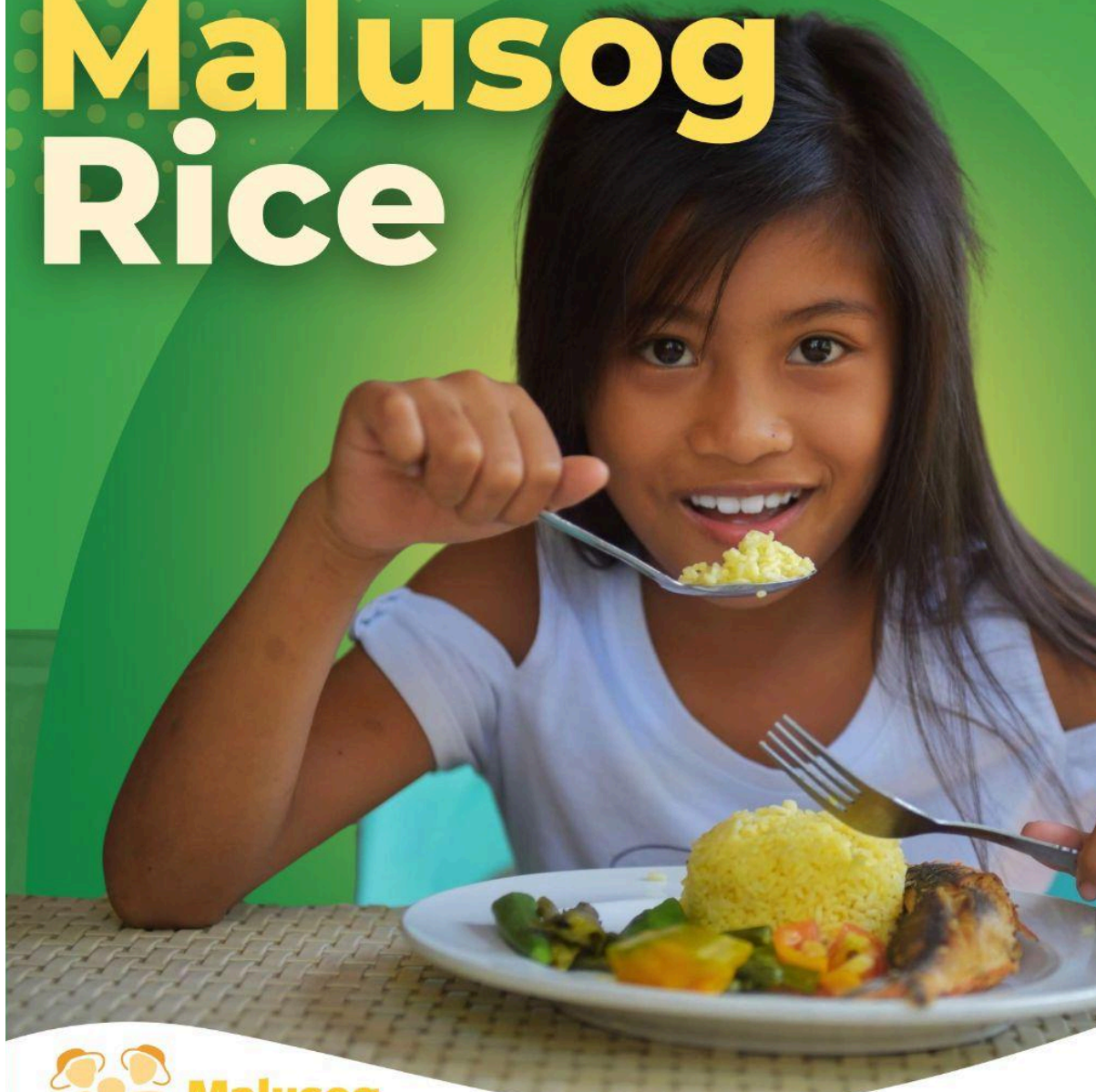




QUESTIONS
& ANSWERS

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Malusog Rice



**Malusog
Rice**

Bawat butil, puno ng sustansiya



Department of Agriculture
PHILRICE
PHILIPPINE RICE RESEARCH INSTITUTE



IRRI
International Rice
Research Institute



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Malusog Rice and Vitamin A Deficiency

What is Malusog Rice?

