

2013 Seed Health Unit Annual Report

The Seed Health Unit (SHU) is the single gateway for safe and efficient germplasm exchange and distribution, process incoming and outgoing rice seeds/grains, nonseed biological materials, and soil samples for phytosanitary certification and/or post entry clearance. In addition, SHU facilitates the processing of incoming and outgoing other than rice materials and transgenic rice seeds/grains for phytosanitary certification and/or post entry clearance and assists Plant Quarantine Service in monitoring crop health, disposals, and movements/transfers of transgenic materials, wild rices, and introduced materials. Furthermore, SHU ensures that all incoming and outgoing seed shipments are accompanied by an appropriate Material Transfer Agreement (MTA).

Phytosanitary Certification

A. Rice seeds/grains

From January to December 2013, SHU issued 547 phytosanitary certificates covering 74,213 nontransgenic seedlots with a total weight of 4,337.41 kg and sent to 54 countries worldwide (Table 1). By region, Southeast Asia received the highest total number of shipments and total number of seedlots with 228 shipments and 33,564 seedlots, respectively. SHU also issued 15 phytosanitary certificates covering 499 transgenic seedlots (2.70 kg) sent to eight countries worldwide (Table 2). By region, Europe and Central Asia, North America, Oceania, and Southeast Asia received the highest number of total shipments with three shipments for each region. However, Europe and Central Asia received the highest total number of seedlots with 354 seedlots (1.9 kg). The highest number of shipment and corresponding volume of materials sent by IRRI to different countries were nontransgenic rice seeds with 462 shipments covering 57,092 seedlots and weighing 4,001.99 kg (Table 3). The Plant Breeding, Genetics, and Biotechnology (PBGB) sent the highest number of nontransgenic and transgenic rice seeds/grains to different countries (Tables 4a and 4b). Furthermore, 25 phytosanitary certificates covering

24,840 seedlots (497.95 kg) were also issued to the International Network for Genetic Evaluation of Rice (INGER)-PBGB for their nursery seed distribution to 20 countries worldwide (Table 5). By region, South Asia, Southeast Asia, and sub-Saharan Africa received the highest total number of shipments with 6 shipments for each region. However, South Asia received the highest total number of seedlots with 16,892 seedlots weighing 333.330 kg.

The different fungi and nematode detected with corresponding affected seedlots and detection levels are shown in Table 6. Routine seed health tests conducted on 3,335 nontreated, nontransgenic outgoing seedlots showed that *Curvularia* spp. affected 95.74% of the seedlots while *Pyricularia oryzae* affected only 1.02% of the seedlots. Nontransgenic rice seeds were cleaned of objects for quarantine importance, tested for health, and treated with the prescribed ASEAN standard seed treatment for rice—52-57 °C/15 min. This was followed by fungicide slurry treatment with benomyl and mancozeb, both at 0.1% by seed weight, except for countries that do not allow seed treatment. Fumigation with phosphine was also administered to all outgoing seeds.

A total of 6,120 seedlots from the T.T. Chang Genetic Resources Center (T.T. Chang-GRC) were submitted to SHU for advance seed health testing. The different fungi detected with corresponding detection level and affected seedlots are shown in Table 7. Routine seed health testing revealed that *Curvularia* spp. affected 99.90% of the seedlots, while *Tilletia barclayana* affected only 0.21%.

B. Nonseed biological materials (NSBM)

Through SHU, a total of 239 shipments covering 62,749 various nontransgenic samples were processed for phytosanitary certification and sent to 21 countries worldwide (Table 8). In addition, a total of 12 shipments covering 942 various transgenic samples were processed for phytosanitary certification and sent to 7 countries worldwide (Table 9). For nontransgenic NSBM, East Asia received the highest total number of shipments with 93 shipments. However, Europe received the highest total number of samples with 23, 114 samples. For transgenic NSBM, Oceania received the highest total number of shipments and total number of samples with 5 shipments covering 587 samples, respectively.

Table 10 shows the sources and nature of transgenic and non transgenic NSBM sent to different countries worldwide. For both nontransgenic and no transgenic NSBM, Crop and Environmental Science Division (CESD) sent the highest number of total shipments (85) and total number of samples (26,478). The highest number of NSBM sent was *Setaria* leaf samples (8,266) from C₄ Rice Center (CRC) followed by rice DNA (5,928) sent by PBGB.

Post-entry clearance

A. Rice seeds/grains

Ninety-three (93) incoming nontransgenic seed shipments covering 6,813 seedlots (628.44 kg) from 21 countries worldwide were also processed for post-entry clearance from January to December 2013 (Table 11). By region, the highest total number of shipment and total number of seedlots came from Southeast Asia with 54 shipments covering 3,413 seedlots and weighing 425.90 kg. In addition, five incoming transgenic seeds were also processed through SHU for post-entry clearance (Table 12). The highest total number of transgenic rice seeds came from the Philippines (through the Golden Rice Project) with 170 seedlots weighing 11.65 Kg. Table 13 shows that out of the 98 incoming nontransgenic and transgenic shipments, 75 shipments (including HRDC materials) were nontransgenic rice seeds covering 5,723 seedlots and weighing 515.69 kg. PBGB received the highest number of total incoming shipments (61) and total number of seedlots (4,573) (Table 14).

Out of the 2,784 incoming nontransgenic rice seedlots that were visually inspected none were contaminated with weed seeds but 3.34% was damaged by insects (Table 15a). Furthermore, none of the seeds were found to be with soil. In terms of general quality, 1,973 (70.87%) were under category 3 (Table 15b).

Seed health tests on 138 incoming, nontreated seedlots showed that *Trichoconis padwickii* affected 98.55% of the seedlots, followed by *Curvularia* spp., 92.75%. (Table 16). *Aphelenchoides besseyi* affected only 0.72% of the seedlots. The prescribed ASEAN standard treatments were also applied to all incoming seeds.

B. Nonseed biological materials (NSBM)

Seventy-seven incoming NSBM shipments covering 22,012 various transgenic and nontransgenic samples from 17 countries worldwide were processed through SHU (Table 17). The highest number of incoming shipments came from Southeast Asia with

33 shipments covering 19,898 various samples, among which 9,578 samples were herbarium and insect samples. Table 18 shows that the C₄ Rice Center received the highest number of incoming NSBM with 23 shipments covering 1,161 samples, most of which are transgenic materials.

Crop health inspection

Crop health inspections were conducted on post-entry plant quarantine areas and in the GRC, PBGB, CESD and GQNPC seed multiplication plots during 2013 dry and wet seasons at three different crop stages. Table 19 shows the different diseases observed with corresponding percent incidence. For incoming materials planted during the dry season, 0.09% of the seedlings were infected with *Sclerotium* seedling blight, whereas 0.58% of the seedlings were infected with the same disease during the wet season. During the dry season, the most prevalent disease observed at tillering and maturity stages was tungro, 0.69% and 0.78%, respectively.

On the other hand, for outgoing materials planted in multiplication plots, *Sclerotium* seedling blight was the only disease observed at seedling stage during both seasons, with 0.25% and 0.92%, respectively. During the dry season, the most prevalent disease at tillering and maturity stages was tungro with 0.64% and 0.06 %, respectively. On the other hand, bacterial leaf streak was the most prevalent disease observed during tillering and maturity stages, with 4.12% and 4.72%, respectively.

