, we found that the yield as well as the economic parameters were significantly different. That means IPM was better than the farmer's field.

Duff: The second question is with regard to cost. When you finished your presentation, you cited some cost figures. I wasn't sure that was the cost used to implement the trials or that was what the farmers invested.

Adalla: There were two costs there. We imputed the costs of the IPM activities and we also put a cost to what the farmer is traditionally doing. We did this to make sure that we did not miss anything in the farm activity of the farmer and to enable us to compare the figures in the IPM field and in the farmers field.

Duff: If you are going to extend the IPM technology, one of the issues posed is how much it would cost to train the farmers. You have 22 farmers; maybe that's not a large enough sample to make any extrapolation. But do you have any idea how much it would cost?

Adalla: I really cannot tell exactly how much was devoted for training the farmers because the training component was incorporated in the project itself.

Rola: The wet season's cost for the whole project was around P80,000. I would like to mention also that the approach was participatory, in that the farmers also managed the IPM plot. We just managed the pest control of that operation. But basically, we were training the farmers everytime we were there. The whole project was an action-research project in as much as while we were doing research, we were also in the process of giving hands-on training to the farmers.

Bustrillos: I noticed from the pictures which you showed that your field assistants were all women. Are they really all women? Is there any significance to this as far as the role of women as agents of technology transfer is concerned?

Adalla: This is a 100 percent women's group. I don't know if it is coincidental, but in reality, all my research assistants are women. Even my technicians are all women. I find them more efficient because they work without any complaints.

Bustrillos: I think that is an area which is of importance in relation to the introduction of technologies. We should look into its implications for all areas in the country and for various agencies involved in rural development.

Samonte: I would like to comment on the presentation of data in the paper of Dr. Adalla. I noticed that the names of the farmer-cooperators are listed in the table. Ordinarily, we don't put the names of the farmer-cooperators to preserve their anonymity. I was wondering if you have any special reason for putting their names.

Adalla: I don't really have any special reason for putting their names there. But as far as anonymity in the project is concerned, these farmers have shown that they are very proud of being mentioned in all our reports. I don't know what social implications it has though. But one thing sure is that whenever we mentioned their names in our report, they felt good about it.

Samonte: I can understand the value of mentioning their names in the report. But when you give these data on yield where some farmers register very low yield levels, I really don't know how it affects the relation among the farmers. I'm thinking in terms of the social implication it may have on them.

Adalla: Well, during the year-end season, we had one general meeting to tell them how they fared during the season. So, we enumerated their names, with their yields, benefits, and profits. And the feeling I got was that it was more of a challenge to those who did not make it to the higher mark. And it was a feeling of compliment for the topnotcher.

Samonte: That's all right if you acknowledge people who got the highest yield, but how about for people at the bottom. "Hiya" could become a strong social pressure among peers. It is a strong behavioral concern especially among Filipino male farmers who also value their "macho" image.

Adalla: Thank you for the suggestion. We'll consider that angle next time.

Cornista: Dr. Adalla, you mentioned that about 55 percent of your cooperators are share-tenants. How does tenure affect the acceptability of IPM? Does tenure affect the performance of the farmers, particularly in terms of detailed activities that you require them to do?

And how about educational attainment, does it make a difference in terms of IPM adoption?

Adalla: I will answer the second question first and Dr. Rola will probably elaborate on the first. As far as education is concerned, we found that college graduates are better equipped to understand the concept. IPM is a very difficult technology to extend. But once you are able to convince the farmer, it's going to be a very spontaneous adoption.

Rola: Actually, we do not yet have any analysis on the relationship of tenure and adoption of IPM. In the long run, of course, we would like to analyze that relationship. From my observation, the farmer-owner was more interested to learn about IPM than the tenant. With regard to the aspect on education and its relationship to adoption, we had one cooperator who reached only grade three, yet he was open to matters pertaining to IPM. But at this point we are not in a position to say whether there is a correlation between education and IPM adoption.

Paris: I would like to react to that question on education. I think education is needed but it's not the most critical in the adoption of the technology. I think what is important is the process and method of imparting the technical knowledge from the scientists to the farmers. This involves imparting the knowledge in the layman's language. There are several communication methods to do this and I think Dr. Stuart will talk about this later.

Bustrillos: Mrs. Ancheta, was there an existing indigenous organization in your site in Bataan prior to your arrowroot project?

Ancheta: Yes, there was an existing women's organization, the Rural Improvement Club, or RIC. But when we introduced the project, they changed their officers. They elected more dynamic officers. We noticed that after being involved in the project for one year, these women became more aware of their capabilities, and they even started questioning the work of the home management technician. During our meeting with them for example, it was evident that these women had already "arrived" and they now know what leadership is all about.

Duff: Mrs. Ancheta, how many women extension agents does BAEx have?

Ancheta: We have about 2000 women extension agents throughout the country. They were formerly called home management technicians but now they are called agricultural and food technologists.

Duff: How many extension agents in all?

Ancheta: We have a total of about 14,000; 12,000 male extension workers and 2000 females.

Paris: This is a question for Dr. Escalada and Ms. Binongo. You mentioned about the involvement of women in rootcrop processing. What kind of rootcrop processing activities are you referring to?

Escalada: The women make native delicacies which they sell in the market, like cassava bibingka, cookies, etcetera.

Castillo: Is your project still on-going or continuing?

Rivera: We expect to continue with phase two. Next time around, we will be introducing the processing aspect of soybean in the Central Luzon area. We hope to help augment the income in the area through soybean processing technology.

Paris: Dr. Rivera, I noticed that there is a lot of handwatering being practiced in Central Luzon. I am wondering why these farmers do not adopt the long hose for handwatering as practiced in the Ilocos region.

Rivera: I think it is more a matter of the expenses involved although we did not pursue that question. While testing a newly installed pump, some people were even recommending that they build a storage tank for the water and have a faucet and a hose. But then, you see, the farmers could not even afford the pump. The hose could be very difficult to introduce because of the cost constraint.

Paris: What is the adoption rate of the foot treadle or "tapak-tapak" pump in Central Luzon?

Rivera: Not too many have adopted. It seems to me that the problem is the lack of follow up. We thought that these pumps were already being used in Pangasinan. We even heard that a former Minister bought 30 sets which were distributed during election time. But there has been no follow up for the technical and maintenance needs of these pumps. And so, I think the technology died a natural death. Handwatering agriculture is not in the program of either the NIA or the DA. I think that if it is covered within irrigation water management, NIA will take it on. But so far, it does not have any extension support, except for what we did in the area.

Cornista: Thank you. That ends the discussion for this morning.

DISCUSSION (Afternoon Session)

Moderator: Dr. Delfina M. Torreta

Escalada: Dr. Stuart, how did you select the IPM issues to address in the school on the air?

Stuart: For the IPM school on the air and likewise for the school on the air on rice production, part of our pre-planning activity was to ask the farmers what topics on pest management or rice production they would like to learn about. We presented to them a set of topics on IPM and asked them to rank the top ten topics that they were interested in and that they most needed information on. This was one of the bases for the selection and development of the content materials for the school on the air.

Escalada: I was wondering if you conducted a needs assessment or a KAP study before selecting those issues or problems that you addressed.

Stuart: Yes, the needs assessment was in fact the first activity that our team conducted in Calamba. It was designed as a knowledge-attitude-practice or KAP study on IPM for the cooperators of the IPM technology verification and generation activities of Drs. Adalla, Rola and Hoque. The cooperators were also participants of the school on the air. So, we also based the topics to be ranked by the farmers on information we obtained from this initial KAP study.

Castillo: I think I can live with the fact that we have provided a way for these women to learn something new, even if afterwards, they never monitor pests. The mere fact that you have opened their minds to this is very significant in itself.

Sumayao: I hope that this is the attitude that will be taken by the funding agencies, especially. Because you see, the expectation is that when you submit the results of a project, there must always be concrete evidences of what happened to clients after the training.

Castillo: The fact that they learned something is already a significant input into their human capacity.

Ocampo: I am reminded of the women's situation in one of the cooperatives that we are studying. Many of the women start their day from the wee hours of the morning to get their products to the market. They spend half of the day in the market selling their produce. And these women were not as regular as their husbands in attending the cooperatives meetings in their area. They reason out that they are already busy trying to improve their economic situation. And to them, participation in the credit cooperative means obtaining and making productive use of their loans in their little enterprises.

Escalada: Dr. Hoque, how did you motivate the women to attend the training? Did you give some kind of psychic motivation?

Hoque: The motivation was in terms of the opportunity to be involved in doing something meaningful for their community, such as service to their community.

Sumayao: Actually, we first met with the municipal agricultural officer and the extension technicians. They helped us identify two barangays for our project site. Then they introduced us to some women from those barangays who could be possible cooperators. After the introductions, we conducted home visits by which we explained the project. It was during these visits that we motivated them to take part in the project. We organized meetings of the women in the two barangays. However, we were disappointed that the extension technician in one barangay, who was a male, never showed up during our meetings. Since we were newcomers in the area, we needed his support for project legitimization. Perhaps he did not like the prospect of working with women.

Castillo: We know very well that despite the fact that there are many women extension workers, women in fact are not well regarded as clientele. In some meetings I have attended the men always laughed when the topic is about the role of women. This is not the case in

Bangladesh for example, where they are serious about the role of women in development. And the men would hardly argue about that. But here, where women occupy very high positions in government and even in the private sector, people have a cynical attitude about women's concerns. And we are not even talking about women activists leading demonstrations, but women participating in development activities.

Bustrillos: I think that is true. Perhaps we should reverse the research so that we can get the perceptions of the men, involve them in the effort to improve the male attitude towards the participation and non-domestication of women.

Ocampo: Actually, that was one suggestion I got from the menfolk in a Batangas barangay where most of the women were predominantly working and were out of the house most of the day. This area registered the highest percentage of men and women participating in the cooperative. One board member suggested that what we were doing on women's concerns should instead be addressed to the menfolk because they were the ones left at home caring for the children while the mothers were selling their wares in the market. The men were actually the ones who were able to attend the seminars and meetings that we were sponsoring. They were suggesting that our research should be addressed to the men rather than to the women because the women are already preoccupied with so many things.

Paris: Dr. Sumayao mentioned that farmers always need more seeds to soak because they give allowance to poor germination. Do the women participate in seed management? We have been encouraging this aspect because it is one area in which women can play an important role. Probably aside from learning about IPM, this is something that the women may be very much interested in because this is what they actually do.

Sumayao: In the survey that we did, next to care of seedlings, it is the sowing of the seeds where more of the women are also involved. So, I guess it's because of their involvement that they ask this question of how much to sow.

Paris: This is a problem that has always been raised: the losses in yield because of poor seed management.

Adalla: Actually, the situation in Calamba is like this: The seed problem arises because planting is dictated by a group of planters. It appears to be a monopoly, so that the large amount of seeds is brought about not because of poor seed management but because these planters dictate their wage rates based on the amount of seeds soaked. Hence, while we were recommending one cavan of seed per hectare, they were planting four cavans per hectare. And so I told them, "I can show you how to plant one cavan to cover a hectare." We then conducted the demonstration. I was able to convince the farmers but the planters would not like to adopt it because it would lessen their rates and nobody would plant. I even tried to convince the planters by bringing them to IRRI. We showed them the mechanical planter but one disadvantage they found with it was that it cuts off some portion of the seedling, hence, replanting is needed. We should therefore tell the designers of this implement that this is what farmers have observed, as a form of feedback to enable them to improve the technology. Essentially, the issue on seed management is on how they can economize on seeds.

Torreta: Thank you. That ends our discussion for this afternoon.

OTHER PAPERS

The effectiveness of A Farmer's Primer on Growing Rice in Tagalog and Pangasinan among women farmers

Victoria L. Cabanilla and Thomas R. Hargrove *

INTRODUCTION

Women throughout the world make important contributions to agriculture. They play a significant role in rice cultivation, post harvest processing, and marketing (IRRI 1983).

Women are also often consulted in most of the decision-making processes in both the household and farming activities. They therefore, could be good extension agents in technology transfer.

In a recent study conducted on farmers in Cavite and Negros, (Cabanilla and Hargrove 1987) we learned that the wives of many farmer respondents read the IRRI rice primer, "A Farmer's Primer on Growing Rice" (Primer) at least as comprehensively as did their husbands. Some wives claimed to have read the entire book and discussed what they learned to their husbands who did not have the time to read . There were also cases wherein the wives read the book to their illiterate husbands.

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From this observation, we may say that female literacy could play a very critical role in the transfer of farming technology.

It is on this premise that we extend the study to include women farmers in further testing the effectiveness of an agricultural publication like the Primer in the transfer of rice farming technology.

To have an idea on how women scored in the test for the effectiveness of the Primer, we analyzed separately the women respondents from Bulacan and Pangasinan provinces.

OBJECTIVE

The objective of the study was to determine the effectiveness of the Primer in Tagalog and Pangasinan among women farmers.

METHODOLOGY

We tested the Tagalog and Pangasinan edition of the Primer among 23 women farmers in Bulacan and Pangasinan. A pretest and post test design was used to determine the knowledge scores of the respondents before and after exposure to the Primer. The test is composed of 73 questions taken from the different chapters of the Primer. The subjects were individually tested, then interviewed, in his dialect on socio-demographic, educational and communication variables.

The subjects were basically categorized into high and low scorers. Low scorers were those who got between 0 and 36 correct answers, while high scorers obtained between 37 and 73 points.