Malusog Rice, also known as Golden Rice, is a type of rice that contains beta carotene (a source of vitamin A), and gives the grain its golden color. When people eat food containing beta carotene, it is converted to vitamin A as needed by the body. According to research published in the American Journal of Clinical Nutrition, about one cup of Malusog Rice may provide up to 30-50% of the vitamin A needs of preschool-age children and pregnant or lactating mothers.

Because rice is widely produced and consumed, Malusog Rice has the potential to reach many people, including those who do not have reliable access to or cannot afford other sources of vitamin A. Malusog Rice is intended to be used in combination with existing approaches to reduce vitamin A deficiency (VAD). These findings were validated in a desk study by the Department of Science and Technology - Food and Nutrition Research Institute (DOST-FNRI).

How was Malusog Rice developed?

Malusog Rice was developed using genetic modification, with genes from corn and a common soil microorganism that together produce beta carotene in the rice grain. The beta carotene in Malusog Rice is the same as the beta carotene found in green leafy and yellow-colored vegetables, orange-colored fruit, and even in many vitamin supplements and food ingredients.

Who developed Malusog Rice?

Malusog Rice was first developed by Professor Ingo Potrykus, then of the Institute for Plant Sciences, Swiss Federal Institute of Technology and Professor Peter Beyer of the University of Freiburg, Germany. The co-inventors have donated the technology for Malusog Rice to resource-poor farmers in developing countries. The Department of Agriculture - Philippine Rice Research Institute (DA-PhilRice) is leading the development and deployment of Malusog Rice in the Philippines, in collaboration with the International Rice Research Institute (IRRI).

What is the difference between Golden Rice and Malusog Rice?

Golden Rice was the term used by its inventors Ingo Potrykus and Peter Beyer to describe the rice they developed that contains beta carotene, which gives the grain a golden yellow color. In April 2022, Golden Rice in the background of PSB Rc 82 was registered with the National Seed Industry Council (NSIC) as NSIC 2022 Rc 682GR2E with a local name – Malusog 1. Since then, we took this opportunity to call Golden Rice with its local name given by NSIC to highlight the health benefits and communicate this in a language that all Filipinos can understand. *Malusog* means healthy, and the name Malusog Rice emphasizes the nutritional benefit that the program hopes to help Filipino families achieve.

What is vitamin A and vitamin A deficiency?

Vitamin A is an essential micronutrient found in animal food products and breast milk. It can also be obtained from orange colored-fruits and vegetables that contain beta carotene, which is converted to vitamin A depending on the body's needs. Vitamin A is crucial for the visual system, the body's growth and development, and a healthy immune system.

The chronic lack of vitamin A in the diet results in vitamin A deficiency (VAD), which can also be caused by childhood illnesses such as diarrhea, pneumonia, and other infections that reduce appetite and the body's ability to absorb vitamin A.

While current approaches to address VAD – food fortification, vitamin A capsule supplementation, promotion of optimal breastfeeding and complementary feeding, dietary diversification, and nutrition education – have made real successes, gaps still exist.

How big is the vitamin A deficiency problem?

Many people in the developing world do not get enough vitamin A or beta carotene from the food they eat, contributing to the serious public health problem of VAD.

VAD remains a major public health problem across the world, with women and children being the most vulnerable to it. According to the World Health Organization (WHO), VAD afflicts 250 million people worldwide, most of which are preschool children (190 million) and pregnant women (19 million). VAD is the leading cause of preventable blindness in children and increases the risk of disease and death from severe infections. Each year, up to 500,000 children go blind as a result of VAD. Half of them die within 12 months of losing their sight.