Material Transfer Agreement (MTA)

The different types of MTA issued for outgoing and incoming transgenic and nontransgenic rice seeds/grains from January to December 2013 are shown in Tables 20a and 20b, respectively. A total number of 795 various MTAs were issued for 587 outgoing shipments covering 99,552 seedlots (4,838.06 kg). Of these, 464 were standard MTAs + Open MTAs (OMTA) issued for 193 shipments covering 51,216 seedlots, weighing 3,367.41 kg. On the other hand, 98 incoming shipments covering 7,019 seedlots and weighing 640.717Kg were accompanied by a standard MTA.

Monitoring of disposals and movements of transgenics

Part of SHU's task is to coordinate with different organizational units and assist plant quarantine service officers dispose (Table 21) and move/transfer

transgenic materials (Table 22). In 2013, a total of 4,759 various samples were disposed, most of which were soil samples from PBGB. In the same year, 20,836 various samples were transferred/moved, most of which were seeds from the C₄ Rice Center.

Workshops, training courses, visitors, information awareness drive

SHU also participated in the following activities coordinated by the Training Center (TC), the National Program Relations, and/or the Events, Visitors, and Exhibit Office (EVEO): 1) orientation of on-the-job trainees, postdoctoral fellows, MS and PhD research scholars, and interns from different countries/organizational units; 2) Human Resource orientation for new employees; 3) IRRI events such as the Ambassador's Day (May 3) and Women in Rice Farming (August 5); 4) training courses such as *Two-week Rice Breeding Course* with 25 participants from various countries; *Rice: Research to Production Course* with 29 participants from 11 countries; *Rice Production Techniques for Research Technicians* (Africa) with 16 participants; *Rice*

Production Techniques for Young Researchers with 16 participants; and *Seed Certification Workshop Training* with 26 IRRI participants.

SHU also conducted on-the-job training for four plant quarantine officers and did lectures and hands-on activities on seed health testing methodologies, identification of seedborne organisms, and seed treatment for Agronomy 170 students from U.P. Los Baños.

The Unit also had the following visitors: Dr. Fareyzul Haque Ansarey, executive director-Agribusiness, Advanced Chemical Industries (ACI) Limited; Dr. Valerio Tanguilig, technical and agronomy manager, Blue Ribbon Rice, Australia; four students from Ubon Ratchathani University, Thailand; Dr. Aiman Rysbekova, senior research scientist, Institute of Plant Biotechnology and Biology, Kazakhstan; Ms. Marilyn M. Belarmino, manager, Genetic Resources Center, EastWest Seed Company, Philippines; Dr. Viviana Velazquez, INIA, Chile; and eight delegates (lawyers) from the Office of the Government Corporate Counsel of the Philippines. SHU also conducted an information awareness lecture for the IRS of CESD.

Table 1. Distribution by region and country of outgoing, nontransgenic rice seeds/grains (January to December, 2013).

Region/country	Total shipments (no.)	Total seedlots (no.)	Total weight (kg)
East Asia (6)			
Hongkong	1	6	.050
Japan	16	1,007	6.617
Korea N	2	6	.149
Korea S	8	8,050	193.770
PROC	39	4,247	43.670
Taiwan	8	746	4.715
Subtotal	74	14,062	248.971
Europe and Central Asia (12)			
Austria	4	77	3.140
Belgium	5	10	.109
Bulgaria	1	6	.080
Denmark	1	20	.075
France	2	47	.324
Germany	11	123	64.506
Netherlands	11	630	38.095
Norway	1	2	.024
Portugal	1	6	.080
Russia	2	17	.214
Switzerland	4	75	7.343
United Kingdom	11	73	2.030
Subtotal	54	1,086	116.020
Latin America (1)			
Colombia	4	1,248	6.192
Subtotal	4	1,248	6.192
North America (2)			
Canada	2	5	2.610
USA	21	8,887	132.902
Subtotal	23	8,892	135.512
Oceania (3)			
Australia	12	4,546	57.580
Fiji	1	32	.720
New Zealand	1	19	.240
Subtotal	14	4,597	58.540

Region/country	Total shipments (no.)	Total seedlots (no.)	Total weight (kg)
South Asia (4)			
Bangladesh	17	787	60.140
India	72	5,615	169.216
Nepal	9	406	36.640
Sri Lanka	4	84	4.905
Subtotal	102	6,892	270.901
Southeast Asia (10)			
Brunei Darussalam	2	32	.430
Cambodia	1	134	10.700
Indonesia	16	3,284	77.430
Laos	3	355	11.300
Malaysia	5	85	1.819
Myanmar	13	449	142.170
Philippines	161	27,578	3,086.764
Singapore	5	41	5.235
Thailand	5	283	16.970
Vietnam	17	1,323	49.215
Subtotal	228	33,564	3,402.033
Sub-Saharan Africa (11)			
Burundi	5	275	17.480
Ethiopia	1	40	2.100
Ghana	2	20	.255
Kenya	2	90	2.640
Mali	1	31	.670
Mozambique	3	963	27.200
Rwanda	1	12	.925
Senegal	6	367	8.640
South Africa	2	15	.100
Tanzania	8	834	18.444
Uganda	2	76	4.000
Subtotal	33	2,723	82.454
West Africa (1)			
Benin	7	28	1.700
Subtotal	7	28	1.700

Region/country	Total shipments (no.)	Total seedlots (no.)	Total weight (kg)
West Asia & North Africa (4)			
Afghanistan	2	18	.420
Iran	4	1,062	11.010
Israel	1	3	3.000
Turkey	1	38	.660
Subtotal	8	1,121	15.090
Grand total (54)	547	74,213	4,337.413

Table 2. Distribution by region and country of outgoing transgenic seeds/grains (January to December, 2013).

Region/country	Total shipments (no.)	Total seedlots (no.)	Total weights (kg)
East Asia (1)			
Japan	2	32	.130
Subtotal	2	32	.130
Europe and Central Asia (2)			
Germany	2	310	1.800
United Kingdom	1	44	.100
Subtotal	3	354	1.900
Latin America (1)			
Colombia	1	36	.036
Subtotal	1	36	.036
North America (2)			
Canada	1	23	.025
USA	2	9	.464
Subtotal	3	32	.489
Oceania (1)			
Australia	3	34	.056
Subtotal	3	34	.056
Southeast Asia (1)			
Philippines	3	11	.085
Subtotal	3	11	.085
Grand total (8)	15	499	2.696

Table 3. Nature of outgoing shipments with corresponding total number of shipments, total number of seedlots, and total weight (kg) (January to December 2013).

Nature of shipment/ Destination	Total shipments (no.)	Total seedlots (no.)	Total weight (kg)
Rice seeds			
East Asia	45	10,457	210.169
Europe and Central Asia	45	670	96.735
Latin America	3	1,228	6.165
North America	15	212	5.785
Oceania	8	2,250	27.280
South Asia	85	5,883	224.511
Southeast Asia	213	32,520	3,332.103
Sub-Saharan Africa	33	2,723	82.454
West Africa	7	28	1.700
West Asia & North Africa	8	1,121	15.090
Subtotal	462	57,092	4,001.992
Rice flour			
Europe and Central Asia	1	5	.055
South Asia	1	5	.035
Southeast Asia	3	24	.300
Subtotal	5	34	.390
Wild rice seeds			
East Asia	4	142	.660
North America	1	9	.035
South Asia	1	6	.020
Subtotal	6	157	.715
Dehulled rice seeds			
East Asia	12	427	4.887
Europe and Central Asia	1	10	.355
Latin America	1	20	.027
Oceania	1	1,351	23.000
South Asia	1	8	.110
Subtotal	16	1,816	28.379
Rice and wild rice seeds			
East Asia	13	3,036	33.255
Europe and Central Asia	5	63	.675
North America	6	8,659	129.597
Oceania	1	54	.360
South Asia	7	515	6.025
Southeast Asia	4	324	6.630
Subtotal	36	12,651	176.542