RESULTS AND DISCUSSION

Sociodemographic characteristics

The mean age of the 23 women respondents was 43, ranging from 28 to 62 years. Only one respondent was single and two were widows. Except for the three women farmers who came from either a city or a town, everyone was born in a barrio, where most of them still reside and farm.

Educational background

All the respondents had the chance to attend a formal school with only 13% not making it through Grade 6. The majority were elementary graduates; 3 finished high school and 2 were BSEE graduates.

The interest of women in rice farming was manifested in their attendance in rice production training courses. Seventy percent had attended at least one training course in the past 3 years.

More than 80% of the respondents were active members of an organization with a third serving as officers.

Farming background

Being a tenant did not discourage the women's involvement in rice farming. More than half of the women farmers in the study were tenants. About 40% were owners or future owners of the land they cultivate. Future owners are the Certificate of Land Transfer (CLT) holders of the Land Reform Program.

The respondents were relatively new in rice cultivation. Almost half had less than 10 years of rice farming experience. Those who had been farming for more than 20 years were either owners of the land they cultivate or CLT holders.

Exposure to print and broadcast media

Only about a third of the farmers did not read either a newspaper or a magazine or an agricultural publication. But still these respondents who were exposed to print media seldom read such publications because they were often not available.

Radio was a popular channel of information used by the respondents. About 80% listen to radio while 61% listen to farm broadcasts; with a third listening at least once a day and 4% listening very often - three times a day.

Effectiveness of the Primer

Effect of the Primer on knowledge scores. The effectiveness of the Primer was relatively strong on the women. Although most of the respondents were relatively new in rice farming, they exhibited high mean initial knowledge on the rice technology presented in the Primer. Although there were 74% low scorers before the treatment, they exhibited a relatively high mean initial score of 33.

Even with a relatively higher initial score, high scorers still increased by more than three times after exposure to the Primer.

The mean scores of the women farmers increased significantly from 33 to 44 points. Highest score attained was 59 which was 81% of the highest possible score.

Knowledge score by subject matter. The initial mean scores for the different topics covered in the Primer increased by as high as 51%. Carbohydrate production showed a higher percentage increase over the other topics. The women farmers who had more media exposure and training tended to be more interested in the more technical topics such as carbohydrate production and fertilizers.

These findings are in contrast with the Cavite and Negros study (Cabanilla and Hargrove, 1987) wherein farmers tend to be "scared" of the more technical subject matters.

Knowledge scores by group. Only 7 of the women farmers did not read the entire book during the 60-day exposure period. We compared the performance in the pretest and post test of farmers who finished the book (Group A) with those who did not (Group B).

The initial mean knowledge score of Group B was higher than Group A. However, Group A exhibited a higher mean score after the treatment. High scorers for those who read the entire book increased from 19 to 94%.

Initially, there were more high scorers in Group B; but after the treatment, Group A showed a higher percentage of high scorers.

Overall final scores among the women farmers could have probably been higher if everybody had read the entire book.

Discussion

Although women's contributions to agriculture is now recognized, little has been done to make women visible and more productive in the field of extension. The findings outlined here indicate that rural women could play an effective role as agents in the diffusion of agricultural technology.

LITERATURE CITED

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Cabanilla, L.V. and R.T Hargrove. 1987. The effectiveness among farmers of A Farmer's Primer on Growing Rice in Two Philippine Dialects. IRPS 127. IRRI.

Table 1. Sociodemographic characteristics of 23 women farmers, Bulacan and Pangasinan. 1987.

Characteristic	No.	%
Age[a]		
Less than 41	11	48
41 - 50	7	30
More than 50	5	22
Civil status		
Single	1	4
Married	20	87
Widow	2	9
Birthplace		
Barrio	18	78
Town	3	13
City	2	9

[a] mean = 43

Table 2. Educational background of 23 women farmers in Bulacan and Pangasinan, 1987.

Background	No.	%
Highest education		
Less than Grade 6	3	13
Elementary (Grade 6)	15	65
High school	3	13
College[a]	2	9
Previous training		
Yes	16	70
No	7	30
Membership in organization		
Yes	19	83
No	4	17
Position in organizations		
Officer	6	32
Member	13	68

[a] BSEE graduates

Table 3. Rice farming background of 23 women farmers in Bulacan and Pangasinan, 1987.

Farming variable	No.	%
Land Tenure		
Owner	4	17
Leaseholder	1	4
Tenant	13	57
CLT holders	5	22
Years in rice farming		
1—10	11	48
11—20	7	30
21—30	5	22

Average years in rice farming = 11.8

Table 4. Exposure to print and broadcast media of 23 women farmers in Bulacan and Pangasinan, 1987.

Type of media	Frequency (%) of exposure				
	Very Often	Often	Seldom	Very Seldom	Never
Print					
Newspaper	8	0	22	35	35
Magazine	0	9	13	43	35
Agricultural Publications	0	13	13	44	30
Comics	0	0	22	22	56
Broadcast					
Radio	22	8	35	13	22
Farm broadcasts	4	0	26	31	39
Television	4	9	39	22	26

Table 5. Knowledge scores of 23 women farmers in, Pangasinan and Bulacan, 1987.

	Low		High		Mean	Range
Before Treatment	17	74	6	26	33	23—40
After Treatment	3	13	20	87	44	32—59

Table 6. Mean scores of 23 women farmers by topic, 1987.

Topic	Mean Scores			
	Maximum score	Pretest	Posttest	% increase
Fertilizer	15	5.6	8.2	46
Carbohydrate production and water	9	5.5	8.3	51
Parts and life cycle of rice plant	25	10	12.4	24
Seeds	17	7.8	10.6	36
Weeds	7	4.5	4.6	2

Table 7. Knowledge levels in rice farming technology of 23 women farmers in Bulacan and Pangasinan, by group (A = read the entire book, E = did not finish the book).

Classification of respondents	Knowledge level: Low No.	%	High No.	%	Mean	Range
			Initial[a]			
Group A (16)	13	81	3	19	33	23-45
Group B (7)	5	71	2	29	35	26-45
All	18	78	5	22	33	23-45
			Final[b]			
Group A (16)	1	6	15	94	45	36-59
Group B (7)	1	14	6	86	42	32-52
All	2	9	21	91	44	32-59

The role of women in the optimization of inputs for vegetable production in a rice based farming community: A case study

Melanda M. Hoque and Napoleon Saavedra *

INTRODUCTION

This project is an offshoot of a pilot trial on the participatory verification of rice IPM technology in Looc and San Juan, Calamba, Laguna. Towards the end of the wet season rice crop in November, 1986, the rice IPM cooperators asked for assistance on vegetable pest control after they became aware of the toxicity hazard brought about by their use (or over-use) of chemical pesticides.

Having observed the significance of vegetable farming among these farmers, we decided to conduct a pilot trial using the principle of IPM, specifically that of a need-based application of pesticides. The pilot trial would be compared with the farmer's usual pest control practice. But unlike in rice IPM where application of pesticides is based on economic threshold level (ETL) figures, the decision to apply pesticides

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on vegetables had to be based on recommendations from UPLB. Hence, this study was conducted to:

(1) demonstrate the optimum use of inputs for vegetable production; and

(2) create awareness and encourage the adoption of proper handling techniques and use of pesticides.

To accomplish the objectives of this project, a study was conducted on demo-experiment on optimization of inputs for vegetable production.

Description of Study Site and Profile of Cooperators
The study was conducted in Barangay Looc and Uwisan, about nine and twelve kilometers, respectively from the town proper of Calamba. Two of the vegetable fields were located near ricefields, while the rest were in areas usually submerged every rainy season due to its proximity to the Laguna de Bay.

Four of the six farmers were rice IPM cooperators. Selection of the four rice IPM cooperators was based not only on their interest in the project but also on the degree of their wives' involvement in vegetable production.

MATERIALS AND METHODS

Baseline Survey
The questionnaire[1/] had two major parts: the household's participation in vegetable farming production practices, and knowledge of pests, diseases and their control. The farmers were assured that they would be paid back whatever the difference in the harvests between the demo-plot and their own plots. This was done to make sure that the farmers would not interfere or "doctor" with the activities done in the demo plots.

[1/] A 12-page interview schedule prepared in English by Dr. B. Sumayao for her study on the "Training of Village Non-traditional Extension Audiences on IPM" incorporated the questions asked of the vegetable farmers.

Case Study on Demo-Experiment on Optimization of Inputs for Vegetable Production

Two treatments were compared in this study, namely: (1) farmer-managed plot (FMP) and (2) farmer-researcher-managed plot (FRP). Two vegetable crops, pole sitao and tomatoes, were utilized for this purpose. These vegetables were planted between December 25, 1986 to January 25, 1987. Three farmer-cooperators planted tomatoes and four planted pole sitao. Fields planted to pole sitao ranged from 365 - 840 sq m while the tomato fields ranged from 240-850 sq m.

Adjacent plots designated as FRP and FMP were monitored as to the inputs incurred such as labor for land preparation, planting, weeding and cultivation. These activities were done by the farmers. Labor costs were recorded in both FRP and FMP plots. Fertilizers and pesticides used in the FRP plots were subsidized by the project. Whenever the farmer was not available to apply the pesticide in the FRP plots, the project staff would hire someone to spray these plots. In any case, the farmers were informed of all the activities undertaken in the FRP plots. Likewise, all activities in the FMP plots were also recorded.

Separate recording sheets were kept to note down every activity undertaken, such as input costs and quantity, total harvest for each plot, labor in harvesting and the prevailing farm prices at each harvest. Economic analyses were made for each of the seven vegetable fields. In cases where the FRPs had smaller areas than the FMPs, the latter's areas were adjusted to the size of the FRPs. It also followed that the inputs and profits were computed to correspond to the size of plot. This was done for better comparison.

RESULTS AND OBSERVATIONS

Baseline Survey

Variety of Vegetables Planted. Pole sitao followed by tomato topped the list of vegetables planted in Looc, Calamba, Laguna (Table 1). Greater proportions of the farmers, 73% (pole sitao) and 77% (tomato), respectively, plant these crops only once a year and a small proportion of the farmers interviewed plants the same crop twice a year. Farmers who plant pole sitao and tomatoes once a year are those who would start their planting late December until late March. Late planters are those whose lands are at the outskirts of the Laguna de Bay. These areas are usually submerged during the rainy season. According to the farmers, the last wet season proved to be one of the longest, in the sense that majority of the vegetable fields bordering the lake were only planted in March. As a consequence their vegetable crops particularly pole sitao and tomato suffered due to lack of water in the dry season. Another crop, ampalaya, is planted two times a year but majority of the farmers plant it during the dry season. Other crops like okra, upo, eggplant and squash were planted only once a year.

The project staff observed interesting cropping patterns practiced by vegetable farmers in the locality. Some planted tomatoes or upo or okra in between the pole sitao when the first crop (pole sitao) was at the fruiting stage. The sitao-upo or sitao-tomato combination was usually planted in the months of January-February. Pole sitao, planted late March to April was intercropped with okra. These plantings were mostly vegetable fields near the lake. Several farmers were asked why this was so and the reasons given were the same: these are the only vegetables that can withstand water. By the time crops bear fruit, it is already rainy season and apparently these could thrive even if the field is submerged for several days. While okra is the most suitable crop during the rainy season, farmers also mentioned that they do not get a good price for their crop. Areas that were not submerged are usually planted to eggplant, sitao, upo and green corn.

Participation in Vegetable Farming. Table 2 provides a picture of the family's involvement in vegetable production. Majority of the activities, i.e., from seedbed preparation to cultivation is done by the husbands. The wives' involvement are on seedbed preparation, care of seedlings, fertilizer application and marketing. The children's participation includes such tasks as planting, spraying, cultivation and harvesting. It appears that care of seedlings and weeding are the two common activities participated in equally by women and children. It also shows that spraying is the children's responsibility.

It appears from this observation that this group (children, i.e., mostly youth) might be good channels of creating awareness and adoption on the proper handling and use of pesticides. Table 2 lends support to this since 27% of the production activities is contributed by the children in the family. It is also interesting to note that 30.7% of these activities is participated in by wives, even, including the unconventional work of women in spraying and land preparation. Evidently, this shows the importance of vegetable production and its contribution to the family income.

A similar interview was conducted specifically with the cooperators, to find out the degree of involvement of males, females and children (Table 3). The males are the husbands or hired male labor, the females are the wives and/or adult hired female labor, the children are either members of the family or hired ones, and the combination of females and children. As shown in Table 2, production activities are participated in greatly by males.

It is interesting to note, however, that purchase of fertilizers and pesticides is solely done by the female (wife) in the household. Greatest participation by females are in post production (51.6%) and decision making (45.4%). This seems to indicate that the women might also be good channels in the diffusion of vegetable production technologies. Their high involvement in the purchase of pesticides and in the hiring of labor for spraying might make them more receptive to adoption on the proper use and handling of pesticides.

Knowledge of Insect Pests and Their Control. Pictures of insect pests commonly present in vegetables were shown to the respondents to find out the local names given to the insects. Table 4 is a list of local names given by the farmer, with "uod" as the most commonly mentioned name for at least six pest species. This is understandable since what has been observed by the farmers are the larvae that feed on the plant parts. The respondents were also asked to describe the characteristic damage caused by the insect pests shown in the pictures (Table 5). The respondents could only describe the damage inflicted by 8 pest species while the damage characteristics of the others were not familiar to them. When asked what control measures they used against these pests, about 88% pointed to the use of insecticides while 12% mentioned the removal of the damaged part. The use of insecticides were also dictated by the presence of pests (59%), 27% follow scheduled spraying and 21% spray only when there are many pests.