In the Philippines, VAD continues to be a significant public health problem affecting 15.5% percent or 2 million Filipino children under the age of 5. This is based on the 2018-2019 Expanded National Nutrition Survey of the Department of Science and Technology – Food and Nutrition Research Institute (DOST-FNRI). Children aged 6 months to 5 years old and pregnant/lactating women are the most at risk of VAD. Across all sectors, VAD prevalence is higher among the poor.

How is Malusog Rice better than regular rice?

Malusog Rice is an enhanced version of ordinary rice designed to address a specific nutrition problem, without any additional cost or difference in taste. While Malusog Rice is expected to cost and taste the same as regular rice, its beta carotene content makes it a valuable intervention in the battle against VAD. In the Philippines where rice is a staple of nearly every meal, beta carotene-enriched Malusog Rice can supply up to 30-50% of the estimated average vitamin A requirement (EAR), particularly for sectors that are most vulnerable to VAD: preschool-age children and pregnant or lactating mothers.

Why do we need Malusog Rice?

Current approaches (such as vitamin A supplementation, food fortification, diet diversification, and promotion of optimal breastfeeding), have made some successes in combating VAD. However, more work is necessary to fill the nutritional inadequacy of the diet and address the needs of at-risk populations, especially those in rural remote areas and in urban depressed communities. Additionally, millions continue to suffer from VAD to this day.

Studies have shown that the addition of vitamin A (or some form of vitamin A) to the diets of children below the age of 5 could reduce all mortality by 24-30 percent. Meanwhile, vitamin A availability could prevent 1.3-2.5 million of the nearly 8 million late-infancy and preschool-age child deaths annually in developing countries with the highest risk.

With rice being a staple food in many vitamin A-deficient communities, Malusog Rice presents a unique opportunity for meeting the nutritional needs of these populations, in combination with other existing interventions.

Malusog Rice Program

What is the Malusog Rice Program?

The Malusog Rice Program (MRP) is a research and development (R4D) program implemented by DA-PhilRice in close collaboration with the International Rice Research Institute (IRRI), DA-Regional Field Offices (DA-RFOs), local government units, and other concerned agencies to develop and deliver nutritionally-enhanced rice varieties to Filipino farmers and consumers. The MRP covers the overall planning, implementation, and integration of project activities to effectively deploy Malusog Rice to target areas in the Philippines. The beta carotened-enriched Malusog 1 (NSIC 2022 Rc 682GR2E) is the first variety of Malusog Rice registered with the National Seed Industry Council (NSIC) that is being promoted by the program. The MRP is also working on another nutrient-dense rice that is rich in iron and zinc called High Iron and High Zinc Rice (HIZR). It is currently undergoing the final stages of biosafety regulatory review. Once the HIZR is deregulated, the plan is to stack it with Malusog Rice to develop and register 3-in-1 rice varieties. The combination of beta carotene (vitamin A), iron and zinc in a single grain of rice will be a game-changer in the fight against micronutrient deficiencies.

What is the objective of the program?

The Malusog Rice Program aims to contribute to the country's goal of achieving food and nutrition security. Within the next 5-8 years, the goal is to have Malusog Rice comprise 10% of the total rice production in the Philippines, enough to meet the rice requirement of vitamin A deficient households in the country.

Who are involved in the implementation of the Malusog Rice Program?

In collaboration with the International Rice Research Institute (IRRI), DA-PhilRice takes the lead on the development and deployment of Malusog Rice in the Philippines. The deployment and

commercialization of Malusog Rice will need to mobilize the entire rice value chain players such as the technology developer, extension workers, policymakers, farmers, market players, and consumers to realize the program's goal of increasing vitamin A intake and improving vitamin A levels of the target populations.

Who are the target beneficiaries?