Nature of shipment/destination	Total shipments (no.)	Total seedlots (no.)	Total weight (kg)
Transgenic seeds			
East Asia	2	32	.130
Europe and Central Asia	2	343	.800
Latin America	1	36	.036
North America	3	32	.489
Oceania	2	32	.050
Subtotal	10	475	1.505
HRDC seeds			
South Asia	7	475	40.200
Southeast Asia	8	696	63.000
Subtotal	15	1,171	103.200
Milled Rice seeds			
Europe and Central Asia	2	338	18.200
North America	1	12	.095
Oceania	4	942	7.900
Subtotal	7	1,292	26.195
Golden Rice			
Southeast Asia	3	11	.085
Subtotal	3	11	.085
Polished rice and Golden Rice			
Europe and Central Asia	1	11	1.100
Subtotal	1	11	1.100
Polished Golden Rice			
Oceania	1	2	.006
Subtotal	1	2	.006
Grand total	562	74,712	4,340.109

Table 4a. Sources of outgoing nontransgenic rice seeds/ grains (January to December, 2013).

Organizational unit	Total shipments (no.)	Total seedlots (no.)	Total weight (kg)
C4 Rice Center			
Rice seeds	2	5	.020
Subtotal	2	5	.020
Crop and Environmental Sciences Division (CESD)			
Dehulled seeds	3	3	.168
Rice seeds	19	879	76.981
Subtotal	22	882	77.149
Grain Quality and Nutrition Center (GQNC)			
Dehulled rice seeds	1	10	.355
Milled rice seeds	7	1,292	26.195
Rice flour	5	34	.390
Rice seeds	4	579	7.930
Subtotal	17	1,915	34.870
National Program Relations (NPR)			
Rice seeds	7	16	35.800
Subtotal	7	16	35.800
Plant Breeding, Genetics & Biotechnology (PBGB)			
Dehulled rice seeds	7	1,445	24.037
HRDC seeds	15	1,171	103.200
Rice and wild rice seeds	2	32	.345
Rice seeds	321	50,556	3,772.748
Subtotal	345	53,204	3,900.330
T.T. Chang Genetic Resources Center (TTC-GRC)			
Dehulled rice seeds	5	358	3.819
Rice and wild rice seeds	34	12,619	176.197
Rice seeds	109	5,057	108.513
Wild rice seeds	6	157	.715
Subtotal	154	18,191	289.244
Grand total	547	74,213	4,337.413

Table 4b. Sources of outgoing transgenic rice seeds/grains (January to December, 2013).

Organizational unit	Total shipments (no.)	Total Seedlots (no.)	Total weights (kg)
C4 Rice Center			
Transgenic rice seeds	6	400	.879
Subtotal	6	400	.879
Plant Breeding, Genetics & Biotechnology (PBGB)			
Golden Rice	3	11	.085
Polished Rice and Golden Rice	1	11	1.100
Polished Golden Rice	1	2	.006
Transgenic seeds	4	75	.626
Subtotal	9	99	1.817
Grand total	15	499	2.696

Table 5. Distribution by region and country of outgoing rice seeds (nursery sets) sent through INGER-PBGB (January to December, 2013).

Region/country	Total shipments (no.)	Total seedlots (no.)	Total weights (kg)
East Asia (3)			
Korea N	1	166	2.700
Korea S	1	489	9.400
PROC	1	1,173	27.010
Subtotal	3	1,828	39.110
Europe and Central Asia (1)			
Russia	1	606	13.100
Subtotal	1	606	13.100
Latin America (1)			
Surinam	1	120	3.700
Subtotal	1	120	3.700
South Asia (5)			
Bangladesh	2	1,194	22.130
India	1	11,867	235.300
Nepal	1	777	13.000
Pakistan	1	1,298	28.500
Sri Lanka	1	1,756	34.400
Subtotal	6	16,892	333.330
Southeast Asia (3)			
Indonesia	1	394	9.400
Myanmar	1	259	6.000
Vietnam	4	2,142	41.520
Subtotal	6	2,795	56.920
Sub-Saharan Africa (5)			
Mozambique	1	264	4.000
Senegal	1	565	13.400
Tanzania	1	264	3.860
Uganda	2	607	10.570
Zambia	1	84	1.760
Subtotal	6	1,784	33.590
West Asia and North Africa (2)			
Egypt	1	402	8.700
Iraq	1	413	9.500
Subtotal	2	815	18.200
Grand total (20)	25	24,840	497.950

Table 6. Seedborne pathogens detected on untreated, nontransgenic outgoing seeds received by SHU for phytosanitary certification (January to December, 2013).

Pathogens	Affected seedlots (%)	Detection level (%)	Mean value (%)
Curvularia spp.	95.74	1 – 76	13.97
Trichoconis padwickii	89.87	1 – 82	13.72
Phoma spp.	79.73	1 – 67	6.60
Sarocladium oryzae	48.07	1 – 36	4.27
Nigrospora spp.	47.17	1 – 59	4.70
Fusarium moniliforme	24.92	1 – 14	1.52
Bipolaris oryzae	23.72	1 – 12	1.44
Microdochium oryzae	10.40	1 – 11	1.55
Tilletia barclayana	6.30	1 – 100	12.04
Aphelenchoides besseyia	2.82	1 – 51	5.73
Pyricularia oryzae	1.02	1 – 9	1.38

Based on 200 seeds/seedlot for testing (n=3,335)
^aActual nematode count using sedimentation test.

Table 7. Seedborne pathogens detected on untreated GRC seeds submitted to SHU for advanced seed health testing (January to December 2013).

Pathogens	Affected seedlots (%)	Detection level (%)	Mean value (%)
Curvularia spp.	99.90	1 – 72	16.50
Phoma spp.	94.05	1 – 64	6.58
Trichoconis padwickii	92.73	1 – 72	11.02
Sarocladium oryzae	38.04	1 – 59	3.89
Nigrospora spp.	28.81	1 – 28	2.37
Fusarium moniliforme	26.55	1 – 18	2.04
Bipolaris oryzae	6.29	1 – 6	1.35
Aphelenchoides besseyia	2.88	1 – 60	5.15
Microdochium oryzae	1.78	1 – 3	1.23
Pyricularia oryzae	0.98	1 – 22	3.12
Tilletia barclayana	0.21	1 – 2	1.54

Based on 200 seeds/seedlot for testing (n=6,120)
^aActual nematode count using sedimentation test.

Table 8. Distribution by region, country, and nature of shipment with corresponding total number of shipments and total number of samples of outgoing nontransgenic, nonseed biological materials (January to December, 2013).