Case Study on Demo Experiment on the Optimization of Inputs for Vegetable Production

Tables 6 to 6e summarize the results of experiments on pole sitao and Tables 7 to 7b show the results of the tomato experiment. The pole sitao in the FRPs were sprayed with Cymbush, Azodrin and in addition, Mesurol, Malathion and Plantvax to two plots. The FMPs were sprayed with various insecticides such as Lannate, Azodrin, Decis, Sevin, Brodan and Thiodan to control the insect pests. In the FRPs planted to tomatoes, Cymbush was the insecticide used by the researcher. However, Lannate, Thiodan and Azodrin were sprayed at the seedling stage, i.e., before the researchers started the study. These insecticides were sprayed primarily to control ants just after planting. The farmers, on the other hand, sprayed various insecticides like Azodrin, Thiodan, Sevin and Lannate in the FMPs. It was interesting to have observed farmers' practices with regard to insect control in the area. Our findings and observations on the seven cooperators are worthy of the following individual case reports.

Pole Sitao

Case Study I. The farmer in case study 1 (CS1) planted a 1560 sq m field to pole sitao on December 26. 1986. On January 9, 1987 we marked an area of 625 sq m. as the FRP and the remaining 935 sq m as FMP. Both plots were already 10 DAE and have been sprayed twice with Azodrin (.423 kg ai/ha) to control "tungro". This was the farmer's term for the damage inflicted by beanfly larvae, a characteristic mottling of leaves resulting from the insect feeding on the undersurface of the bean leaves. Just before the application of Cymbush (.048 kg ai/ha) in FRP AT 2 DAE, the insect counts were: 4 leaffolder (lf) and 6 leafhopper (lh) while the FMP had 23 and 41 thrips (t) per 20 plants sampled. In the afternoon of the same day the farmer sprayed Azodrin (.3 kg ai/ha) in FMP. At 26 DAE, which is 6 days after the last spraying, the insect counts were 3 if, 1 t in FRP and 9 earworms (ew) and 1 t in the FMP.

We have twice observed the farmer's wife picking out the folded leaves due to leaffolder to augment her husband's spraying. Two days later the farmer again sprayed Azodrin (.31 kg a.i./ha). The next application in the FRP was at 30 DAE and the insect counts at this time were 8 1f and 50 t while the FMP had only 4 1f/20 plants.

The presence of thrips prompted the application of Mesurol (.768 kg a.i./ha) with sticker at the rate of 3 ml/14 1 and Plantvax (.768 lg a.i./ha) with sticker at the rate of 3 ml/14 1 and Plantvax (.768 kg/a.i./ha) in tank mix to check the presence of rust. This last application of pesticides in the FRP was 37 DAE to control leaffolders. While this was the last application in the FRP, the FMP was still periodically being sprayed with Lannate at .231 kg ai/ha at 35 DAE, and .45 kg ai/ha at 37, 43, 45, 49, 54, 59 and 62 DAE. It should be noted here that the first priming was at 42 DAE which was 5 days after the last application of insecticides in FRP.

While spraying in the FRP was already stopped, the farmer continued to spray in the FMP. When asked why it was so, he reasoned that this was their practice. We commented that it was not necessary since damage is negligible and the cost of insecticide applied might even be higher than the added return that he would get from his harvest. Besides, frequent application of insecticides on crops is not healthy to the consumers.

Apparently they themselves do not even consume their own vegetable produce. Their reason is that they are not fond of vegetables. Further probing revealed that their reluctance was due to fear of consuming frequently sprayed vegetables.

Table 6 shows the result of case study 1 (CS1). To have a better comparison on the inputs and benefits between FRP and FMP, all inputs and return in the FMP were adjusted to the area equivalent to FRP. The harvest was higher (321 kg) in the FRP than in FMP (180.7 kg). We have noticed that at each priming, the FMP had more damaged pods than in the FRP inspite of the frequency of insecticide application in the FMP. This may be due to the way the farmer sprayed. He usually walked fast such that the right volume of spray was not delivered. Another is that the pesticide he used (Lannate) was probably not quite specific to the insects present at the fruit bearing stage.

Upon computation of all expenses on both plots, the return on investment (ROI) in the FRP (2.12) is 1.8 times higher than in FMP (1.16). In essence, the farmer managed plot only gained P0.16 for every peso invested whereas the farmer-researcher managed plot gained P1.12. Evidently, this result shows that the net return and ROI can be significantly increased by cutting down the cost of production even if it only means just reducing the inputs from insecticides.

Case Study 2. The farmer in CS2 had planted a total of 1680 sqm to pole sitao on January 2, 1987. This was divided into two to represent the FRP (840 sq m) and FMP (840 sq m). Both plots were sprayed with Azodrin (.24 kg ai/ha) at 3 DAE. According to the farmer, this was also the rate that he had used in the FMP. Succeeding application in the FMP were done at 5, 23 and 31 DAE with the same insecticide, Azodrin at (.353 kg ai/ha). The farmer complained that a lot of damage has been inflicted in the FRP. He was assured that he would be reimbursed whatever differences in the harvest between the FRP and FMP. His confidence was gained by this assurance. At this point, the farmer's wife was beginning to quiz the researchers on why the FRP has not been sprayed yet since the FMP has been already sprayed twice. Apparently she and her husband would already want to follow what the researchers are doing in the FRP. Again she was discouraged not to follow yet since the practice that is being done in the FRP has not been perfected yet. They were also encouraged to follow what is being done in the FRP in other fields that they may plant with pole sitao.

The second application of pesticides in the FRP was made at 26 DAE after having counted 75 t/plant. The countings at the FMP was 35t/20 plants. Since rust was also observed, a tank mixture of Plantvax (.768 kg ai/ha), Mesurol (.762 kg ai/ha) and 3 ml sticker/14 1 was applied on the same day. Another application of insecticide, Cymbush (.033 kg ai/ha) tank mixed with fertilizer Agrowell was made at 40 DAE. Had it not been for the presence of aphids at 61 DAE, spraying should have not been done anymore as soon as priming started. The aphids were controlled by the application of Malathion (1.33 kg ai/ha), the available insecticide that could check aphids with least residue on the crop. The farmer was informed and was discouraged to pick the pods for at least three days. However, the advice was not followed. Priming started at 44 DAE which was 4 days after the third application in the FRP and 3 days after the 4th application in the FMP. Insecticide application in the FMP plots during harvesting was, on the average, every 1-7 days. Further application of insecticides in the FMP were done at 39, 41, 45, 52, 57, 59, 63 and 71 DAE. Tank mixtures of Lannate (.019 kg ai/ha) and Agrowell (.32N .32P, .64K, .04Zn kg ai/ha) were applied at 57, 59 and 63 DAE while only Lannate (.257 kg ai/ha) was sprayed last (71 DAE). It should be noted here that the pole sitao had a longer life span than the pole sitao in CSI. This is because the farmer had his field irrigated when the crop was at 50 DAE.

Table 6a shows the economic analysis of CS2. The total cost of pest control in the FMP was higher (P421.50) than in FRP (P221.92) with a difference of P119.58. Total harvest was higher in the FRP (1234 kg) than in FMP (1020 kg) with a difference of 205 kgs. It also followed that the ROI in the FMP was lower (2.76) than in FRP (3.43) which means that for every peso invested, the net return in FRP was P0.67 more than the FMP.

The farmer in CS2 had seen the advantage of the method of insect control practiced in FRP. However, he has not yet ventured into adopting the technology. He has also planted two other plots of pole sitao but failed to minimize application of pesticides. It seems that the result of the demo experiment had no impact on him even if he had already seen the result. The researcher encouraged him to try using the techniques that they used in his FRP plot but it appeared that he was not yet quite convinced to apply it. Instead, CS2 farmer again wanted researchers to conduct the same study in his wider pole sitao field. This reaction of the farmer seems to indicate that a longer time or more demo-experiments would still be needed before he could be totally convinced. Due to financial constraints, the researchers could not conduct the same trial in the farmer’s other field.

Case Study 3. The farmer in CS3 had his field planted on January 10, 1987. The total area of 730 sq m was divided into two to represent the FRP (356 sq m) and FMP(365 sq m). It was interesting to note that from the time of planting, the farmer's wife managed and directed the activities in this field. The wife made most of the decisions as to what fertilizer to use and when to apply it; which insecticide to apply, how much and when to use it. Apparently the major involvement of the husband was on land preparation and cultivation, i.e., when the activity called for the use of a carabao-drawn implement such as plowing and harrowing in between rows to control the weeds. Other than these, the farmer showed great confidence on his wife's judgment with respect to vegetable production.

When the researchers had just marked the plots and the plants were only 5 DAE, the wife was not pleased that the researchers had applied Azodrin (1.55 kg ai/ha) since she had experienced in the past that this insecticide did not control the "tungro" in her field. It was explained to her that this insecticide is highly effective at the correct rate and proper timing of application. Nevertheless, she was assured that if there would be a reduction in the yield of her crop in FRP she would be given a reimbursement on it. Seemingly satisfied with the researcher's explanation, she then also sprayed the FMP the following day with Lannate at .099 kg ai/ha.

The second application in the FRP was preceded by the counting of insects on both plots. The insect counts at 22 DAE were 14 If and 6 lh in FRP while 10 lf and 8 lh in FMP. Considering that the FMP had just been sprayed with Lannate (.5 kg ai/ha) 4 days before, the insect count during this period was still high whereas the FRP had not been sprayed for 8 days. After the insect count at 22 DAE, the FRP was sprayed with Cymbush (.028 kg ai/ha) tank mixed with liquid fertilizer, Agrowell (.86N, .86P, 1.72K, .12Zn ai/ha). At this time the sitao was already 20% flowering. The first priming was at 37 DAE, 15 days after the spraying of Cymbush which was 22 DAE. Had it not been for the presence of aphids, this should have been already the last spraying. Thus, Malathion (1.94 kg ai/ha) was applied at 59 DAE.

Insecticide applications in the FMP were done at 18, 35, 40, 46, 48, 50, 53, 58 and 65 DAE even during harvesting. The average interval between applications during harvesting (starting at 35 DAE) was 3.6 days ranging from 2-7 days. Shorter interval of spraying was observed during the first two weeks of priming, it then became longer as the crops matured.

It was also observed that the price of vegetables plays a certain role in the frequency of insecticide application. The wife in CS2 commented that if prices are high, as much as possible they do not want to have blemishes on their produce. In two occasions, the wife had the FMP also sprayed with Brodan and Agrowell at 22 and 29 DAE, without the researchers' knowledge. The wife apparently is not even satisfied with using just one insecticide at a time. For instance, she used a tank mixture of Dicarzol and Vestox at 35 DAE. Again at 48 DAE, the wife applied Thiodan (1.97 kg ai/ha) and a mixture of Brodan (1.29 kg ai/ha) and Agrowell, a liquid fertilizer (.24N, 0.48K, .03Zn ai/ha) at 50, 53, and 58 DAE. Hence, it was not surprising to hear that some vegetable farmers just break even and some do not gain anything because of this high input on pesticide. Her actions might have stemmed from the fact that price of sitao during these periods increased by P0.50/kg from the previous prices.

Table 6b shows the comparison on the cost and benefits derived from the experiment in CS3. As in cases 1 and 2, the cost of insect control in FMP (P382.90) was higher than in FRP (P137.96) with a difference of P244.94. Even with more applications of insecticides in the FMP, the total harvest was even lower (582 kg) compared to the FRP (664 kg). It was also recorded that the total damage in FRP (76.45 kg) was lower than in FMP (80.95 kg) inspite of less frequent applications of insecticide. Consequent to the higher inputs on pest control, the ROI in FMP was lower (2.24) compared to FRP (3.09). It means that the practice of insect control in the FRP enabled it to have an advantage of P0.85 net gain for every peso invested over the FMP. This clearly shows the great benefit derived from minimal use of inputs from pesticides.

In spite of this result as conveyed to the farmer, they have not yet fully appreciated the technology that was demonstrated to them. Nevertheless their willingness to conduct this cooperative endeavor is a strong indication that a longer study of this nature might eventually induce them to change their outlook with respect to insect control.

Case Study 4. The farmer in CS4 already had a previous experience in working with researchers a few years back. A total area of 905 sq m was planted to pole sitao on January 24, 1987. A portion of this area (557 sq m) was designated as the FRP and the remaining 348 sq m as the FMP.

The researchers were not informed ahead of time that the farmer had planted two varieties of pole sitao. In this case, the plot marked as the FRP had only two furrows of the same variety as those in the FMP. Both varieties were pole sitao except that one was better yielding (local name: pinalay) than the other (local name: kinalabaw). The five furrows belonging to the FMP were all "pinalay" whereas only two of the 8 furrows in the FRP were "pinalay" and the rest were planted to "kinalabaw".

The crop stand in the FRP was much better than FMP but at pod bearing stage, the FRP plot had less pods than the FMP. Nevertheless, the experiment went on so that the harvest in the two rows of pinalay in the FRP was compared with two rows in the FMP. As before, the farmer was assured of reimbursement to compensate for whatever losses that might occur in the FRP plot, either due to poor yield or reduction in yield due to insect pests. Since the plots did not have the same areas, the inputs and also the harvests were computed for better comparison on the factors in the economic analyses.