Since rice is widely produced and consumed, Malusog Rice has the potential to reach many people, including those who do not have reliable access to or cannot afford other sources of vitamin A. Malusog Rice's beta carotene content makes it a useful asset in the battle against VAD since vitamin A is an essential micronutrient for growth, development, and keeping the body's visual and immune systems healthy. It is intended to be used in combination with existing approaches to reduce VAD. In the Philippines, children 6 months to 5 years old, pregnant and lactating women are highly vulnerable or at risk of VAD because of their increased nutritional needs.

How will Malusog Rice be deployed?

Malusog Rice is primarily developed for humanitarian purposes to help address VAD. It will be deployed through market- and program-based approaches in partnership with rice industry players and the relevant government agencies that implement nutrition and public health programs.

The program-based pathway focuses on tapping existing programs and interventions by government agencies and NGOs to facilitate the promotion and acceptability of Malusog Rice. The market-based pathway, on the other hand, shall ensure that there is a sustainable supply and demand of Malusog Rice in the rice industry. Stable consumer demand for Malusog Rice is important to provide strong incentives for the rice value chain to sustain planting, processing, and distributing Malusog Rice to the target consumer segments. DA-PhilRice and its partners will seek the necessary policy support to make this beta carotene enriched rice available, accessible, and affordable to Filipinos, especially in areas where malnutrition is a high concern.

What is the current status of the program?

On April 17, 2024, the Court of Appeals (CA) granted the Writ of Kalikasan filed by anti-GMO groups against Malusog Rice and Bt Talong. This means that we must stop the commercial propagation and/or the conduct of activities relating to Malusog Rice under the issued biosafety permit. The Malusog Rice Program's operation is currently put on hold, in compliance with this ruling.

DA-PhilRice understands the cautious approach the CA has adopted in its decision and has done the same taking into account the safety concerns of the people and the effectiveness of the initiative that resulted in the Malusog Rice product. On October 24, 2024, DA-PhilRice, through the Office of the Government Corporate Counsel, filed a petition to the Supreme Court (SC) seeking to overturn the decision of the CA, emphasizing the nutritional value and potential health benefits of Malusog Rice.

What is the Writ of Kalikasan against Malusog (Golden) Rice and Bt Talong?

On October 17, 2022, a Petition for Writ of Kalikasan and Continuing Mandamus was filed before the Supreme Court (SC) by MASIPAG and other anti-GMO groups to enjoin the testing, propagation, and use of Malusog Rice and Bt Talong. The petition was filed against the Secretary of the Department of Agriculture, et al. Acting on the Petition, the SC issued a Resolution dated April 18, 2023, issuing a Writ of Kalikasan against the respondents and requiring the respondents to file a Verified Return. The SC referred the case to the Court of Appeals for acceptance of the verified returns, conduct of hearing, and rendition of judgment. After due proceedings, the Fourth Division of the Court of Appeals promulgated a Decision dated April 17, 2024, granting the Petition. A full copy of the decision may be searched, and accessed from the [Court of Appeals website](#) (Case no. SP-00038-KALIKASAN).

With the revocation of the biosafety permit, does that mean that Malusog Rice is not safe to eat?

Even with the ruling, the fact remains that Malusog Rice has been proven as safe as ordinary rice. It was issued a biosafety permit by DA-BPI for direct use as food and feed and for processing in December 2019. It has been evaluated for safety and has met the necessary standards and regulations to be approved for use as food and animal feed, as well as for industrial processing.

What happens to the program now that the biosafety permit for the commercial propagation of Malusog Rice is revoked?

The Program has complied with the Court of Appeals' (CA) cease and desist order and has stopped the conduct of activities relating to the commercial propagation of Malusog Rice. While awaiting the result of the appeal filed before the Supreme Court to overturn the CA decision, we are conducting limited activities such as storage of seeds, disposal of milled grains, and outreach to stakeholders.