Region/country	Total shipments (no.)	Total samples (no.)
EAST ASIA (4)		
Hongkong		
DNA (bacterial isolates)	1	4
DNA (sorghum leaves)	2	8
RNA (bacterial isolates)	2	24
RNA (rice leaves)	2	13
RNA (rice seeds)	1	12
Japan		
DNA (rice)	4	340
Rice seedlings (<i>Porteresia coarctata</i>)	1	5
Rice seedlings (wet)	1	5
RNA (rice)	2	42
Soil (ground-dried)	1	5
Soil (wet)	2	10
Korea S		
DNA (plasmid)	30	216
DNA (rice)	20	148
DNA, primer (plasmid)	8	146
DNA, primer (rice)	5	94
DNA, primer (sorghum)	1	30
China, PR		
DNA (rice)	1	1
DNA (rice blast)	1	50
Insects and spiders (assorted pinned and card-pointed)	1	909
Insects and spiders (with alcohol)	1	3,527
RNA (rice)	5	66
RNA (rice leaves)	1	24
Subtotal	93	5,679
EUROPE (6)		
Belgium		
Soil (air-dried)	1	6
France		
Aeschynomene (seed)	2	13
Germany		
Arthropods (assorted insects)	1	147
Bees (dead)	1	49
Bees (oven-dried)	2	326
Fruits and vegetables (freeze-dried/ vacuum-sealed)	1	18
Grass, rice leaves (dried)	1	108
Herbarium specimens (dried plant and leaf)	1	418

Region/country	Total shipments (no.)	Total samples (no.)
Herbarium specimens (oven-dried)	1	503
Insects (assorted)	3	1,493
Insects (dead)	1	45
Insects and Rice plants (LEGATO collections)	3	567
Living earthworms (in wet soil)	1	200
Living earthworms in wet soil (Pheretima)	1	100
Maize plant (protein extracts)	1	2
Moths and Butterflies (dead)	1	292
Parasitoids, arthropods, BPH, GLH nymphs (assorted)	1	3,419
Plant samples (leaves (air-dried))	1	79
Rice anther (frozen)	1	79
Rice grains, leaves, straw, plants, soil, water (ground-dried)	1	718
Rice Leaf samples (protein extracts)	1	2
Rice plant and root samples (dried)	1	36
Rice plant straw, maize leaves and stalk, rice roots (dry)	1	36
Rice plant straw, maize leaves and stalk, rice roots, maize roots (dry)	2	63
Rice Root samples (dried)	1	79
Rice Root samples (frozen)	1	32
Rice spikelets and leaves (frozen)	1	495
Rice straw (decomposed)	1	516
Rice straw (oven-dried)	2	657
Rice straw and roots (dried)	1	36
Germany		
Rice straw, rice leaves, maize leaves, grass leaves (dried)	1	86
Root samples (rice)	2	56
Root slurry, soil slurry and soil cores (frozen)	1	1,880
Root slurry, soil slurry and soil cores (wet)	1	54
Root, soil, pore water (core and slurry)	1	54
Root, soil, pore water (frozen)	1	90
Soil (dried)	2	153
Soil (dried and coarse)	3	1,076
Soil (frozen)	4	80
Soil (oven-dried)	1	2
Soil (wet)	2	46
Soil and water samples (frozen)	5	970
Soil, plant and water (frozen)	1	169
Straw, leaves and water samples (rice)	1	619
Vegetables and Fruits (oven-dried)	1	57
Water samples (pore)	1	25

Region/country	Total shipments (no.)	Total samples (no.)
Italy	2	266
DNA (leaf from sweet sorghum and sugar cane)	1	2
RNA and rice spikelets (frozen)	1	88
Netherlands		
Rice leaf samples (ground)	1	2,930
Rice root samples (frozen)	1	8
Root samples (rice)	1	1,776
Soil (dried)	1	8
United Kingdom		
Bacterial isolates (in ampoules)	1	19
DNA (rice)	4	1,951
DNA, sterilized H2O (rice)	1	96
Fungal isolates (in tubes)	1	4
Protein extracts (rice)	1	8
Rice straw (ground-dried)	2	2
Soil (dried)	1	3
Soil (dried and ground)	1	2
Subtotal	86	23,114
NORTH AMERICA (1)		
USA		
Azolla (<i>Azolla filiculoides</i> , <i>mexicana</i> , <i>caroliniana</i>)	1	13
Bacterial artificial chromosome probe (dried)	2	8
Bacterial culture Xoo (lyophilized)	1	74
DNA (rice)	11	4,752
Plasmids (dried)	1	2
Rice Leaf samples (dried)	1	69
Rice Leaf tissues (frozen)	2	3,080
Rice seeds (young) (frozen)	1	5
Rice straw (ground)	1	1,046
RNA (rice)	1	24
Setaria (leaf samples)	1	8,266
Setaria leaf (<i>Poaceae</i>) (dried)	2	4,705
Soil (dry)	1	2
Sorghum seeds (seed)	1	4
Wild rice leaf tissues (frozen)	1	11
Subtotal	28	22,061
OCEANIA (1)		
Australia		
DNA (rice)	1	369
Parasitic wasps (insects)	1	700
Plant tissue (ground)	1	252
Rice leaf and water (ground)	1	34
Rice straw (dried)	1	360
Setaria stem (oven-dried)	1	2,736

Region/country	Total shipments (no.)	Total samples (no.)
Sorghum leaves (dried)	1	281
Sorghum leaves (dried and ground)	1	135
Sorghum seeds (seed)	1	2
Subtotal	10	8,088
SOUTH ASIA (2)		
Bangladesh		
Taq polymerase enzymes (gene clone)	1	1
India		
DNA (rice)	1	360
Rice seedlings (wet)	1	5
Subtotal	3	366
SOUTHEAST ASIA (4)		
Malaysia		
Antiserum (RTSV, RTBV)	1	4
Philippines		
Azolla (Azolla microphylla, mexicana, caroliniana)	1	3
Azolla (fresh)	1	4
Azolla (fresh)	1	5
Bacterial culture Xoo (lyophilized)	1	26
Bacterial isolates (in ampoules and slants)	1	96
DNA (bacteria)	1	96
DNA (bacterial isolates)	1	46
DNA (fungal isolates)	1	8
Flour extract (rice)	1	249
Rice seedlings (fresh)	1	
Singapore		
DNA (rice)	1	575
Flour extract (rice)	3	35
Leaf tissues (rice)	1	276
Rice Leaf tissues (frozen)	1	1,915
Vietnam		
Bacterial isolates (in ampoules)	1	18
Subtotal	17	3,356
SUB-SAHARA AFRICA (2)		
Nigeria		
Primers (SC3, ART5)	1	4
Senegal		
Taq polymerase enzymes (frozen)	1	81
Subtotal	2	85
Grand total (20)	239	62,749

Table 9. Distribution by region, country, and nature of outgoing, transgenic, nonseed biological materials shipments with corresponding total number of shipments and total number of samples (January to December, 2013)

Region/ Country	Total shipments (no.)	Total samples (no.)
EAST ASIA (1)		
Japan		
RNA (transgenic, ground)	1	78
Subtotal	1	78
EUROPE (2)		
Germany		
Transgenic rice leaves (protein extracts)	1	4
United Kingdom		
Metabolites (transgenic rice leaves)	1	27
Subtotal	2	31
NORTH AMERICA (2)		
Canada		
Transgenic rice leaves (dead)	2	50
USA		
Transgenic rice leaves (dried)	1	192
Subtotal	3	242
OCEANIA (1)		
Australia		
DNA from rice leaves (Golden rice purified plant genomic)	2	458
Golden Rice (flour)	1	5
Transgenic DNA (plasmid)	1	4
Transgenic rice root and shoot tissue (ground)	1	120
Subtotal	5	587
SOUTHEAST ASIA (1)		
Philippines		
Rice straw, rice bran (transgenic, ground)	1	4
Subtotal	1	4
Grand total (7)	12	942

Table 10. Sources of outgoing transgenic and nontransgenic, nonseed biological materials (January to December, 2013).