There were only three applications of insecticides prior to the first priming in the FRP. Azodrin at the rate of .09 kg ai/ha was sprayed at 12 DAE, followed by Cymbush (.058 kg ai/ha) at 22 and 40 DAE. Before the second application (24 DAE) the insect counts per 20 plants in the FRP were 8 lf, 8 ew and 1 cw while in the FMP there were 6 lf. Cymbush application in FRP following each counting (22 and 40 DAE) had protected this plot effectively. Had it not been for the occurrence of aphids when the crop was already 65 DAE, this would have been the last spraying.

A total of 14 applications of insecticides were made in the FMP. These were applied 5 times before the first priming and 9 times during priming. Azodrin (.49 kg. ai/ha) was applied at 6 DAE followed by Lannate (.39 kg ai/ha) at

16, 26, 33, 42, 44, 48, 53, 55, 60, 62 and 70 DAE. The farmer shifted to Brodan (.679 kg ai/ha) during the two sprayings, i.e., at 76 and 78 DAE.

Starting at 42 DAE, 2 days after the first priming, application of insecticide was done on an average of every 3.8 days ranging between 2-8 days. The researchers asked the farmer's reason for this frequent spraying. He believed that his periodic application would actually enhance the growth of developing buds and also the development of flowers. This particular farmer also reasoned out that the rate he was applying was not harmful to consumers but may check the population of insects.

We then asked him how much of their produce is usually left for home consumption. The wife replied that none is left for home consumption. According to her, other farmers' families were not fond of vegetables either. As the conversation went on, other people in the group (the harvesters which consisted of relatives and neighbors) participated in the conversation. One of the men, also a farmer, commented that a great deal of the farmers do not consume their produce for fear of ingesting the toxic substances sprayed on the crop.

Apparently, some farmers designate furrows which are less frequently sprayed for home use. The researchers seized the opportunity of explaining to this group the dangers of pesticides left in vegetables. Still the farmer (CS4) reasoned out that it should be the government's concern to ban insecticides that are highly toxic.

Table 6c summarizes the result of the economic analysis made on CS4. Inputs on insect control in FRP (P103.58) was lower than in FMP (P326.85) or a difference of P223.27. However, the total harvest was higher in FMP (821 kg) compared with FRP (662 kg). As promised, the farmer was reimbursed a total of P394, the difference in the value of harvest between the FRP and FMP. It also followed that the gross profit in the FRP was higher with an ROI of 2.74 than that of the FMP with an ROI of 2.36. This shows that the production method used in the FRP was more efficient such that a peso invested gave back an advantage of P0.38 on the FRP over that of the FMP.

Tomato

Tables 7-7b summarize the results of the tomato demo-experiment. The FMP plots were sprayed with various insecticides namely: Thiodan, Lannate, Sevin and Azodrin, and the FRP was sprayed mainly with Cymbush. As in the pole sitao experiments, the total harvests were recorded in all the plots. In cases where the FMPs were bigger in area than the FRPs, the inputs and harvests were adjusted to the size of the FRP plots to have better comparisons. Prices at harvest and labor were all recorded. The labor for harvesting was P4/crate and produce was sold on a per crate basis. One crate for the "marikit" variety was approximately 30-33 kg while the "pope" variety was 35-38 kg/crate. Thus, the total harvests reflected in the tables were those in packed crates ready for the market.

Case Study 5. The farmer in CS5 planted his tomato field on December 31, 1986. There were 7 applications of insecticides in the FMP while only 4 were made in the FRP. Both plots were first sprayed with Thiodan (.224 kg ai/ha) at 3 days after planting (DAP) primarily to check the ants feeding at the newly transplanted seedlings. The second application was with Lannate (.095 kg ai/ha) at 10 DAP to control leaffeeding insects. Both applications were done by the farmer himself. After this, the 760 sq m plots were divided into two to represent the FRP and FMP plots. The FMP was totally managed by the farmer with respect to insect control while the FRP was jointly managed by the farmer and researchers. All inputs and activities were recorded for both plots.

Before spraying in the FRP, insect countings were done. The first counting, at 37 DAP, gave 8 earworms (ew) and 2 cutworms (cw). Cymbush (.047 kg ai/ha) was then applied to check defoliators at 51 DAP. Insect counts at the latter application were only 3 ew and 2 cw. The insect count at 37 DAP was 38 cw and 6 ew at 51 DAP. The FMP was applied with Lannate (.284 kg ai/ha) mixed with Sevin (.224 kg ai/ha) at 41, 48 and 60 DAP. At 67 and 75 DAP only Lannate was applied at the rate of .425 kg ai/ha. The last two applications in the FMP were done one day after the last and 5th primings. On the other hand, the FRP was last sprayed 14 days before the first priming and no more applications thereafter.

There were 13 primings in all with a total harvest of 28 pack crates (kaing) in the FRP and 27 in the FMP. Considering that the FRP was only sprayed twice after the onset of flowering in contrast to five applications in the FMP, the yield of the FRP was still higher. The comparative analysis on the cost and return on the tomato fields of CS5 is shown in Table 7. The total cost of production is higher in the FMP (P433.18) than in the FRP (P366.53). The amount spent on insect control was much lower in the FRP (P50.28) than in the FMP (P134.93). Consequently, a return of P0.38 for every peso invested was realized in the FMP, while P0.63 more was gained in the FRP.

The CS5 farmer was somewhat happy with the outcome of the joint undertaking. All along he thought that he would not gain this season owing to the very low price of the produce (P15-P35/crate) compared to previous years. The analyses made him appreciate the value of keeping the records of all his activities and farm inputs. The records made him realize how much profit he derived from his tomato production inspite of the low price of the produce. His wife has often commented that once the price of tomato goes lower than P25/crate, profit is unlikely to be realized. To this, they have only considered the cash inputs such as fertilizers and pesticides excluding family labor. It was pointed out to them that the risks of losing from vegetable farming as a result of lower market price may be avoided if inputs could be minimized beforehand. For instance, inputs on pesticides may be minimized with maximum effect through proper timing of application and correct dosage.

Case Study 6. The farmer in CS6 had planted a 3,230 sq m tomato field (var. pope) on January 4, 1987. However, only two 850 sq m areas were used for the study for better comparison. CS6 farmer had spent a lot in irrigation and watering (P387) which was about 57% of the total cost for land preparation, planting, cultivation, weeding, irrigation and watering. This farmer used three insecticides to control the insect pests in the FMP, namely, Thiodan, Azodrin and Sevin while only Cymbush was used in the FRP.

The farmer's wife was greatly involved in the tomato production, as the husband was engaged in other non-farm activities like piggery and raising of game cocks. Previously, the husband did most of the farming but since their children have been helping in the farm, management was then left to the wife. As a matter of fact, whenever the researchers inquired what activities had been done on the FMP field, the husband would refer them to his wife. The wife reported such activities as irrigation expenses, fertilizer applied and the amount used in the FMP. Besides supervising hired labor in the farm, the wife of CS6 farmer helped in weeding. The researchers also gathered that the decision on what vegetables to plant in their field was a joint decision between the husband and the wife.

There were five applications of insecticides in the FMP while only two were made in the FRP. The first application in the FMP with Thiodan (.135 kg ai/ha) was at 9 DAP. This was followed by a tank mixture of Sevin (.18 kg ai/ha) and Azodrin (.315 kg ai/ha) at about a month after (33 DAP) and was repeated at 61 DAP. One day before the first priming, at 70 DAP, a tank-mixture of Thiodan (.42 kg ai/ha) and Sevin (.18 kg ai/ha) was again applied, and repeated at 74 DAP.

Spraying in the FRP was made at 44 and 61 DAP with Cymbush at (.029 kg ai/ha) and (.033 kg ai/ha), respectively. Prior to the first application the insect count per 20 plants was 10 cw and 6 ew while the FMP had 5 cw and 4 ew. The next reading was made at 61 DAP for both plots. When there were 20 ew and 10 cw in the FRP and 4 ew and 6 cw in the FMP.

The benefit cost analyses for the tomato fields of CS6 are shown in Table 7a. Judging from the ROI figures, the FMP plot barely made a break-even on the expenses incurred while the FRP gained P0.79 for every peso invested. The total costs of production in FRP (P995.63) was lower than that of the FMP (P1185.13). Consequently, greater benefit was derived from the former than the latter. More harvests were recorded in the FRP (47 crates) compared with the FMP (34 crates).

The researchers asked the wife regarding her perception on possible gains she made that season. She thought that there may not be much since the harvest was poor and the price was low. She also attributed their low harvest to lack of water. Even though they had irrigated twice, it was not sufficient to combat the heat. It was also observed that there were plenty of tomato plants that wilted in the FMP, which again may have contributed to their low harvest. She was also asked if the number of sprayings that they made in their tomato that season was their typical practice. She said that sprayings were lesser because of lesser pests. Moreover, the tomato plants had a poor stand and the price of tomatoes was also low.

Apparently, the conditions she stated did not give them any incentive to do more applications of pesticides. She was also asked if she might be interested to adopt what was practiced in the FRP. Her answer was positive. She also commented that the FRP yielded more inspite of fewer applications of pesticides. Analysis on expenses incurred on both plots made her appreciate the importance of keeping farm records. Apparently, they did not keep records except about harvests as this was their basis for paying the tomato pickers. Harvesters are paid by the number of crates filled with tomato harvest.

Case Study 7. This plot was located at the border of Looc and Uwisan, Calamba, Laguna. CS7 farmer planted his tomato field (var. pope) on January 28, 1987 with an area of 480 sq m. These plots were adjacent to an experiment on the generation of ETL for major insect pests affecting tomatoes.

CS7 farmer apparently had been planting tomatoes for quite sometime. Hence, as far as the culture of tomato is concerned, he claimed to know the trade already. Last season, he planted two varieties namely, "marikit" which is locally called "tagalog" and pope which is locally called "apolo". His reason for planting the two varieties was to be assured of better returns should prices of tomato become cheap. For instance, if prices are low, apparently the marikit variety gives the farmer an advantage since this variety is bulky when packed. There would be lesser quantity of this variety to fill a crate than the other variety. However, if the price of tomato is high the pope variety would be in greater demand because this is heavier. On a per weight basis, lesser quantity is needed to make a kilogram compared with the "marikit" variety.

There were six applications of insecticides in the FMP. The first used Azodrin (.34 kg ai/ha) at 9 DAP, followed by Lannate (.41 kg ai/ha) at 16, 23, 33, 38 and 46 DAP. Agrowell (.17N, .17P, 0.34K, .02Zn kg/ha) tank-mixed with Lannate was applied at 16 and 26 DAP and another dose of Agrowell alone was applied at 32 DAP. It should be noted that he also applied urea (42.52 kg N/ha) dissolved for watering the tomatoes at 17 and 32 DAP. Side dressing was also done at 9 DAP at the rate of 37.5 kg N/ha.

The farmer was asked if the number of spraying he had practiced last season was a typical one. He answered that it was not. According to him, he normally sprayed his tomatoes the moment he saw any pest even if there was not much damage, just to prevent further damage. But his practice last season was quite different. He attributed his recent practice to having planted his crop later than previous years. He also foresaw that the price would be very low such that he did not want to risk spending much, lest he may not gain any profit. Also, the rate of fertilization that he practiced last season was apparently lower. According to him had he planted earlier, i.e. even if only as early as mid-December, the amount of fertilizer applied would have perhaps been double the amount he applied last season. He claimed that the tomato stand last season was rather poor compared to previous years.

In the FRP plot, side dressing with urea (46 kg N/ha) was done at 13 DAP followed by watering of dissolved complete fertilizer (12 kg NPK/ha) at 35 DAP. This was followed by a tank mixture of foliar fertilizer, Agrowell and Cymbush (.04 kg ai/ha) at 27 DAP. The farmer applied Azodrin (.375 kg ai/ha) earlier, i.e., at 9 DAP, primarily to control the ants that were damaging the newly transplanted seedlings. Cymbush (.04 kg ai/ha) applications were repeated at 34 and 55 DAP. This last application was 7 days before the first priming.

Last application of insecticide in the FMP was at 46 DAP or 15 days before the first priming. Again the farmer was asked why he had stopped spraying and his reason was that he did not want to spend anymore on it inasmuch as there would be too much supply of tomatoes at harvest. It seems that this farmer was somewhat reluctant to take the risk of putting in extra expense to control the pests affecting his crop if he does not foresee much gain.

Table 7b shows the total cost of production. It was slightly higher in the FMP (P338.81) compared with FRP (P321.90). Greater volume of harvest was also realized in the

FRP (24 crates) than in FMP (15 crates). Although no exact counting was done, greater damage was observed in the FMP than in FRP. The higher damage in the FMP may be attributed to the farmer's practice of stopping of insecticide application too soon, i.e., 16 days before priming. As far as returns are concerned, greater profit was realized in the FRP with 3.30 ROI while it was only 2.09 ROI in the FMP. Inspite of the farmer's (FMP) prediction that he would not gain last season, his investment of one peso gained P1.09. According to him, however, he expected that the FRP would have more profit judging from the harvest.

Table 8 is a summary of the economic parameters compared between the FRPs and FMPs on a per hectare basis. Except for one plot (CS4), FRPs had higher total profits with a mean of P45,536.40/ha compared to the FMPs with a mean of P40,940.33/ha for the pole sitao. For tomatoes, it followed the same trend with a mean of P27,691/ha. in FRP while the FMPs had a mean of P20,082.84/ha.