Pilot-Scale Deployment¹

When will Malusog Rice seeds be available?

DA-PhilRice will make the necessary announcements on the result of the ongoing case, and when seeds are available for distribution.

Who will distribute Malusog Rice seeds?

DA-PhilRice, being the technology developer in the Philippines, will continue to lead the distribution and commercialization of Malusog Rice once it has been cleared from any legal, regulatory, and certification requirements following the existing rice distribution and sales networks. DA-PhilRice will work with relevant agencies and organizations to ensure a targeted

¹ Implemented prior to the issuance of the Court of Appeals' decision on the Writ of Kalikasan case against Golden Rice.

and well-coordinated seed distribution system and will make the necessary announcements once there are enough seeds available for propagation.

In which areas was Malusog Rice initially planted as part of the pilot-scale deployment?

Seven provinces across the Philippines have been identified as initial areas for Malusog Rice distribution during pilot-scale deployment, based on a range of criteria including rice production status and nutrition data, specifically aligning with the Philippine Plan of Action for Nutrition Priority Areas 2017-2022. These are Quirino, Catanduanes, Samar, Antique, Agusan del Sur, Lanao del Norte, and Maguindanao.

Malusog Rice seeds were distributed beginning in May 2022 for wet season planting in selected DA-PhilRice branch stations, DA research stations, and farms of partner farmers and seed growers in the abovementioned provinces. Additional cities/municipalities and provinces joined the pilot-scale deployment following engagement activities with their respective local government units that have expressed interest and willingness to adopt Malusog Rice in their agriculture and nutrition programs. Harvested Malusog Rice from these areas was mainly used for seed multiplication, acceptability and consumer studies, and promotional activities.

How much do the seeds of Malusog Rice cost?

As part of the pilot-scale deployment activities, the Program conducted market testing of Malusog Rice in 10 provinces in 2023. Results of the market test indicate that Malusog Rice is a marketable product, with a price comparable to regular/well-milled.

How can farmers avail of Malusog Rice seeds?

Once Malusog Rice is cleared from any legal, regulatory, and certification requirements, the Malusog Rice Program will announce the availability of seeds. Please contact the nearest DA-PhilRice branch station or your local agricultural extension worker to signify your interest. We will reach out about the guidelines for farmer-cooperators once sufficient seed supply has been established for upcoming planting seasons.

Will Malusog Rice seeds be available to private seed growers and companies?

For the initial phase of seed production and deployment, DA-PhilRice is prioritizing distribution to selected farmers, seed growers, and research centers that are willing to test Malusog Rice. A comprehensive strategy for expansion through the private sector is still under development. Interested companies may leave their contact details at the nearest DA-PhilRice branch station or contact the Malusog Rice Program Management Office at mrpmo@goldenrice.philrice.gov.ph.

How does DA-PhilRice ensure the purity and quality of Malusog Rice across the value chain?

A comprehensive quality assurance and stewardship program that covers all steps in the chain from seed production to post-harvest processing, to marketing has been developed by

DA-PhilRice to ensure the quality and purity of the Malusog Rice that will reach farmers' fields and consumers' tables.

What strategies are being implemented to ensure that farmers will plant and consumers will eat Malusog Rice?

We are introducing Malusog Rice in varieties that are already popular with farmers and we are focusing on varieties that farmers currently prefer because they grow well in local conditions, with high yields and natural insect and disease resistance. Malusog Rice will be planted, harvested, threshed, stored, and milled in the same way as their parental varieties. We will continue to breed Malusog Rice into other popular varieties as well so that farmers will have even more choices.

Malusog Rice has undergone various tests on the appearance, cooking quality, and taste of consumers. Our preliminary research shows that many are willing to try yellow-colored rice, especially if there is a nutritional benefit associated with its color. Malusog Rice can be cooked just like other rice. Taste tests have shown that Malusog Rice does not taste differently and its other eating qualities are as good as other rice. More importantly, the price of Malusog Rice is expected to be comparable to its conventional counterpart.