Organizational unit/ nature of materials	Total shipments (no.)	Total samples (no.)
C4 Rice Center		
DNA sorghum leaves	2	8
DNA, primer rice	2	42
DNA, primer sorghum	1	30
Maize plant protein extracts	1	2
Rice Leaf samples dried	1	69
Rice Leaf samples protein extracts	1	2
RNA rice	5	66
RNA rice leaves	3	37
Setaria leaf samples	1	8,266
Setaria leaf (Poaceae) dried	2	4,705
Setaria stem dried	1	3,219
Setaria stem oven-dried	1	2,736
Sorghum leaves dried	1	281
Sorghum leaves dried and ground	1	135
Sorghum seeds seed	2	6
Transgenic rice leaves dead	2	50
Transgenic rice leaves dried	1	192
Transgenic rice leaves protein extracts	1	4
Subtotal	29	19,850
Crop and Environmental Sciences Division (CESD)		
Aeschynomene seed	2	13
Arthropods assorted insects	1	147
Azolla Azolla filiculoides, mexicana, caroliniana	1	13
Azolla Azolla microphylla, mexicana, caroliniana	1	3
Azolla fresh	1	4
Bees dead	1	49
Bees oven-dried	2	326
DNA plasmid	1	17
DNA rice	1	369
Grass, rice leaves dried	1	108
Herbarium specimens dried plant and leaf	1	418
Herbarium specimens oven-dried	1	503
Insects assorted	3	1,493
Insects dead	1	45
Insects and rice plants LEGATO collections	3	567
Insects and spiders assorted pinned and card-pointed	1	909
Crop and Environmental Sciences Division (CESD)		
Insects and spiders with alcohol	1	3,527
Living earthworms in wet soil	1	200
Living earthworms in wet soil Pheretima	1	100

Organizational unit/ nature of materials	Total shipments (no.)	Total samples (no.)
Moths and butterflies dead	1	292
Parasitic wasps Insects	1	700
Parasitoids, arthropods, BPH, GLH nymphs assorted	1	3,419
Plant samples leaves (air-dried)	1	79
Primers SC3, ART5	1	4
Rice grains, leaves, straw, plants, soil, water ground-dried	1	718
Rice leaf and water ground	1	34
Rice leaf samples ground	1	2,930
Rice plant and root samples dried	1	36
Rice plant straw, maize leaves and stalk, rice roots dried	1	36
Rice plant straw, maize leaves and stalk, rice roots, maize roots dried	2	63
	2	40
Rice Root samples frozen	1	249
Rice seedlings fresh	1	516
Rice straw decomposed	1	360
Rice straw dried	2	2
Rice straw ground-dried	2	657
Rice straw oven-dried	1	36
Rice straw and roots dried		
Rice straw, rice leaves, maize leaves, grass leaves dried	1	86
Root samples rice	2	3,656
Root slurry, soil slurry and soil cores frozen	1	54
Root slurry, soil slurry and soil cores wet	1	54
Root, soil, pore water core and slurry	1	90
Root, soil, pore water frozen	2	153
Soil air-dried	1	6
Soil dried	6	1,089
Soil dried and coarse	4	80
Soil dried and ground	1	2
Soil frozen	1	2
Soil ground-dried	1	5
Crop and Environmental Sciences Division (CESD)		
Soil oven-dried	2	46
Soil wet	7	980
Soil and water samples frozen	1	169
Soil, plant and water frozen	1	619
Straw, leaves and water samples rice	1	57
Taq polymerase enzymes frozen	1	81
Taq polymerase enzymes gene clone	1	1
Water samples pore	2	266
Subtotal	85	26,478

Organizational unit/ nature of materials	Total shipments (no.)	Total samples (no.)
Grain Quality and Nutrition Center (GQNC)		
DNA rice	1	285
Flour extract rice	4	43
Subtotal	5	328
T.T. Chang Genetic Resources Center (TTC-GRC)		
DNA rice	4	1914
Rice seedlings <i>Porteresia coarctata</i>	1	5
Rice seedlings wet	2	10
Subtotal	7	1,929
Plant Breeding, Genetics & Biotechnology (PBGB)		
Bacterial isolates (<i>Xanthomonas oryzae</i>)	1	14
Antiserum RTSV, RTBV	1	4
Bacterial artificial chromosome probe dried	2	8
Bacterial culture Xoo Lyophilized	2	79
Bacterial isolates in ampoules	2	37
Bacterial isolates in ampoules and slants	1	26
DNA bacteria	1	96
DNA bacterial isolates	2	100
DNA fungal isolates	1	46
DNA leaf from wweet sorghum and sugar cane	1	2
DNA plasmid	29	199
DNA rice	37	5928
DNA rice blast	1	50
DNA from rice leaves Golden rice purified plant genomic	2	458
DNA, primer plasmid	8	146
DNA, primer rice	3	52
DNA, sterilized H2O rice	1	96
Fruits and vegetables freeze-dried/vacuum-sealed	1	18
Plant Breeding, Genetics & Biotechnology (PBGB)		
Fungal isolates in tubes	1	4
Golden Rice flour	1	5
Leaf tissues rice	1	276
Plant tissue ground	1	252
Plasmids dried	1	2
Protein extracts rice	1	8
Rice anther frozen	1	79
Rice Leaf tissues frozen	3	4995
Rice Root samples dried	1	79
Rice seeds (young) frozen	1	5
Rice spikelets and leaves frozen	1	495
Rice straw ground	1	1046
Rice straw, rice bran transgenic, ground	1	4
RNA bacterial isolates	2	24
RNA rice	6	134

Organizational unit/ nature of materials	Total shipments (no.)	Total samples (no.)
RNA transgenic, ground	1	78
RNA and rice spikelets frozen	1	88
Transgenic DNA plasmid	1	4
Transgenic rice root and shoot tissue ground	1	120
Vegetables and fruits oven-dried	1	25
Wild rice leaf tissues frozen	1	11
Subtotal	125	15,093
Grand total	251	63,678

Table 11. Origin and corresponding total number of shipments, total number of seedlots, and total weight (kg) of incoming nontransgenic rice seeds/grains (January to December, 2013).

Region/country	Total shipments (no.)	Total seedlots (no.)	Total weight (kg)
East Asia (3)			
Japan	1	169	.450
Korea S	8	2,391	25.873
China	2	2	5.500
Subtotal	11	2,562	31.823
Europe and Central Asia (2)			
Germany	2	4	.095
Portugal	1	2	.425
Subtotal	3	6	.520
Latin America (1)			
Colombia	1	143	19.200
Subtotal	1	143	19.200
South Asia (2)			
Bangladesh	2	11	5.200
India	12	33	56.150
Subtotal	14	44	61.350
Southeast Asia (5)			
Cambodia	3	100	17.245
Indonesia	3	398	78.030
Myanmar	2	80	6.900
Philippines	45	2,616	323.345
Vietnam	1	219	.377
Subtotal	54	3,413	425.897
Sub-Saharan Africa (4)			
Burundi	1	1	.099
Madagascar	1	410	82.000
Senegal	1	9	.018
Tanzania	1	26	2.100
Subtotal	4	446	84.217
West Africa (1)			
Benin	3	126	2.740
Subtotal	3	126	2.740
West Asia & North Africa (3)			
Egypt	1	3	.150
Iran	1	2	.340
Turkey	1	68	2.200
Subtotal	3	73	2.690
Grand total (21)	93	6,813	628.437

Table 12. Origin and corresponding total number of shipments, total number of seedlots, and total weight of incoming transgenic rice seeds/grains (January to December, 2013).