In the case of CS4 where the total profit was slightly higher in the FMP, the ROI in the FRP was higher. This shows that the technology used for the FRP was more efficient than what was used in the FMP.

The total cost of production varied between farmers and types of vegetables. In general higher inputs were recorded in pole sitao than tomatoes on both plots. The mean total cost of production in the FRPs were P15,544.90/ha and P11,854.31/ha for pole sitao and tomatoes, respectively while FMPs had a mean of P18,406.57/ha in pole sitao and P13,152.62/ha in tomatoes.

The total crop protection cost also followed the same trend. The percentage crop protection costs to total cost of production in pole sitao were 20.14% and 36.76% in FRP and FMP, respectively. In tomatoes, it was 15.99% for the FRP and 25.08% for the FMP. This means that the pole sitao farmers (FMPs) were spending 1.83 times more compared to the FRPs for crop protection while tomato farmers in the FMPs were also spending 1.63 times more than the FRPs. This shows that the cost of crop protection for one hectare pole sitao or tomato can be greatly reduced by using the technology in FRP.

Reduction on the cost of crop protection is not just on the inputs due to pesticides but also on the cost of labor for spraying. As can be seen, the frequency of spraying in sitao ranged from 12-14 (mean = 12.5) times in the FMP while the mean number of sprayings in the FRP was 4.5 times. Had it not been for the 2 sprayings done by the farmer in the FRP (CS3) without the researchers' knowledge, the average frequency of spraying would have been only 4 times in FRP for this crop. Tomatoes were less frequently sprayed compared to pole sitao for both plots. Frequency ranged from 2-4 (mean = 6) times in FMP. Table 8 shows that labor cost due to application of pesticides in the FMPs was 2.8 times in pole sitao and 1.8 times in tomatoes more than the FRPs. This expense in FRPs represented about 16% and 25% of the total cost of crop protection in pole sitao and tomatoes, respectively. For the FMPs, cost of spraying represented about 20% of the total cost of crop protection in pole sitao and about 27% in tomatoes.

Table 9 shows the rate of pesticide applications in the demo-experiment, FRPs and those that were used by the farmers, FMPs. Slightly higher dosages were used in the FRP with Malathion. This was done intentionally by the researchers owing to the high population of aphids which was controlled by the chemical. Note that the higher range of Azodrin used in the FRP was due to one application used by one farmer. Lower doses of Thiodan and Lannate in the FRP were also applied by the farmers without the researchers knowledge.

Except for Thiodan and Brodan, the rates used by the farmer (FMPs) for pole sitao were below the recommended dosage. This could be the reason for the differences in yield between the FMPs and FRPs. Inspite of the frequency of sprayings done by the farmers at the FMPs, the damage in these plots were generally higher or at par with FRPs which were less frequently sprayed. The results suggest that there is still a lot to be worked out with farmers with respect to proper use of pesticides.

OTHER OBSERVATIONS

Trial Adoption of Insect Control Used in FRP

One of the pole sitao farmer cooperators (CS1) expressed his desire to try what we practiced in his FRP plot, i.e., to apply pesticides less frequently than his practice. Apparently he wanted to try what was practiced in FRP because his previous FMP plot dried up too soon. It seems that this farmer's motivation to adopt what we practiced in the FRP plot was due to minimal inputs.

The pole sitao field where he tried the FRP technology was adjacent to the experimental plots on the generation of ETL. A 1,800 sq m plot was planted on January 26, 1985. He sprayed only four times during the vegetative to pod bearing stage. He sprayed Lannate (.21 kg ai/ha) at 7, 14 and 28 DAE and Cymbush (.048 kg a.i.) at 42 DAE. He also applied Folidol (.333 kg a.i./ha) after the 6th priming. Incidentally, he had told his neighbors that he was following the pesticide applications practiced in the researchers' plot. Every now and then the neighbor would come and visit his field adjacent to our plot. He received various comments which could have discouraged him to follow what he had planned to do. Nonetheless, he persisted. In order to stop his neighbors from pressuring him to apply pesticides, he resorted to just telling the neighbors that he had already stopped his "mini" experiment. The researchers recorded all his inputs and harvests and was constantly encouraged not to give up his "mini" experiment.

The comparisons between his other pole sitao (FMP, CSl) and this farmer's "mini" experiment are shown in Table 10. The ROI in his previous plot (FMP, CSl) was only 1.16 whereas this plot gave an ROI of 2.08. He was very pleased with the outcome. As farmers in the locality would not normally plant pole sitao during the wet season (June-onwards) this particular farmer decided to plant this crop. His reason was that he feels more confident now to tackle the insect pests. Moreover he was optimistic that his produce would command a better price. He anticipated a lower supply of this vegetable since majority of the farmers would not plant during the rainy season.

Another farmer, a rice IPM cooperator, had frequent dialogues with the researchers. Because his land was very close to the lake, he was not able to synchronize land preparation and planting with the vegetable cooperators. Apparently, he was a tomato farmer. Before the start of the project, he mentioned that tomatoes planted during March are not likely to bear fruit. His interest was to plant tomatoes during this month to have a good price for his produce. The project staff advised him to go ahead but to plant only a small area for experiment. He did not inform the researchers of the size of land that he planted. Later, it was learned that he planted about one-fourth of a hectare. As far as crop stand was concerned, the crop was excellently robust.

The researchers advised him on insect control. They were very optimistic that he would make money from his tomatoes. The tomato plants flowered profusely but there was no fruit setting. The researchers sought the advise of a tomato specialist as to why the tomato plants performed this way. Apparently, the variety planted by the farmer was photosensitive, i.e., a short day variety. For this reason, no fruits set. He advised that a "tomato fruit set" inducer, if available in the market should be sprayed. The chemical was later learned to be a "chlorphenoxy-acetic acid CPA and at 50 ppm, it can aid fruit setting in tomatoes. Since the product was not available, a growth regulator 2,4-D (of the same a.i.) at 50 ppm was then applied by hand spraying directed on the flowers.

The farmer's children patiently applied the solution but stopped when they noticed that the tomato plants were wilting. However, they continued to apply the solution at half the rate three days later upon seeing that there were already some fruit setting. They were advised to apply fertilizer and have the field irrigated to counter the phototoxicity of the herbicide but failed to take heed. The farmer did not want to spend on inputs any further since they were not too sure of the outcome. Indeed the phytotoxic effect of the chemical even at sub-herbicide level had induced ripening of immature fruits. Nevertheless, about 30% of the fruit grew to maturity.

The periodic visits made by the researchers had reinforced the farmers' confidence in them. The final outcome enabled the farmer to gain a net profit of more than a thousand pesos. According to the wife, they did not spend much on pesticides after the third spraying. This was at about 7 days after onset of flowering. Moreover, there was no hired labor in harvesting and the price per crate ran between p70-P250 as compared to P15-P40 previously. The farmer and family were so pleased that they were planning on planting off season tomatoes again. They asked for the remaining chemical so that they would have something to use next year. They were informed that a tomato variety suitable for long day periods is already available for them to try if they wished.

SUMMARY AND RECOMMENDATIONS

The farmer participants in the project were generally cooperative. Since there were only seven, the project staff was able to visit each one for at least once a week, during preharvest and 2-3 times a week at harvest time. A good rapport between staff and farmer had been established.

The one season trial on a "demo-experiment on the optimization of inputs for vegetable production" has drawn much interest among other farmers. They indicated a willingness to participate in future projects in the area.

The farmer cooperators were very willing to share their experiences in vegetable farming. One of the most commonly discussed topic was insect control. Some of them would buy the most expensive insecticide thinking that is the best among the lot. Others claim that there are more pests now than 5-10 years ago.

They have associated the terminal diseases besetting people nowadays as due to numerous pesticides being applied on food crops. Apparently, these farmers are already prepared for an educational campaign on the hazards brought about by improper use of pesticides. Some even claim that they do not eat their vegetables anymore for fear of getting poisoned.

Since the wives are active participants in vegetable production, they might be easier to convince on the hazards of pesticide misuse. A preliminary study on the level of residues from samples taken from farmers' fields at harvest proved to be a real cause for concern. Since the samples did not represent the entire area, there is a need to monitor the amount of pesticides present in major vegetables grown in the area.

Results of the two studies yielded valuable information for developing an interim vegetable IPM technology that could be verified and further evaluated with the farmers in Calamba.

While a project of this nature also aims at increasing production of farmers through good management of pests and diseases, it may not necessarily follow that there would be an increase in the net income of the farmers. This was because of the low price of vegetables due to over supply. The price was very low, yet the farmer had no alternative but to sell his product to retrieve part of his investment.

A big proportion of the vegetable fields in Looc and Uwisan is close to the lake. A popular crop grown in this area is okra. While this is the most suitable crop during the rainy season, farmers also mentioned that they could not have a good price for it. Evidently, there are other pressing issues that need immediate attention to fully realize the impact of the technology extended to the farmers. In this case, one should not only be concerned with the increase in production but should also look into possible ways of maximizing the net income of the farmer as a result of the technology that was adopted. One such area is on what could be done to the vegetables when there is an oversupply. For example, a processing technology for tomatoes and okra could be introduced.

Table 1. Variety of vegetables planted in Looc, Calamba, Laguna and number of times planted every year.

Variety	No. who Planted	%	Frequency of Planting once/year No.	%	twice/year No.	%
Pole Sitao	15	79	11	73	3	27
Tomato	13	68	10	77	3	23
Ampalaya	7	37	6	86	1	14
Okra	5	26	5	100	0	
Upo	4	21	4	100	0	
Eggplant	2	11	2	100	0	
Squash	1	5	1	100	0	

Table 2. Family involvement in vegetable production in Looc, Calamba, Laguna.

Activities	Degree of Participation (%)		
	Husband	Wife	Children
Seedbed Preparation	36.2	36.2	27.6
Land Preparation	76.2	11.9	11.9
Care of Seedlings	50	25	25
Planting	46.2	17.5	36.3
Fertilizer Application	54.6	33.3	12.1
Watering	50	25	25
Spraying	38.1	11.9	50
Weeding	22.6	37.2	37.2
Cultivation	60.5	11.6	27.6
Harvesting	27.6	27.6	44.8
Marketing	0	100	0
Percentage contribution to total family labor	42.3	30.7	27.0

Table 3. Degree of participation by men, women and children in vegetable production in Looc, Calamba, Laguna.*

Activities	Male	Female**	Male & Female	Female & Children	All
A. Production					
Land Preparation	100				
Seed bed preparation & care	75		25		
Seed selection		12.5	87.5		
Planting/Transplanting	12.5	12.5	37.5		37.5
Cultivation	100				
Weeding	50		25	12.5	12.5
Fertilizer application	80	20			
Watering/irrigation	50		25	12.5	12.5
Purchase of pesticides & fertilizer		100			
Spraying	100				
Percentage contribution to production activity	56.8	14.5	20	2.5	6.2
B. Post Production					
Harvesting	12.5	62.5	12.5	12.5	
Sorting/packing		37.5	25	12.5	12.5
Hauling	100				
Marketing		100			
Percentage contribution to post production	29	51.6	9.7	6.5	3.2
C. Decision Making					
Buying of seeds	37.5	12.5	37.5		
Fertilizer & pesticides	75	25			
Hiring labor for spraying	50	37.5	12.5		
weeding	12.5	50	37.5		
harvesting		100			
Watering & irrigation	12.5	87.5			
Vegetable to plant in an area			100		
Percentage contribution to decision making	27.3	45.4	27.3		

*Among the eight respondents, seven were current cooperators who planted tomatoes and beans. An equal number of males and females were interviewed.

**Female are those wives and/adult women hired in production and post production activities.

Table 4. Number of respondents (n=29) who could name the insect pests of vegetables as shown to them through pictures.

Pest Species shown to respondents	Local Names	Number of Mentions
Bean fly	tungro	1
	pasik	1
Fruit worm	uod	2
Pod borer	uod	2
Aphids	apaya	2
	dapulak	1
Leaf folders	uod	1
	buyaot	1
	selopin	1
	bunot	1
Cutworm	uod	1
Fruitfly (Dacus)	uod	1
Shoot and fruit borer	uod	1
	bagambong	1
Flea beetle	salagubang	1
Green stink bug	pagong-pagongan	1
Cotton stainer	no name	
28 spotted lady beetle	no name	
Black leafhopper	no name	
Thrips	no name	

Table 5. Number of respondents (n=29) who could describe the damage inflicted by the insects in the picture shown to them.

INSECT	Damage Characteristics	Number of Mentions
Bean fly	eat the leaves and fruit	1
Pod borers	eat the leaves and fruit	2
Aphids	fold the leaves	4
Leaffolder	fold the leaves	4
Fruitworm	eat the stem and fruit	5
Shoot and fruit borer	eat the stem and fruit	2
Cutworm	cut the leaves and stem	2
Fruitfly (Dacus)	wilt and dries up plant	2
28 spotted Lady Beetle	do not know	
Black leafhopper	do not know	
Thrips	do not know	
Flea beetle	do not know	
Cotton stainer	do not know	
Green stink bug	do not know	

Table 6. Total cost of production, total profit and return on investment in researcher—farmer managed (FRP) vs farmer—managed (FMP) plots. Two 625-sq m plots were planted to pole sitao in Looc, Calamba, Laguna on December 26,1986. There were 10 primings which started on February 13 until March 3, 1987. (CS1: Nemensio Matanguihan.