The Malusog Rice Program, in collaboration with national and local government partners, value chain players, and other supporters, will continue to work together to ensure that Malusog Rice is accessible and affordable to the most vulnerable populations. This will entail strategic and consistent communication and stakeholder engagement to help promote awareness, understanding, and acceptance of the product.

Who will be in charge of monitoring the progress and measuring the impact of Malusog Rice?

DA-PhilRice will lead the monitoring and evaluation of Malusog Rice as it moves through the distribution system. A nutritional study will be conducted by an independent organization with expertise in public health to determine whether Malusog Rice improves the vitamin A status of individuals.

How many countries have allowed the planting of Malusog Rice?

Filipino farmers became the first in the world to cultivate a variety of rice enriched with nutrients to help reduce childhood malnutrition. This milestone has put the Philippines at the forefront of leveraging rice research to address a malnutrition problem. Golden Rice as it is popularly known globally, is undergoing regulatory review in Bangladesh and awaiting approval for cultivation.

What other countries have approved the safety of Malusog Rice for consumption?

Malusog Rice has been assessed to be as safe as ordinary rice with the added benefit of beta carotene in the grains by Food Standards Australia New Zealand (22 February 2018), Health Canada (16 March 2018), the United States Food and Drug Administration (24 May 2018) and the Department of Agriculture-Bureau of Plant Industry (19 December 2019). In July 2021, the Philippines became the first country in the world to approve Golden Rice for commercial propagation.

Food safety reports/notifications are listed below:

Australia New Zealand (<https://www.foodstandards.gov.au>)

United States (<https://www.hfpappexternal.fda.gov>)

Canada (<https://www.canada.ca>)

[Downloadable certificates](#)

Production

What new farming methods are being promoted for Malusog Rice cultivation?

Malusog Rice is planted just like conventional rice varieties and does not require any changes in farm management or cultivation practices. All current local practices for conventional rice varieties, including the application of fertilizer, crop protection products, and labor, are directly applicable to the cultivation of Malusog Rice.

How is planting Malusog rice different from other rice varieties?

Malusog Rice is an inbred rice variety, so the method of planting and caring for it is the same as for other inbred varieties. Additionally, its seeds can be kept for subsequent plantings, just like other inbred varieties.

What is the average yield in planting Malusog rice?

The yield per hectare of Malusog Rice is estimated at 5 tons or higher, depending on the area and season of planting.

How will farmers profit from it?

Due to the high-yield nature of the popular inbred rice background of Malusog Rice, there is a high probability that farmers will profit from planting Malusog Rice.

The cost to produce Malusog Rice, including the application of pesticides and fertilizers, is comparable to that of ordinary inbred rice. This means that farmers will not incur additional expenses for these inputs when cultivating Malusog Rice. The costs for labor, water

management, and other farming practices remain the same as those required for conventional inbred rice varieties, ensuring that the overall production remains unchanged.

Does the beta carotene in Malusog Rice affect yield?

Results of recently conducted tests have shown that Malusog Rice has no unintended effects on yield or grain quality. Aside from the beta carotene content of the grain, Malusog Rice is the same as conventional rice varieties.

Additionally, based on germination tests conducted under two different temperature regimes, genetic engineering did not result in any unintended changes that could affect Malusog Rice's seedling development or environmental growth.

What effect does planting Malusog Rice have on the growth of weeds?

Confined field tests of Malusog Rice at multiple locations in the Philippines have confirmed that there were no unintended or unexpected changes in the characteristics of rice concerning seedling germination and vigor, plant growth and morphology, reproductive characteristics, and susceptibility to pests and diseases resulting from genetic engineering.

Can Malusog Rice be raised organically?

Malusog Rice can co-exist with organic agriculture and other production systems, and will not make any other species more invasive or less viable. In other words, any production method for cultivating ordinary rice, including organic practices, can be used to cultivate Malusog Rice.