Region/country	Total shipments (no.)	Total seedlots (no.)	Total weight (kg)
East Asia (2)			
China	1	11	.120
Taiwan	1	24	.480
Subtotal	2	35	.600
Europe and Central Asia (1)			
Germany	1	1	.030
Subtotal	1	1	.030
Southeast Asia (1)			
Philippines	2	170	11.650
Subtotal	2	170	11.650
Grand total (4)	5	206	12.280

Table 13. Nature of incoming transgenic and nontransgenic shipments with corresponding total number of shipments, total number of seedlots, and total weight (January to December 2013).

Nature of shipment/origin	Total shipments (no.)	Total seedlots (no.)	Total weight (kg)
Rice seeds			
East Asia	8	2,521	25.323
Europe and Central Asia	1	1	.074
Latin America	1	143	19.200
South Asia	3	16	5.350
Southeast Asia	34	2,342	256.945
Sub-Saharan Africa	3	420	82.117
West Africa	2	36	2.300
West Asia & North Africa	3	73	2.690
Subtotal	55	5,552	393.999
HRDC seeds			
East Asia	2	2	5.500
South Asia	11	28	56.000
Southeast Asia	7	141	60.200
Subtotal	20	171	121.700
Transgenic rice seeds			
East Asia	2	35	.600
Europe and Central Asia	1	1	.030
Subtotal	3	36	.630

Nature of shipment/origin	Total shipments (no.)	Total seedlots (no.)	Total weight (kg)
Golden Rice seeds			
Southeast Asia	2	170	11.650
Subtotal	2	170	11.650
Milled rice seeds			
Europe and Central Asia	1	2	.425
Southeast Asia	6	400	73.100
Subtotal	7	402	73.525
Milled & dehulled rice seeds			
Southeast Asia	1	210	4.100
Subtotal	1	210	4.100
Dehulled rice seeds			
Europe and Central Asia	1	3	.021
Southeast Asia	1	219	.377
Sub-Sahara Africa	1	26	2.100
Subtotal	3	248	2.498
Polished rice seeds			
Southeast Asia	2	66	30.170
Subtotal	2	66	30.170
Ground rice grains			
Southeast Asia	1	24	.170
Subtotal	1	24	.170
Rice and dehulled rice seeds			
East Asia	1	39	1.000
Subtotal	1	39	1.000
Rice flour			
Southeast Asia	2	11	.835
West Africa	1	90	.440
Subtotal	3	101	1.275
Grand total	98	7,019	640.717

Table 14. Consignees and corresponding total number of shipments, total number of seedlots, and total weight of incoming transgenic and nontransgenic rice seeds/ grains (January to December, 2013).

Organizational unit	Total shipments (no)	Total seedlots (no.)	Total weight (kg)
Analytical Service Laboratory (ASL)			
Ground rice grains	1	24	.170
Polished rice seeds	1	4	.170
Rice flour	1	4	.800
Rice seeds	1	9	2.100
Subtotal	4	41	3.240
C4 Rice Center			
Transgenic seeds	1	24	.480
Subtotal	1	24	.480
Crop and Environmental Sciences Division (CESD)			
Dehulled rice seeds	1	219	.377
Rice seeds	8	558	103.474
Transgenic seeds	1	1	.030
Subtotal	10	778	103.881
Grain Quality and Nutrition Center (GQNC)			
Milled rice seeds	3	230	3.425
Milled and dehulled rice seeds	1	210	4.100
Rice flour	2	97	.475
Rice seeds	6	191	47.400
Subtotal	12	728	55.400
Plant Breeding, Genetics, and Biotechnology (PBGB)			
Dehulled rice seeds	2	29	2.121
Golden Rice	2	170	11.650
HRDC seeds	20	171	121.700
Milled rice seeds	1	8	5.600
Polished rice seeds	1	62	30.000
Rice seeds	33	4,083	135.230
Rice and dehulled rice seeds	1	39	1.000
Transgenic seeds	1	11	.120
Subtotal	61	4,573	307.421
Social Sciences Division (SSD)			
Milled rice seeds	3	164	64.500
Rice seeds	2	34	.500
Subtotal	5	198	65.000

Organizational unit	Total shipments (no)	Total seedlots (no.)	Total weight (kg)
T.T. Chang Genetic Resources Center (TTC-GRC)			
Rice seeds	5	677	105.295
Subtotal	5	677	105.295
Grand total	98	7,019	640.717

Table 15a. Results of visual inspection conducted on incoming nontransgenic rice seeds received by SHU for post-entry clearance (January to December, 2013).

Observations	No. of infested seedlots	Percent (%)
Weed-contaminated seedlots	0	0
Insect-damaged	93	3.34
Seeds with soil	0	0

a Based on 2,784 seedlots visually inspected

Table 15b. General quality of incoming nontransgenic rice seeds received by SHU for post-entry clearance.

General quality	Number of seedlots	Percent (%)
Category 1	604	21.70
Category 2	0	0.00
Category 3	1,973	70.87
Category 4	207	7.44

b Based on 2,784 seedlots visually inspected (seedlot x 100 / total)

Table 16. Seedborne pathogens detected in incoming rice seeds received by SHU for post-entry clearance (January to December, 2013).

Pathogens	Affected Seedlots (%)	Detection level (%)	Mean value (%)
Trichoconis padwickii	98.55	1 – 78	27.28
Curvularia spp.	92.75	1 – 62	17.05
Sarocladium oryzae	15.22	1 – 4	1.38
Bipolaris oryzae	75.36	1 – 50	4.86
Phoma spp.	57.97	1 – 10	1.89
Fusarium moniliforme	18.84	1 – 4	1.23
Tilletia barclayana	32.61	1 – 100	7.51
Nigrospora spp.	21.74	1 – 16	2.17
Microdochium oryzae	4.35	1 – 2	1.17
Aphelenchoides besseyia	0.72	1 – 2	2.00
Pyricularia oryzae	1.45	1 – 2	1.50

^aActual nematode count based on 200 seeds/seedlot (n=138)

Table 17. Origin, nature of materials, total number of shipments, and total number of samples of incoming non-transgenic and transgenic, nonseed biological materials (January to December, 2013).

Region/Country	Total shipments (no.)	Total samples (no.)
EAST ASIA (3)		
Korea S		
DNA rice	1	181
China		
Primers	1	4
Taiwan		
Antibody	1	1
Rice leaves	1	1050
Subtotal	4	1,236
EUROPE (6)		
Belgium		
DNA bacterial isolates	1	37
France		
Sorghum seeds	1	16
Germany		
Bacterial DNA, cultures Xoo & Xoc, PCR reagents, phosphate buffered saline	1	126
DNA rice leaves	1	126
DNA plasmids	1	11
Plasmids	1	3
Netherlands		
Grass, pepper (fruit & leaf), cherry laurel, and polished rice ground	1	4
Plant samples (maize, staghorn, grass, potato) ground	1	4
Plant samples (tomato, grass, lucerna, oilpalm) ground	1	4
Plant samples (willow wood, summer barley, milk thistle seed & grass) ground	1	4
Soil ground	3	12
Soil ground-dried	1	4
Switzerland		
Tobacco seeds	1	1
United Kingdom		
Antibody	3	40
Cleome seeds	1	2
DNA plasmids	3	6
DNA primers	1	4
Plasmids	5	17
Plasmids and primers	2	21
Subtotal	30	442
NORTH AMERICA (1)		
USA		
Antibody	1	2