FACTORS	FRP	FMP
Land preparation, planting weeding, cultivation & seeds	P213.24	P213.34
Fertilizer : Urea	59.40	55.00
Agrowell	13.60	40.80
Pesticides : Lannate	0	232.50
Cymbush	51.00	0
Mesurol	55.68	0
Plantvax	62.40	0
Sticker	1.22	
Labor: Spraying	28.00	46.00
Harvesting	160.50	90.35
Total costs	655.14	677.89
Total Harvests (kg)	321	180.7
Total Profits	1386.50	783.00
Return on Investment	2.12	1.16

Table 6a. Total cost of production, total profit and return on investment in researcher-farmer managed plot (FRP) vs. farmer-managed (FMP) plots. Two 840 sq m plots were planted to pole sitao in Looc, Calamba, Laguna on January 2, 1987. There were 17 primings which started on February 19 up to March 23, 1987 (CS2: Ireneo Ocdamia).

FACTORS		FRP	FMP
Land preparation, planting, weeding watering, cultivation and seeds		₱340.00	₱340.00
Fertilizers:	Urea	49.50	38.50
	Complete	19.60	19.60
	Agrowell	28.00	18.00
Pesticides:	Azodrin	10.20	40.80
	Lannate	0	176.70
	Decis	0	60.00
	Sevin	0	44.00
	Mesurol	74.24	0
	Plantvax	62.40	0
	Cymbush	28.00	0
	Malathion	26.46	0
Sticker		.82	0
Labor:	Spraying	30.00	100.00
	Harvesting	611.00	514.40
	Total costs	1286.22	1352.10
	Total harvest	1227.00	1029.00
	Total profits	4408.25	3733.80
	Return on investment	3.43	2.76

Table 6b. Total cost of production, total profit and return on investment in research-farmer managed (FMP) plots. Two 365—sq m plots were planted to pole sitao on January 10, 1987 in Looc, Calamba, Laguna. There were 18 primings which started on March 3 up to April 6. 1987 (CS3: Conrado Mabait).

FACTORS		FRP	FMP
Land preparation, planting, weeding watering, cultivation and seeds		₱ 294.00	₱ 294.00
Fertilizer:	Urea	0	24.20
	Complete	47.07	3.92
	Agrowell	10.50	12.00
Insecticides:			
	Azodrin	29.07	0
	Cymbush	21.00	0
	Malathion	16.75	0
	Brodan	46.14*	92.28
	Lannate	0	124.00
	Sevin	0	66.00
	Thiodan	0	28.62
Labor:	Spraying	25.00	72.00
	Harvesting	332.00	291.00
	Total Costs	821.53	1008.02
	Total Harvest (kg)	664.00	582.00
	Total Profits	2536.37	2256.69
	Return on Investment	3.09	2.24

* Farmer applied the insecticide without the researcher's knowledge.

Table 6c. Total cost of production, total profit and return on investment in researcher-farmer managed (FRP) vs. farmer-managed (FMP) plots. Two 557-sq m plots were planted to pole sitao in Looc, Calamba, Laguna on January 24, 1987. There were 20 primings which started on March 13 up to April 20, 1987 (CS4: Domingo Gomez).

FACTORS		FRP	FMP
Land preparation, planting, weeding cultivation and seeds		₱ 301.50	₱ 275.64
Fertilizers:	Urea	26.40	28.61
	Agrowell	10.50	0
Insecticides:	Azodrin	17.68	20.41
	Cymbush	48.00	0
	Malathion	18.90	0
	Lannate	0	204.68
	Brodan	0	38.17
Labor:	Spraying	25.00	84.00
	Harvesting	331.00	410.50
	Total Costs	772.98	1062.01
	Total Harvests (kg)	662.00	821.00
	Total Profits	2116.20	2504.06
	Return on Investment	2.74	2.38

Table 7. Total cost of production, total profit and return on investment in researcher-farmer managed (FRP) vs. farmer-managed (FMP) plots. Two 380 sq m plots were planted to tomatoes (var. marikit) on December 31, 1986. There were 13 primings which started on March 6 up to March 30, 1987 (CS5: Basilio Ocdamia).

FACTORS		FRP	FMP
Land preparation, planting, cultivation, watering and weeding		₱173.75	₱173.75
Fertilizers:	Urea	16.50	16.50
	Agrowell	14.00	0
Insecticide:	Thiodan	3.18*	3.18
	Lannate	3.19*	69.75
	Sevin	3	22.00
	Cymbush	28.00	0
Labor:	Spraying	16.00	40.00
	Harvesting	112.00	108.00
	Total Costs	366.53	433.19
	Total Harvests (no. of kaing)	28.00	27.00
	Total Profits	598.93	549.95
	Return on Investment	1.63	1.38

* Respectively, insecticide applied by the farmer at the seedling stage for the control of ants and without the researcher's knowledge.

Table 7a. Total cost of production, total profit and return on investment in researcher-farmer managed (FRP) vs. farmer-managed (FMP) plots. Two 850 sq m plots were planted to tomatoes (var. pope) in Looc, Calamba, Laguna on January 4, 1987. There were 15 primings which started on March 20, up to April 14, 1987 (CS5: Ricardo Gatdula).

FACTORS		FRP	FMP
Land preparation, planting, cultivation, weeding, irrigation and watering		₱ 679.63	₱ 699.63
Fertilizer :	Urea	33.00	43.42
	Agrowell	17.50	0
Insecticides:	Thiodan	0	44.29
	Azodrin	0	42.50
	Sevin	0	149.29
	Cymbush	59.50	0
Labor:	Spraying	18.00	70.00
	Harvesting	188.00	136.00
	Total Cost	995.63	1185.13
	Total Harvest (no. of kaing)	47	34
	Total Profits	1782.86	1266.85
	Return on Investment	1.79	1.07

Table 7b. Total cost of production, total profit and return on investment in researcher-farmer managed (FRP) vs. farmer-managed (FMP) plots. Two 240 sq m plots were planted to tomatoes (var. pope) in Uwisan, Calamba, Laguna, January 28, 1987. There were 11 primings which started on March 31 up to April 20, 1987 (CS7: Pantaleon Lapaz).

FACTORS		FRP	FMP
Land preparation, planting, cultivation, weeding and watering		₱ 131.00	₱ 134.64
Fertilizer :	Urea	4.36	60.00
	Complete	9.72	0
	Agrowell	8.55	8.18
Insecticides:	Azodrin	9.27	9.27
	Cymbush	42.00	0
	Lannate	0	42.27
Labor:	Spraying	21.00	20.45
	Harvesting	96.00	64.00
	Total Cost	321.90	338.81
	Total Harvest (no. of kaing)	24	16
	Total Profits	1112.15	709.35
	Return on Investment	3.30	2.09

Table 8. Total crop protection cost, total profits and return on investment per hectare in farmer–researcher (FRP) VS. farmer–managed (FMP) plots of vegetable cooperators in barangays Looc and Uwisan, Calamba, Laguna.

Case No.	Total profits (₱)		Total cost of production (P)		Total crop protection cost (₱)		Total labor cost in spraying		Percent (%) crop protection cost to total cost of crop production		Freq. of spraying		Return on investment	
	FRP	FMP	FRP	FMP	FRP	FMP	FRP	FMP	FRP	FMP	FRP	FMP	FRP	FMP
POLE SITAO														
1	22,184.00	15,528.00	10,482.24	10,846.24	3,390.40	5,108.80	448.00	735.00	32.34	47.10	5	12	2.12	1.16
2	52,479.17	44,450.00	15,312.14	16,096.43	2,763.33	5,017.86	357.15	1,190.48	18.05	31.18	4	12	3.43	2.76
3	69,486.59	61,827.12	22,507.67	27,616.99	3,779.73	10,490.41	684.93	1,972.60	16.79	37.99	5*	12	3.09	2.24
4	37,992.82	44,956.19	13,877.56	19,066.61	1,859.60	5,868.04	448.83	1,508.08	13.40	30.78	4	4	2.74	2.36
MEAN	45,536.40	40,940.33	15,544.90	18,406.47	2,948.27	6,621.28	484.72	1,351.79	20.14	36.76	4.5	12.5	2.84	2.13
TOMATO														
5	15,761.32	15,788.16	9,645.53	11,399.47	1,323.16	3,550.79	421.05	1,052.63	13.72	31.15	4	7	1.63	1.38
6	20,974.82	14,904.12	11,713.29	13,942.71	911.76	3,600.94	211.76	823.53	7.78	25.83	2	5	1.79	1.07
7	46,339.58	29,556.25	13,412.50	14,115.67	3,011.25	2,999.58	875.00	852.08	22.45	21.25	4	6	3.3	2.09
MEAN	27,691.91	20,082.84	11,590.44	13,152.62	1,748.72	3,383.77	502.60	909.41	14.65	26.08	3.33	6	2.24	1.51

[1] Includes 2 spraying done by the farmer without the researchers' knowledge.

Table 9. Rate of pesticide application in farmer-researcher (FRP) vs. farmer-managed (FMP) vegetable plots in Barangays Looc and Uwisan, Calamba, Laguna.

PESTICIDES	Kilogram FRP Mean	Kilogram FRP Range	Active Ingridient FMP Mean	Active Ingridient FMP Range	Per Hectare Recomended Rate
POLE SITAO					
Azodrin	.576	.49-1.0	.363	.202-.711	.5-.75
Lannate	0		.314,	.231-.660	.75
Thiodan	0		1.07		.75-1.0
Brodan	0		.985	.679-1.290	.75-1.0
Sevin	0		.302	.202-.699	1.00-1.5
decis	0		.005		.025-.05
Cymbush	.049	.033-.058	0		.025-.05
Malathion	1.63	1.33-1.94	0		1.00-1.5
Mesurol	.765	.762—.768	0		.50-.75
Plantvax	.67	.571-.768	0		.75
TOMATO					
Cymbush	.048	.031-.074	0		.025-.05
Azodrin	0		.315		.50- .75
Thiodan	.224*		.277	.134-.420	.75-1.0
Lannate	.095*		.304	.095-.426	.75
Sevin	0		.202	.180-.224	1.00-1.5

*Farmer used these chemicals in FRP without the researchers' knowledge.

Table 10. Estimated inputs and benefit from a 1800 sq m pole sitao planted in Looc. Calamba. Laguna on January 26. 1987. There were 15 primings which started on March 15 up to April 13, 1987 (Farmer: Nemesio Mantanguihan).

FACTORS	VALUE(P)
Land preparation, planting, weeding and cultivation	₱ 534.92
Seeds	165.52
Fertilizers	165 72.50
Insecticides	124.19*
Labor: Spraying	24.00
Harvesting	469.50
Total Expenses	1,390.63
Total Profits	2.894.00
Return on Investment	2.08

* Farmer applied insecticides for 5 times only.

Women and men in a farming household: The case of the Julian family

Jeanne Frances I. Illo*

INTRODUCTION

The present case study focuses on the Julian family, one of several households cooperating in various farming systems project activities in Barangay Cahabaan in Talisay, Camarines Norte. As of the time of our research in the barangay, this household-cooperator was involved in at least one of the project's field trials.

Objectiyes and Data Sources

The case study of the Julian family aims to accomplish the following goals: (1) to describe how a family in a farming systems research project distributes work, resources, and rcsponsibilities for various production (including marketing) activities among family members, and (2) to pinpoint some gender issues and concerns highlighted by the Julian case. To achieve these objectives, data collected from a research on gender issues conducted in the Bicol Farming Systems Project will be utilized. The information used in this case study were gathered through intensive interviews with members of the Julian household, field visits at various points of the research period, and intensive 24-hour observation of household operations conducted thrice during the research period.

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Demographic characteristics

In 1986, the Julian family consisted of the couple (Tiong Alan and Tiang Edna) and their six children, namely: Alicia, 19 years old; Alejo, 18; Araceli, 17; Alan Jr., 15; Ana, 12; and Alvin, 7. At the time of the study, Tiong Alan was 43 years old while Tiang Edna, 45 years old. During the 5-month fieldwork period, the composition of the household underwent several changes. In early August 1986, only the three younger Julian children (two boys and a girl) were living with their parents. The three other children lived elsewhere. Alicia and Alejo were in Bulacan where they were working in a bakery—Alejoas a baker, and Alicia as a sales aide. Araceli, on the other hand, was in Pampanga working as a domestic servant; she left her natal household early in 1986. In mid-August, Alicia came home; Alejo and Araceli followed in September. Alicia and Alejo returned home after the bakery where they worked was burned down. In December, Alicia went back to Bulacan
and brought Araceli with her. Alejo was persuaded by his mother to stay home and help in the farm.

Of the children who lived with their parents throughout 1986, Alan Jr., who had completed his elementary education, chose to work in the farm rather than go back to school. A younger sister, Ana, decided to proceed to high school; she was in her first year in a secondary school in Daet. The youngest, Alvin, was in Grade 2. Unlike Alan Jr., the older Julian children had either finished a vocational course (Alicia), spent a year or two in high school (Alejo), or completed the secondary level (Araceli).