What unique pest control management is needed for growing Malusog Rice? How will it affect the prevalence of pests or the emergence of new crop diseases?

Malusog Rice does not have any modified or introduced resistance to insect pests or diseases. It is not expected to drive the evolution of resistant pest populations or require any changes in pest control practices. No occurrences of pest and beneficial insect species were observed during Malusog Rice confined field tests. Malusog Rice was not seen as a preferred host for pest insects, nor did it cause any harmful effects on the prevalence of beneficial species.

What is the viability of Malusog Rice pollen compared to other rice varieties? How does it perform in terms of growth and development?

Comparisons of pollen morphology and viability between Malusog Rice and conventional rice have shown no significant differences. The pollen of Malusog Rice maintains the same viability and appearance as that of conventional rice, indicating that genetic modifications have not impacted these characteristics.

What are the potential effects of cross-pollinating or out-crossing with other rice varieties when planting Malusog Rice?

Cross-pollination in rice is rare if plants are separated by a short distance of a few feet or meters. It is also uncommon in rice unless all the rice plants are flowering at the same time. Rice pollen is normally viable for only a few minutes after flowering.

In other words, organically-grown rice will not cross-pollinate naturally with other cultivated rice, unless they are growing close together and flowering at the same time. Additionally, the beta carotene-producing trait in Malusog Rice is not intended to affect the growth-related characteristics of rice. It will also not make it any more or less viable than conventional varieties.

Will there be a problem if I mix Malusog Rice with other rice varieties?

Admixture of different rice varieties is inevitable in fields that are planted with different varieties per season, due to dropped seeds. It can also happen at various points in the postharvest process, such as during drying and milling because it is common practice to share post-harvest facilities within a community.

Based on the consumer standard under the Philippines National Standard for Paddy and Milled Rice (PNS/BAFS 290:2019) set by the Bureau of Agriculture and Fisheries Standards (BAFS), the highest grade of milled rice (premium) allows 3% of "contrasting types," which are paddy/rice kernels of different varieties other than the variety designated, wherein the size, shape, and color differ distinctly from the characteristics of kernels of the variety designated.

A small admixture will not reduce the nutritional value of Malusog Rice and it will remain as safe as ordinary rice; the only difference is its beta carotene content which gives it a golden yellow color. As such, this should pose no issue for Malusog Rice planted for personal consumption, but farmers planting Malusog Rice for commercial production may want to adopt more rigorous practices, such as proper land preparation and strict roguing, to minimize admixture to gain the highest grade of milled rice and receive maximum profit.

For seed production, the separation of Malusog Rice from other varieties is critical as a certain level of purity is required. To meet the consumer standard, the seeds must achieve at least 97% purity. To be able to do this, seed growers should observe the required crop management practices for ensuring seed purity.

How will Malusog Rice affect the cultivation of heirloom rice varieties?

Heirloom rice varieties are mostly planted in the highlands. Malusog Rice varieties are for irrigated lowlands. They will not grow productively in the highlands. DA-PhilRice is deploying Malusog Rice in irrigated lowland farms far from known production areas of heirloom rice varieties.

Would DA require or enforce farmers to exclusively plant Malusog Rice?

The DA ensures that Filipino farmers are empowered to make decisions on what best serves them and their families based on the best possible options to improve their crops, raise their farm productivity, and increase their income. Malusog Rice is a nutrient-dense type of rice like brown rice, black rice, and red rice—an additional option for farmers to plant that can help ensure micronutrient sufficiency.

The Department promotes a range of technologies, interventions, and safety nets to attain its vision of a food-secure and resilient Philippines with prosperous farmers and fisherfolk.

Consumption

Is Malusog Rice safe for human consumption?