Region/Country	Total shipments (no.)	Total samples (no.)
Plasmids	4	122
Setaria seeds	2	3
Subtotal	7	127
SOUTH ASIA (1)		
Bangladesh		
Soil	1	81
Subtotal	1	81
SOUTHEAST ASIA (4)		
Indonesia		
Rice straw	1	378
Philippines		
Arthropods	1	290
Assorted vegetables	1	15
Bamboo plant parts ground	2	122
Butterfly	1	292
DNA rice	1	86
Fruits and vegetables	5	71
Herbarium and insect samples	1	9,578
Honeybee	1	4,602
Insects	2	2,994
Mungbean	1	24
Rice leaf and tillers fresh	1	240
Rice root & shoot samples	1	480
Rice straw transgenic and nontransgenic from Golden Rice	1	165
Rice straw, rice leaves, water	1	22
Snails, worms, different insects	1	117
Soil	5	46
Soil ground	2	185
Soil and straw ground	1	48
Sorghum and sugarcane leaves	1	2
Thailand		
DNA bacterial isolates	1	114
Vietnam		
DNA rice	1	27
Subtotal	33	19,898
SUB-SAHARA AFRICA (2)		
Senegal		
DNA rice	1	40
Tanzania		
DNA rice	1	188
Subtotal	2	228
Grand total (17)	77	22,012

Table 18. Consignees/recipients of incoming nontransgenic and transgenic, nonseed biological materials (January to December, 2013).

Organizational unit/nature of materials	Total shipments (no.)	Total samples (no.)
Analytical Service Laboratory (ASL)		
Bamboo plant parts	2	122
Grass, pepper (fruit & leaf), Cherry Laurel, and polished rice	1	4
Plant samples (maize, staghorn, grass, potato)	1	4
Plant samples (tomato, grass, lucerna, oilpalm)	1	4
Plant samples (willow wood, summer barley, milk thistle seed & grass)	1	4
Soil	6	201
Soil and straw	1	48
Subtotal	13	387
C4 Rice Center		
Antibody	5	43
Cleome seeds	1	2
DNA plasmids	4	17
DNA primers	1	4
Plasmids	7	21
Plasmids and primers	2	21
Rice leaves	1	1,050
Setaria seeds	2	3
Subtotal	23	1,161
Crop and Environmental Sciences Division (CESD)		
Arthropods	1	290
Butterfly	1	292
Herbarium and insect samples	1	9,578
Honeybee	1	4,602
Insects	2	2,994
Mungbean	1	24
Primers	1	4
Rice root & shoot samples	1	480
Rice straw	1	378
Rice straw, rice leaves, water	1	22
Snails, worms, different insects	1	117
Soil	6	127
Sorghum seeds	1	16
Subtotal	19	18,924

Organizational unit/nature of materials	Total shipments (no.)	Total samples (no.)
Plant Breeding, Genetics, and Biotechnology (PBGB)		
Assorted vegetables	1	15
Bacterial DNA, cultures Xoo & Xoc, PCR reagents, phosphate buffered saline	1	126
DNA	8	799
Fruits and vegetables	5	71
Plasmids	3	121
Rice leaf and tillers	1	240
Rice straw	1	165
Sorghum and sugarcane leaves	1	2
Tobacco seeds	1	1
Subtotal	22	1,540
Grand total	77	22,012

Table 19. Incidence (%) of different diseases observed during field inspection at three different crop stages of incoming and outgoing rice materials in 2013.

Crop Stages/diseases	Incoming				Outgoing			
	DS	%*	WS	%*	DS	%*	WS	%*
Seedling								
Total entries	5,495		344		24,526		17,472	
Without disease	5,490	99.90	341	99.12	24,464	99.75	17,311	99.08
With disease	5	0.09	3	0.87	62	0.25	161	0.92
Schlerotium seedling blight	5	0.09	2	0.58	62	0.25	161	0.92
Bacterial brown stripe	0	0.00	1	0.29	0	0.00	0	0.00
Bakanae	0	0.00	0	0.00	0	0.00	0	0.00
Blast	0	0.00	0	0.00	0	0.00	0	0.00
Tillering								
Total entries	5,495		344		24,526		17,472	
Without disease	5,461	99.38	202	58.72	24,365	99.34	16,528	94.60
With disease	38	0.69	147	42.73	161	0.66	953	5.46
Rice tungro	38	0.69	141	40.99	156	0.64	213	1.22
Bacterial leaf streak	0	0.00	5	1.45	0	0.00	720	4.12
Yellow dwarf	0	0.00	0	0.00	0	0.00	1	0.01
Leaf scald	0	0.00	0	0.00	0	0.00	0	0.00
Bakanae	0	0.00	0	0.00	5	0.02	0	0.00
Sheath blight	0	0.00	0	0.00	0	0.00	0	0.00
Leaf blast	0	0.00	0	0.00	0	0.00	19	0.11
Bacterial leaf blight	0	0.00	1	0.29	0	0.00	0	0.00
Maturity								
Total entries	5,495		344		24,526		17,472	
Without disease	5,393	98.14	118	34.30	24,486	99.84	16,241	92.95
With disease	102	1.86	238	69.18	41	0.16	1409	8.05
Rice tungro	43	0.78	106	30.81	15	0.06	62	0.35
Bacterial leaf streak	0	0.00	108	31.40	0	0.00	825	4.72
Sheath blight	0	0.00	1	0.29	6	0.02	313	1.79
Leaf scald	0	0.00	4	1.16	0	0.00	1	0.01
Sheath rot	18	0.33	3	0.87	8	0.03	20	0.11
Narrow brown leaf spot	0	0.00	0	0.00	9	0.04	31	0.18
Yellow dwarf	0	0.00	0	0.00	0	0.00	0	0.00
Leaf blast	0	0.00	0	0.00	0	0.00	0	0.00
Neck blast	0	0.00	0	0.00	0	0.00	5	0.02
Bacterial leaf blight	0	0.00	0	0.00	0	0.00	0	0.00
False smut	41	0.75	16	4.65	3	0.01	152	0.87

Diseases observed on plants originating from incoming seeds were not of an introduced nature.

* Disease incidence (%) is calculated as the number of plant units infected expressed as percentage of the total units assessed.

Table 20a. Different types of Material Transfer Agreements (MTA) for outgoing transgenic and nontransgenic rice seeds/grains including INGER nursery sets (January to December, 2013).

Type of MTA	Total MTAs issued (no.)	Total shipments (no.)	Total seedlots (no.)	Total weight (kg)
Standard MTA ^a	266	267	13,212	511.965
Standard MTA + OMTA	464	193	51,216	3,367.406
Signed SMTA + CMTA	22	13	1,742	15.900
HRDC MTEA	15	15	1,171	103.200
Amendment letter	4	4	389	.855
Transgenic MTA	4	4	63	.140
Collaborative MTA	3	3	727	5.600
Restricted MTA	3	3	24	.300
Golden Rice MTA	3	3	11	.085
Non-IRRI Seed MTA	2	2	31	12.592
Transmittal letter	2	2	23	.510
Signed SMTA + TEA	2	1	18	18.100
Restricted MTA and Transgenic MTA	2	1	11	1.100
Signed SMTA	1	1	758	6.500
Letter of intent	1	1	1,351	23.000
Reference Laboratory MTA	1	1	12	.095
NO MTA ^b	0	73	28,793	770.711
TOTAL	795	587	99,552	4,838.059

^a Two or more Standard MTAs were issued in one shipment because of a large volume of ancestrals of lines under development (SMTA-UD) generated from the system or there are different receiving institutions/location sites in one seed request application.

^b No MTA issued for the materials originally came from the sending institution/country of destination (e.g., Korean seeds multiplied to IRRI, seeds for commercial analysis, IRRI to IRRI seed transfer hubs and seeds for IRRI experimental/training purposes. A transmittal letter provided to a shipment with the previously approved MTA sending the same materials and an amendment letter for shipment using the previously approved MTA with additional samples.

