

HEALTHIER RICE

The International Rice Research Institute (IRRI) is working with national research partners such as the Philippine Rice Research Institute (PhilRice) in the development and deployment of healthier rice varieties to improve the nutritional status of the poor in Asia, particularly in Bangladesh and the Philippines. These healthier rice varieties include beta-carotene fortified Golden Rice, high iron and zinc rice (HIZR), and a stacked vitamin A, iron, and zinc fortified rice.

Potential benefits of healthier rice varieties

Rice is the number one commonly consumed food product among Filipino households and is a major source of calories and carbohydrates, but it lacks micronutrients.¹ Increasing the micronutrient content of rice grains even by small amounts can have a significant impact on human health. Healthier rice varieties have the potential to reach many people because rice is already widely grown and eaten.

Fighting micronutrient malnutrition through biofortification

Biofortification is the process by which the nutritional quality of food crops is improved through agronomic practices, conventional plant breeding, or modern biotechnology. Genetic engineering techniques are used in biofortification when the micronutrient content of rice cannot be significantly increased through conventional practices.

IRRI and PhilRice aim to develop and deploy biofortified rice varieties that can help address micronutrient deficiencies by providing: 30-50% of the estimated average requirement (EAR) for vitamin A, 30% EAR for iron, and 40% EAR for zinc to women and children. These Healthier Rice varieties are intended as a complementary food-based solution to existing nutritional interventions. The development of the biofortified rice varieties under IRRI's Healthier Rice Program is conducted in full compliance with national and international biosafety regulations.

Golden Rice

Golden Rice is a new type of rice that contains beta-carotene, a source of vitamin A, in its grains. It is intended to complement other existing measures to help address the country's vitamin A deficiency (VAD) problem. Despite years of government efforts to curb VAD, it is still a prevalent public health problem

¹ 2013 Food Consumption Survey, Department of Science and Technology-Food and Nutrition Research Institute (DOST-FNRI).



with 20.4% affected in 2013.² This represents 2.1 million Filipino children from 6 months to 5 years old. In addition, half a million pregnant and lactating women also suffer from VAD. PhilRice and IRRI R&D results have established that Golden Rice is free from any toxic or allergenic property, hence it is as safe and nutritious as any other rice. The introduction of beta-carotene into Golden Rice has not affected its agronomic characteristics, including yield, thus Filipino farmers can grow Golden Rice like any local inbred rice variety.

GR2E Golden Rice was assessed as safe by Food Standards Australia New Zealand (FSANZ) in August 2017, and changes to the Australia New Zealand Food Standards Code were gazetted on 22 February 2018. This was followed shortly by positive nutrition and safety assessments from Health Canada on 16 March 2018. Golden Rice completed a third positive food safety evaluation on 24 May 2018, this time from the United States Food and Drug Administration (US FDA). In an official letter, the US FDA concurred with IRRI's assessment regarding the safety and nutrition of Golden Rice.

PhilRice and IRRI are committed to carry out the completion of Golden Rice development and satisfy all regulatory requirements under the Joint Department Circular No. 1, series of 2016 to have well-documented, science-based evidence on the efficacy and safety of Golden Rice.

The Department of Agriculture-Bureau of Plant Industry (DA-BPI) released a consolidated risk assessment report on the application submitted by PhilRice for the proposed field trials of Golden Rice, which indicates positive assessments from: DA-BPI Scientific and Technical Review panel, biosafety committees of the Department of Environment and Natural

Resources and Department of Health, socio-economic ethical and cultural expert; and a recommendation to grant a biosafety permit for the field trial. Local government unit (LGU) resolutions that emanate from the public consultations and a report summarizing feedback gathered during the public comment period will also be assessed as part of the decision-making process. As of 27 September 2018, all required LGU endorsements have been received by PhilRice.

After Golden Rice receives all the required approvals for food, feed and cultivation and is found to be efficacious, a sustainable delivery program will ensure that Golden Rice is acceptable and accessible to those most in need.

High Iron and Zinc Rice (HIZR)

Iron deficiency is a primary cause of anemia, while zinc deficiency can lead to stunting. In the Philippines, 40% of children aged 6 months to 1 year have iron-deficiency anemia (IDA) and 22 out of 100 preschool children are stunted.³

Conventionally bred high iron and high zinc rice varieties do not have the sufficient amounts of iron and zinc that are necessary for improved nutritional status. Most of their micronutrient content is in the external part of the grain, which is removed during the milling process. Using advanced biotech processes to develop HIZR ensures that the additional micronutrient content is expressed in the part of the rice grain that is retained after polishing.

IRRI and PhilRice are set to conduct HIZR confined tests from 2018 to 2019 to identify lead events with high iron and zinc content and desirable agronomic performance suitable for future multi-location trials.

² 8th National Nutrition Survey, Department of Science and Technology-Food and Nutrition Research Institute (DOST-FNRI).

³ 8th National Nutrition Survey, Department of Science and Technology-Food and Nutrition Research Institute (DOST-FNRI).

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International Rice Research Institute

IRRI aims to improve livelihoods and nutrition, abolishing poverty, hunger, and malnutrition among those who depend on rice-based agri-food systems. In doing so, IRRI's work protects the health of rice farmers and consumers, and the environmental sustainability of rice farming in a world challenged by climate change. IRRI's work promotes the empowerment of women and supports opportunities for youth in an equitable agri-food system.