Resource base

At the time of the research, the Julian family was cultivating a 2.5-hectare farm--2.0 hectares of which were primarily planted to coconut and about 0.5 hectare (between 45 and 60 areas), to rice and other short-term cash crops—-anda 0.20-hectare open-upland which they borrowed from one of the barangay leaders. Tiong Alan and Tiang Edna began cultivating the 2.5-hectare land in 1962 after Tiong Alan's father gifted them with his tenancy rights to this land during their wedding. Along with the land, they 'inherited' the Daet-based Chinese landlord to whom they agreed to pay the following shares: 60% of proceeds from the sale of copra and 6 cavans of palay per harvest. Other crops were not covered by the extant land contract, but Tiong Alan was willing to share his harvest from these crops should his landlord require it. On the other hand, Tiong Alan borrowed the 0.20 hectare land in 1972 which he cleared and planted to pole sitao (string beans). No period nor 'payment' was set for the use of this land.

In addition to their own, tenanted and 'borrowed' land, the Julians owned carabaos and several chickens. They also usually had a pig which they raised for fattening. In early 1986, Tiong Alan acquired the 'caring rights' for a Brahman cow under a 50-50 sharing arrangement on the offspring or the sale of the cow.

In 1985, Tiong Alan's brother (Nestor) invested P7,700 on a threshing machine which he asked Tiong Alan to manage. Tiong Alan rented out and operated the machine. The machine rental was pegged at 1.0 ganta per cavan of palay threshed; an additional 0.5 ganta per cavan was collected to pay for the assistants of Tiong Alan. The machine rental income was divided between Nestor and Tiong Alan; the latter spent for the fuel and maintenance of the machine out of his share.

Living arrangements

Tiong Alan and Tiang Edna established their home in a clearing located at the center of the 2.5-hectare coconut farm. There they built a nipa hut for their family. At the time of the study, the house had coconut shingles for roofing and wood and hollow blocks for walls. The dwelling unit was divided into three areas: the sleeping quarters (located in the elevated portion of the building), the receiving room (a combined area for entertaining guests and for sleeping of visiting relatives), and a room which functioned as kitchen, dining area and storage for the household's food supply. Cooking, however, was generally done in a roofed area attached to the back of the house. There Tiang Edna cooked her household meals on an elevated earthen-topped table.

The homelot occupied about 400 square meters. It is bordered by coconut trees, fruit trees (like chesa, santol, banana, blackberry and jackfruit), coffee, a 'garden' planted to pepper and another which Tiang Edna and Alicia had planted to flowering plants, herbs, and leafy ornamental plants. Also found within the homelot were a copra drying shed, a water pump, an outhouse, and a bench (under a leafy tree).

Within the house were found several material possessions. Some of these were purchased out of proceeds of sale of various produce. For instance, a casette tape recorder was bought from sale of palay; a transistor radio was acquired from the sale of pole sitao; a wall clock and a wooden *aparador* or closet for clothes were funded out of the sale of mungbeans. The Julian family also owned two bicycles (one bought in 1982 for Tiong Alan's use, and another which a relative gave to Alejo as a gift), a *petromax* for lighting (which was inherited from Tiong Alan's parents), a wooden bed, and a wooden dining table. Ever since 1984 when the village was served by the Camarines Norte Electric Cooperative, the Julian family had relied on electricity for their lighting needs; the *petromax* was used by the household during power brownouts.

The Julian family lived close to several of Tiong Alan's brothers and other relatives. The men and the women from the related households considered themselves as one network for farm work, emergency, economic and emotional support.

Production activities

Tiong Alan, Tiang Edna, and their children engaged in a variety of production activities. These enterprises included (1) care, harvesting, and processing of coconuts; (2) cultivation of rainfed rice; (3) raising of short-term cash crops like pole sitao; (4) growing vegetables for kitchen use and raising herbs for minor ailments; (5) animal or livestock care; and (6) wage employment. Most of these activities involved more than one household member; some, however, had been acknowledged by the household as the enterprise of specific individuals.

Crop production. Ever since their marriage in 1962, Tiong Alan and Tiang Edna had been raising various crops, including rice, cassava, pole sitao, ampalaya, and a few fruit trees (see Table 1). Other crops were grown during the succeeding years. For instance, in 1970 they began to plant peanuts; they continued to grow this until 1985. Beginning in 1972, they included cucumbers in their crop rotation schedule. In 1984 and 1985, the couple began to cultivate mungbeans. Four additional crops were introduced in 1986: sweet potatoes, eggplants, *sili* (pepper) and *gabi.* Over the past two decades, too, a few coffee trees were planted around the homelot. At the time of the research, therefore, the Julian family was growing several short-term crops and earning from fruit trees and other perennial crops. Between 1962 and 1986, the Julians also tried growing such short-term cash crops as Baguio beans and corn, but they discontinued planting these when it became obvious that these crops did not thrive when planted under coconut. Their bean production was very low, while corn and eggplants were highly susceptible to worm infestation.

The Julian 'landholding' consisted of two defined 'parcels'. One parcel, measuring 2.5 hectares, actually covered several sub-parcels, namely: rice parcel (0.5 hectare) and the land under coconut (2.0 hectares). Intercropped with coconut, however, were several other crops. In July 1986, the coconut parcel contained four 'plots', three of which were cultivated by the Julian family, and a fourth, borrowed by an uncle of Tiong Alan. These plots under coconut were: pole sitao of 'natural' or native variety (1,000 sq.m.); a cassava plot cultivated by the Julian family, and another plot (1,000 sq.m.) was planted to cassava by Tiong Alan's uncle; and sweet potato. Figure 1 presents the configuration of the major crops grown in the Julian family farm. In 1985, Tiong Alan and Tiang Edna claimed that these plots had been planted to mungbean, peanuts, cucumbers, and sweet potato.

Livestock production. As of mid-1986, the Julians had four carabaos, one cow, and two hens and nine chicks. Ever since 1962, Tiang Edna and Tiong Alan usually had at least a pig along with their carabaos and chickens. They bought the first carabao from the proceeds of sales from their first pole sitao harvest. This carabao they had bred, which had resulted into the present four heads. The Julians got their first pig also from the sale of their agricultural produce. From the sale of the fattened pig, Tiang Edna usually bought a piglet for fattening. The last pig they sold was in 1985; they bought a piglet in late 1986 out of their pole sitao sales. A second piglet was acquired by Alicia from a paternal uncle under a 50-50 sharing arrangement. While they owned the carabaos, the chickens, and one pig, they were tending the cow (Brahman) under an arrangement whereby the Julians would get the first calf, and the owner (a Daet-based businessman who also owned several head of cattle which were placed under the care of another Cahabaan farmer), the second calf. Tiong Alan acquired the cow only in early 1986.

Other market production activities. In addition to their various family production enterprises, the Julians were partly dependent on wages which their family members earned. In 1985, Tiong Alan hired out his services as coconut harvester and as threshing-machine operator. Tiang Edna, Alan Jr., and Ana worked as hired transplanters. The two oldest Julian children, Alicia and Alejo, had earlier left for Bulacan to work in a bakery. During the first half of 1986, only Tiong Alan, among the members of his family who were left in Cahabaan, was reportedly able to find wage work. Alicia and Alejo worked in Bulacan until early August, while Araceli worked as a domestic servant in Pampanga from early 1986 through August 1986. When the older Julian children came home in late 1986, they, too, worked as hired transplanters in other rice farms in the village.

Division of Work and Resources
When interviewed in 1986, Tiang Edna and Tiong Alan emphasized that crop cultivation, livestock care and management, marketing of their produce, and search for wage jobs involved more than one family member. However, they also underscored the fact that specific members were acknowledged as primarily responsible for certain activities, The jointness as well as the 'individuality' of own production enterprises and so-called household production (more popularly known as household 'chores') activities are alluded to by the data summarized in Table 2. The arrangements by which the Julian family distributed production responsibilities among its members were dependent on the available family labor, the demand of the farm, and alternative sources of employment in the community. On the whole, too, involvement of family members varied by the nature of the activity. Moreover, the specific activities which members

engaged in defined their individual access to the common resource pool of the family.

Division of work

Crop production. In 1985 and 1986, production responsibilities within the Julian household had been distributed among all the resident members with the exception of Alvin, the youngest child. For crop production, distinct gender-based division of labor was observed. For instance, in the cultivation of their rice crop, Tiong Alan was primarily responsible for land preparation, seedbed preparation, and threshing (that is, operating the threshing machine). Alan Jr. helped him in these tasks. Tiang Edna, Ana and, when at home, Alicia and Araceli undertook transplanting and weeding. These female workers also helped in the harvesting of rice, each of them getting paid a share in the harvest in the same manner as the hired harvesters. When workers were hired to do transplanting and harvesting, Tiang Edna oversaw their work and, with the help of her daughters, provided the hired hands with food in the fields.

In the case of coconut care, harvesting, and processing (into copra), on the other hand, Tiong Alan and Alan Jr. harvested the nuts and hauled these to the copra drying shed. The Julian women helped them husk the nuts and prepare these for smoking. Working-aged family members were involved in cutting up the semi-dried meats into copra meals for further drying/smoking. Tiong Alan packed the meals in sacks and, with Tiang Edna, brought these to Daet to be sold to their customary buyer or *comprador.*

A marked variability in the relative involvement of family members was observed in the production and harvest of short-term cash crops. One of the family's two sitao plots, for example, was acknowledged as Alan Jr.'s. After the harvest of the rice crop, one *sagip* (or box) was 'given' to Alan Jr. for his pole sitao crop. He did the needed tillage, procured and installed the trellis, planted the seeds, weeded the plot, and harvested the crop. His harvest was marketed by his mother who turned the proceeds from the sitao sales over to him. Late in 1986, Tiang Edna had encouraged Alejo not to return to Bulacan and instead cultivate his 'own' pole sitao plot. In contrast, the 'family' pole sitao crop involved more than one member. Tiong Alan did the tilling; he and Tiang

Edna planted the seeds; Tiang Edna and Ana looked for trellis materials which Tiong Alan installed; and whoever was available did the needed weeding. Tiang Edna, however, was exclusively responsible for harvesting, sorting and bundling the sitao, selecting the next crop's seed materials, and bringing the crop to the market in Daet. Tiang Edna carried the bundles of sitao on her head over a 45-minute hike on footpaths, bamboo bridges and dirt roads before she could take a jeepney to Daet. Tiong Alan accompanied Tiang Edna and helped in carrying the harvest during peak seasons.

In the case of rootcrops (like amires and gabi) which were grown primarily for household consumption, Tiang Edna was acknowledged by all members of her family as the major producer. She secured the planting materials, planted and tended the crops, and harvested and decided on the crops' utilization. Whenever tillage was necessary, Tiong Alan or Alan Jr. helped her, although there were instances where she broke the ground by herself preparatory to planting.

Apart from these cash and subsistence crops, Tiang Edna and her family also raised herbal plants which could be used to cure minor ailments. The conversion of garden plots planted to ornamental plants (by Alicia) into herbal garden plots (by Tiang Edna) resulted in minor conflicts betwen mother and daughter. When Alicia returned home from Bulacan, they agreed to raise both without disturbing the herbs which were already in place.

Cure and management of animals. The Julian family had always tended a brood of chickens, carabaos, and at least one pig although in the case of the pig, there could be, as what happened between late 1985 and mid-1986, intervals when their pig stock would not be immediately replaced after a fattened pig was sold. These animals, including the Brahman cow which the household acquired in 1986, were not provided any special 'houses.' Carabaos, pigs, and the cow were tethered, while the chickens were left to roam within the homelot. Bringing both carabaos and cow to pasture and to water were tasks shared by male and female members of the family. Alan Jr., however, was considered as the major caretaker of the cow. On the other hand, the care of pigs--including preparing the feed, feeding, bathing--was the responsibility of Tiang Edna and Alicia.

Work for wages. While the Julians had already diversified their economic survival package by planting different crops, rotating the use of available land, and raising livestock, they also continued to secure additional sources of cash earnings which they could use for both household and farm needs. Tiong Alan generally hired himself out for harvesting of coconut in other farms, while Tiang Edna and the older children worked as transplanters in other rice farms within the village and in adjoining villages. As illustrated in several instances in 1986, Tiang Edna was often involved in finding off-farm wage employment for herself and her children. Apart from off-farm work, three of the Julian children had sought wage employment in distant places to help their family -- Alicia and Alejo as workers in a bakery in Bulacan, and Araceli as a household helper in Pampanga. Very often, however, these children would go home in time to help in the transplanting in their own farm, which was usually scheduled to the date of the fiesta in Cahabaan.

Household production. Between January 1985 and December 1986 the Julian household had seen changes in its composition. In the most part of 1985, Alejo and Alicia were in Bulacan, while Araceli left for Pampanga in early 1986. Beginning in mid-August 1986, these Julian children started coming home, staying until early December except for Alejo who was convinced by Tiang Edna to stay on. These changes in the resident family members affected the division of work not only in market activities, but also in the distribution of responsibilities within the home.

When only the three younger children were living at home, Tiang Edna did the cooking, washing of the laundry, and cleaning the house and yard. Ana and Araceli helped with the dishwashing and gathering of dried coconut fronds and twigs for fuel. Alan Jr. was assigned the tasks of fetching water for domestic use and gathering firewood. Tiong Alan was primarily involved in fetching water whenever Alan Jr. missed to do this. Marketing for household needs was done when Tiang Edna brought agricultural produce to Daet. For a usual week in 1985, when these arrangements held, Tiang Edna reportedly spent 64 hours a week, while the two daughters spent 8 hours each per week.

Tiong Alan's involvement in household production averaged about 10 hours per week, while Alan Jr., 3.5 hours.