Table 20b. Different types of Material Transfer Agreements (MTA) with corresponding total number of shipments, total number of seedlots, and total weight of incoming transgenic and nontransgenic rice seeds/grains (January to December, 2013).

Type of MTA	Total no. of shipments	Total no. of seedlots	Total weight (kg)
Standard MTA	28	1,536	81.106
NO MTAc	27	3,292	215.465
HRDC MTEA	16	34	69.500
Other MTA	12	857	41.981
Letter of intent	8	332	34.225
Signed SMTA	4	840	159.140
Collaborative MTA	3	128	39.300
Total	98	7,019	640.717

^cNo MTA accompanied by the seed package for the materials under Korean Seeds for Multiplication Project (KSMP), IRRI seeds sent back and seeds commercially obtained provided by invoice.

Table 21. Volume of disposed transgenic materials from different organizational units (January to December 2013).

Organizational unit/nature of materials	Quantity (/batches/plastic bags/packets/pails)
C4 Rice Center	
Autoclaved seeds	25
Seed	9
Soil	3
Vegetative waste	59
Subtotal	96
Crop and Environmental Sciences Division (CESD)	
Autoclaved seeds	11
Seeds	23
Soil	51
Vegetative waste	25
Subtotal	110
Plant Breeding, Genetics & Biotechnology (PBGB)	
Autoclaved seeds	147
Seeds	26
Soil	4,172
Vegetative waste	208
Subtotal	4,553
Grand total	4,759

Table 22. Volume of transferred transgenic materials conducted by different organizational units (January to December 2013).

Organizational unit/nature of materials	Quantity (/batches/plastic bags/packets/ pails/no. of seedlings)
C4 Rice Center	
Autoclaved seeds	6
Bags	2
Biomass	250
Crossed seeds	2
Germinated seeds	129
Panicles	3
Plants	6,259
Rice plants	116
Seedlings	1,737
Seeds	6,738
Seeds and plants	200
Seeds and vegetative	130
Subtotal	15,572
Crop and Environmental Sciences Division (CESD)	
Germinated seeds	27
Seedlings	128
Seeds	167
Subtotal	322
Plant Breeding, Genetics, and Biotechnology (PBGB)	
Germinated seeds	13
Panicles	212
Paper bag	2
Plants	1,461
Rachis seeds	95
Seedlings	1,201
Seeds	1,905
Seeds and panicles	36
Seeds and rachis	17
Subtotal	4,942
Grand total	20,836

Analytical Service Laboratory (ASL)

ASL's performance under full cost recovery (FCR)

Effective January 2013, ASL operated on FCR for all its routine testings and use of facilities. A review of the year's revenues show that ASL was able to recover only 38% of its operational costs, short of its 50% target for 2013. One reason for its low recovery was that the projected number of sample submissions and analysis requests for 2013 did not materialize as IRRI customers opted to build their own capacity to perform some of the routine testings offered by ASL. Another reason was that other IRRI research groups bought their own ovens and grinders instead of renting ASL facilities, thus reducing the need. Also, ASL shifted its client focus to capture external market for additional revenue, while the Grain Quality and Nutrition Center restructured its two service facilities (ASL and QES) into an integrated service facility (GQNSL). As part of restructuring, a core collection of research samples that ASL was involved in was established. This includes work in the analysis and data generation of protein and micronutrients to combine with traditional grain quality traits for building research concepts with genomics. These can identify the genes/pathways that determine grain

quality and nutrition and demonstrate to breeders how breeding programs should be targeted. Around 3,000 GQ research samples were analyzed. The revenue was only for the cost of consumables.

Analytical services

ASL completed the analysis of 79,581 assays for 18,237 samples, representing 98% of the total assay requested and 91% of the total samples received from various IRRI OUs (Fig.1). Plant and grain samples constituted the majority of the samples analyzed (91%), soil was 5%, and solution samples were 4%.

Different OUs that availed ASL services came from GQNC (52%), CESD (40%), PBGB (6%), and external customers (1%) (Fig. 2). Kjeldahl N was the most requested assay, followed by multi-element analysis.

Status of its ISO 17025 Accreditation

ASL maintains its compliance to the ISO 17025 standards and received its new PAO ISO 17025 Scope of Accreditation from the Philippine Accreditation Office (PAO) last 29 July 2013. It has added new tests to its scope covering 97% of its routine analytical testing.

PAO also appreciates L. Molina's continuous sharing of expertise and active involvement in PAO activities as the technical assessor for laboratory accreditation and member of the Laboratory Accreditation Committee.

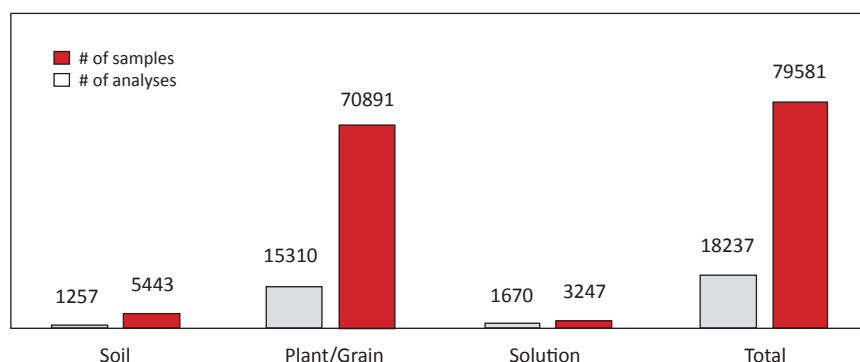
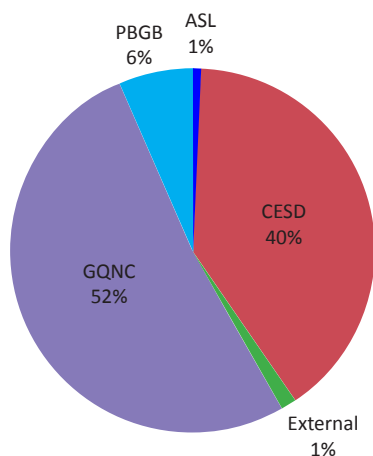


Fig. 1. Completed number of samples and analyses per sample per sample type.



Radioisotope laboratory

Projects assisted through the use of the radioisotope laboratory facilities and liaison services of the PNRI were on rice transformation using disease- and pest-resistant genes and on greenhouse gas emission measurement.

The annual leak test for IRRI's GC-ECDs was facilitated by the RSO to ensure the safe use of sealed sources of radioactive materials for greenhouse gas emission measurement.

The RSO, in coordination with PBGB and GQNC users, facilitated the application of IRRI's license from the Center for Device Regulation, Radiation Health and Research-Department of Health and the Food and Drug Administration to operate an X-ray facility for two XRF units.

Staff training

L.Molina presented an oral paper at the International Symposium in Soil and Plant Analysis in New Zealand last April and participated in study tours on premier commercial and government testing laboratories to learn their best practices. She conducted a series of echo-seminars and training activities for ASL staff and shared other valuable information to IRRI RMQA and CPS teams.

Other technical training attended by E.J. Cruz, R. Gonzales and R. Chavez were on hazardous materials awareness, managing chemical risks in the lab, and on developing your own chemical safety manual. In-house training on quality evaluation testing were attended by J. Lapis and L. Molina. Some ASL staff during its weekly meetings participated in several training activities related to ISO 17025 standards .