Beginning in mid-August 1986, when Alicia came home from Bulacan, she and Tiang Edna shared the housework between them. Often, Alicia took care of cooking the meals while Tiang Edna attended to their farm and worked for wages in other rice farms. Ana also helped with the other chores, but she was more occupied with school during the week. On weekends, she helped her mother work in the field. Alejo, who came home in early September, took over the cutting of firewood and fetching the water. Together with Alan Jr. and their mother, Alejo also worked for wages and did chores in the farm. Except for helping Tiang Edna in the marketing of produce, Tiong Alan had little involvement in household production during the later part of 1986. He was busy with farm work-growing rice, harvesting the coconuts and drying the copra, and the like.

Distribution of resources

The Julian family subsisted principally on what they could get from their various crops, the family share in the sale of copra, and wages of various family members. The data on the end uses of the different household products, presented in Table 3, indicate the following trends. First, products of joint household activities (like rice, the family's pole sitao crop, coconuts) were generally destined for general consumption by the family. Second, produce of individual members generally accrued to them for their personal use and disposal. However, several instances suggest flexibility in the enforcement of this rule. Tiang Edna sometimes asked Alan Jr. for part of his cash income from the pole sitao for household needs or to meet immediate school needs of Alvin. Moreover, Tiang Edna used her rootcrops to add to her family's food supply. And third, because Tiang Edna did the marketing of the family's agricultural produce, she had a considerable control over the disposal of the proceeds from the sales. Available data, however, hint that her control over these liquid resources was limited by the tightness of the household budget. Nonetheless, Tiang Edna was able to buy more than the family's basic needs out of the income from their crops.

Wage incomes of family members were generally beyond Tiang Edna's control, except in the case of shares in the family's rice crop which several family members had helped to harvest. These palay shares were added to the rice stock for household consumption. In contrast, cash wages of the Julian children were usually kept by them. Wages of Tiang Edna, however, were completely diverted to meet household needs, while a part of Tiong Alan's coconut-harvesting wages was retained by him for his personal needs.

Involvement of the Family in the Farming Systems Project

Selection as cooperator

The Julian family's involvement in the Farming Systems Research Project took a circuitous route. Tiong Alan was among the farmers whom the project staff had originally chosen to be their cooperators, but he felt disinclined to engage in any of the field trials because he doubted the effectiveness of the technologies which the project wanted to test. His 'contentious' attitude towards the project earned him the label of *pilosopo.* In early 1986, however, Tiong Alan became interested in a mungbean variety which a brother, a farmer selected to be a project cooperator, said could be secured from the project staff. Tiong Alan then sought out a senior project staff member and inquired about the seeds. Tiong Alan was provided an undetermined amount of seeds which he was told to replace out of his harvest. Tiong Alan planted the mungbeans in mid-March 1986, right after his rice harvest. Heavy rains which poured for three continuous days in mid-April destroyed the mungbean crop. Tiong Alan has not tried that mungbean variety again.

In late August, a visit by a project staffmember with the Julians ended in Tiong Alan's agreeing to try out a pole sitao variety (which could be harvested after 45 days) for the project. It appeared that Tiong Alan had been impressed by the yield realized by a neighbor who had planted said sitao variety, and he had been interested since then in experimenting with the same variety.

The pole sitao trial

Tiong Alan was given one and a half bags of pole sitao seeds before the end of August 1986. These were planted in a plot measuring about 700 sq.m. in a hitherto unutilized section of his under-coconut parcel. The sitao trial, which began in September, was a varietal trial; the cultivation of the crop made use of technologies already tried by the Julians. For instance, the seeds were planted with zero tillage. However, the plot was cleared of weeds using a tarugo; this was accomplished by Alan Jr., who was assigned the job by his father, in one day. The following day, Tiong Alan marked the 15 lines for planting (with a 1-meter distance between lines, and about half a meter between hills) using a *labtic* and broke the soil for the hills with a spade. Tiang Edna and Alicia took over the subsequent preplanting and planting tasks. With the use of a stick, Tiang Edna bored a hole in each hill. She then poured in a pinch of insecticide granules (against worms) and covered these with a little soil, Alicia, who was trailing behind her mother, dropped 2 to 3 seeds to a hole and covered them with soil. These activities took a total of 2 person-days.

Fifteen days after planting, Tiong Alan spent one day putting up the poles (branches of trees and Madre de Cacao). The next two days saw Tiang Edna and Alicia preparing the *kotay* for the trellis. Once the sitao began to climb the poles, Tiong Alan and Tiang Edna took turns visiting the plot each day to ensure that the vines were creeping up the assigned sections of the trellis.

In early October 1986, the research team observed Tiong Alan spraying the crop with insecticides for about 15 minutes. By then, the crop was about a month old, and weeding had yet to be done. During the team's next visit on 9 and 10 November, harvesting of the sitao crop was at its peak (*kamarahayan*), and the Julians had had eight separate harvests at three days apart. Initial harvest reportedly yielded one bundle (*bugkos*); the succeeding harvests progressively increased by about one bundle more such that by 10 November the Julian family got 16 bundles in one harvest. Tiang Edna was primarily responsible for harvesting the crop. Tiong Alan and, later, their older children, assisted her when the bulk of the harvest increased. By the team's last visit in

January 1987, the trial plot had been cleared and the polies transferred to another pole sitao (non-trial) plot.

Of the 15 lines, 2 lines were supposed to be harvested by the project staff for yield-data estimation (or crop cut). The harvest, after having been weighed and recorded, was turned over to Tiong Alan. The project staff was expected to harvest all the two lines. When they failed to show up for the succeeding harvests, Tiang Edna decided to harvest the crops in these lines. She sold the harvest along with that from the other 13, and air-dried the riper sitao for seed purposes.

In a conversation with the couple in January 1987, Tiang Edna praised the high yield of the trial variety, but she said that the harvest period was too short. Moreover, clearing the plot for the next crop would be too labor-intensive in the long run because all the preparatory and cultivation work had to be repeated every so often. Their native variety, on the other hand, might yield less, but it allowed for a longer harvesting period and thus a longer time before the plot would be set up for a second crop.

Some Gender-Related Issues for the Farming Systems Project

The case of the Julian family illustrates several key issues which can be addressed by the Bicol farming systems project. These issues are: jointness of farming operations, variety of production activities of rural households, roles played by different family members, and the importance of female work in the operations of the farm and the household. Also alluded to by the Julian case are the following: timing of activities in response to the cash needs of the household and to the availability of family labor, and the existence of local technologies which appear to serve the family reasonably well.

The various concerns highlighted by the Julian case stress the need for a reconsideration of the content and strategies in designing and implementing project activities. For instance, the fact that families or households undertake farming as a joint or common venture suggests that the effective level (or unit) of cooperation which the project can elicit is the household rather than a pre-determined individual household member. The identification of household pry cooperators, rather than 'farmer-cooperators', seems to be the most realistic strategy since the project staff not only acknowledges the real nature of family farming, but, more importantly, opens the possibility of developing with the household a farming-systems trial or activity which considers the variety of family production enterprises. The shift from a specific household member to the household as a unit appears to be a significant step towards modifying both planning and implementation strategies of project activities.

A second issue revolves around the crucial role women play in certain production activities. Women's production roles are better appreciated if the project understands how work and responsibilities are distributed among household cooperators. While the household as a unit is the project cooperator, details of project activities to be tried out by the household can be worked out with the individual household members who are primarily responsible for specific activities. Such a strategy requires an understanding of existing intrahousehold division of labor. In the case of the Julian family, Tiang Edna was acknowledged by her family as responsible for rootcrops such as gabi and amires. It is reasonable to argue that should the project and the Julian household decide to try out improved gabi or amires varieties, Tiang Edna will be the logical household member with whom the project staff can work. The same argument applies in the case of a livestock project involving swine.

Another issue refers to changes attendant to the technology which the project plans to introduce. These changes cover the amount of labor and of physical exertion which a new 'technology' requires, the period during which the family can earn on the crop (which relates to their cash-flow needs), and the fit between the new technology and the extant farming system observed by the household. Gender-related questions that these changes raise are as follows. Will it make women lose control of activities and earnings which they presently have? Will it mean more work for women? Does the added work translate to more food or income? In addition, a general concern can be raised: Does the activity raise or reduce family resources? The probability of spreading or diffusing 'new' or 'improved' farming-systems technologies beyond the identified household cooperators will tend to be enhanced by the observable positive effects the project has on the cooperators.

Table 1. Crop grown by the Julian family: 1962-1986.[1]

	When grown			Existing pre-1962	Year began growing (post-1962)
	1962	1985	1986		
Coconut	/	/	/	/	--
Rice	/	/	/	/	--
Cassava	/	/	/	/	--
Pole sitao	/	/	/	/	--
Sweet potato	-	-	/	-	1986
Amires	/	/	/	-	--
Banana	/	/	/	/	--
Santol	/	/	/	/	--
Madre de cacao	/	/	/	/	--
Langka	/	/	/	/	--
Gabi	-	-	/	-	1986
Sili	-	-	/	-	1986
Coffee	-	/	/	-	n.d.
Eggplant	-	/	/	-	1977
Cucumber	/	/	/	-	1972
Ampalaya	/	/	/	-	--
Peanut	-	/	-	-	1970
Mungbean	-	/	-	-	1984
Avocado	/	/	/	/	--
Chesa	/	/	/	/	--

[1] A tickmark (/) against a crop means that the family was growing/maintaining the crop for the particular year or period. A hyphen, on the hand, means that at least for that year or period that the family was not growing that crop. Apparently in the variety of short-run crops raised by the Julian family is the intensive use of available land. Figure 1 illustrates the cropping patterns which the family was not growing that crop.

Table 2. Involvement of members of the Julia family in different market production activities in 1985 and 1986.

Activity	Male members				Female members			
	Alan	Alejo	Alan Jr.	Alvin	Edna	Alicia	Araceli	Ana
Crop production								
coconut	/	-	/	-	/	/	-	/
Rice	/	-	/	-	/	/	-	/
Cassava	/	-	/	-	/	-	-	/
Pole sitao	/	/	/	-	/	/	-	/
carnote	-	-	-	-	/	-	-	-
hirer	-	-	-	-	/	-	-	-
Gabi	-	-	-	-	/	-	-	-
Sili	-	-	-	-	/	-	-	-
Coffee	-	-	-	-	-	/	-	-
Cucumber	-	-	-	-	/	-	-	-
Arnpalaya	-	-	-	-	/	-	-	-
Peanut	/	-	/	-	/	-	-	/
Mungbean	/	-	/	-	/	-	-	/
Garden	-	-	-	-	/	/	-	-
Animal Care								
Carabaos	/	/	/	-	/	/	/	/
Pigs	-	-	-	-	/	/	-	-
Chickens	-	-	/	-	/	-	-	-
COW	/	/	/	-	/	/	-	/
Wage Employment								
Off-farm	/	-	/	-	/	-	-	/
Non-farm	-	/	-	-	-	/	/	-
Trading in own produce	/	-	/	-	/	-	-	-

Table 3. End uses of selected household agricultural products: 1985 and 1986.

Product	HH/farm use	Marketed	Remarks
Coconut	Nuts for cooking; copra byproducts for the livestock; husk and nuts for fuel	Dried copra	Proceeds from sale used for food and other needs of HH
Rice	Milled rice; brans for the livestock; palay for seed		
Pole sitao	Sitao for viands; selected sitao for seed; stalks for livestock	Sitao	Proceeds from sales used by Tiang Edna to buy transistor radio and one pig—let, and for HH and farm needs; Alan Jr.'s income used for own needs
Mungbean	Mungbean for viand: stalks for livestock	Shelled mungbeans	Proceeds from sales used by Tiang Edna to buy casette recorder and for HH and farm needs
Cassava	Tuber for break-fast and snacks	Tuber	Proceeds from sales used by Tiang Edna for HH food needs
Gabi	Leaves and tuber for viands		
Amires	Tuber for break-fast and snacks		
Pig		Fattened pig	Proceeds from sales used by Tiang Edna for HH needs

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                        1985                         1986

Parcel and plot         J F M A M J J A S O  N D     J F M A M J J A S O N D

Rice-based parcel

                        ----  --------     -------------------         ---------------
  Sagip 1
                        Rice  Pole sitao    Rice                           Rice
  Sagip 2               ----  --------     -------------------     ----------- --------

                        Rice  Peanuts       Rice                Pole sitao  Rice
  Sagip 3               ----  --------     -------------------              ------------

                        Rice  Peanuts       Rice                             Rice
  Sagip 4               ----  -----------  -----  ----------------  ----              ---------

                        Rice  Mungbean     PS     Rice          Mungbean (M)      Rice
  Sagip 5               ----  -----------  -----  ----------------  ---- ---------------  -----

                        Rice  Mungbean     PS     Rice            M  Pole sitao    Rice

Under coconut           ---------------------------------------           --------------------

                              Sili                                           Sili
  Plot 1                ---------------------------------------  -------------------------

                              Amires                                Amires
  Plot 2                ------------------  ------------------------------  ----------------------

                          Cassava               Cassava                      Cassava
  Plot 3                --------

                        Ampalaya
  Plot 4                --------

                        Cucumber
  Trial                                                               ------------------

                                                                        Pole sitao

Borrowed land           --------             ---------------          ------------------

                        Pole sitao           Pole sitao              Pole sitao
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Figure 1. Cropping calendar observed by the Julian family: 1985–1986

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