Malusog Rice is safe to eat, just like other genetically engineered foods developed under strict regulation by experts. Before any genetically modified (GM) foods become available in the market, they must pass rigorous safety assessments and must not demonstrate a high likelihood of putting human health at risk. In the countries where GM foods have been approved, there have been no scientifically proven negative effects on human health due to the consumption of GM foods.

Malusog Rice received positive food safety evaluations from Food Standards Australia New Zealand, Health Canada, and the United States Food and Drug Administration in 2018. In December 2019, Malusog Rice passed a rigorous biosafety assessment in the Philippines and was declared “as safe as conventional rice” by the country’s Department of Agriculture-Bureau of Plant Industry.

What evidence do you have that Malusog Rice will be beneficial?

Based on computations made in consultation with nutrition experts, one cup of cooked Malusog Rice can provide 30-50% EAR of vitamin A for preschool children, and pregnant and lactating mothers. A simulated analysis study done in 2016 suggests that beta carotene-rich rice like Malusog Rice could improve vitamin A intake and could reduce the prevalence of VAD among women and children. Furthermore, an impact study will be conducted to further show Malusog Rice's efficacy.

Who will benefit most from Malusog Rice?

Malusog Rice is intended to complement existing nutrition interventions to address VAD, a public health problem affecting children and pregnant and lactating women. It is nutritionally-enhanced rice that will benefit the health of all who eat this food. Some people may benefit more than others, depending on their dietary intake of beta carotene or vitamin A and their health and vitamin A status.

When can I eat Malusog Rice?

Considering the amount of time needed to produce enough seeds for farm cultivation, Malusog Rice will be made available for consumption initially in areas with a high prevalence of VAD. Once Malusog Rice is cleared of any legal, regulatory, and certification requirements, the Malusog Rice Program will announce the availability of milled grains.

How should I cook Malusog Rice?

Like the planting method, the cooking method is no different from ordinary rice.

How much Malusog Rice will I have to eat to have enough vitamin A in the body? Can I overdose if I eat too much?

One cup of cooked Malusog Rice can provide 30-50% EAR of vitamin A for preschool children and two cups for school children and adults. It will have to be eaten regularly replacing the existing white rice to have a long-lasting result.

Malusog Rice can be eaten with other sources of beta carotene such as malunggay, carrots, squash, and other green and leafy vegetables-in other words, as part of a diversified and balanced diet as illustrated in DOST-FNRI's Pinggang Pinoy. Beta carotene present in these foods can only be converted into vitamin A as the body needs it so any excess will only be excreted safely.

How much will Malusog Rice cost consumers?

Based on the market test conducted by DA-PhilRice, Malusog Rice appeared to be comparable with well-milled rice, which is the most marketable type of rice in the target areas, with prices ranging from Php 44.00 to Php 54.00 per kilogram. The highest price noted during the study is Php 50.00 while the lowest price is Php 41.00².

Does rice bran from Malusog Rice, which can be used for animal feed, also contain beta carotene?

The beta carotene in Malusog Rice can be found in the endosperm part of the grain. The rice bran that was removed during polishing does not contain beta carotene.

Is Malusog Rice effective as a complementary intervention for VAD?

Malusog Rice is intended to be used in combination with existing approaches to overcome VAD including eating foods that are naturally high in beta carotene or processed foods fortified with vitamin A; oral supplementation, breastfeeding, and complementary feeding practices.

An independent nutrition study will be conducted by an organization with expertise in public health to determine the impact of Malusog Rice on vitamin A intake.

² The market test was conducted prior to the court's decision in November - December 2023. Prices may also vary due to the market trends in the areas.

What is the taste and texture of Malusog Rice?

Based on the result of the initial sensory evaluation, Malusog Rice is the same as its conventional background variety in terms of aroma, texture, and taste. Beta carotene is a nature-derived color additive; it affects the color, not the taste, of the foods it is added to. This is different from how colored rice dishes (such as paella and Java rice) don't taste like regular white rice; that's because of the ingredients used in preparing the dishes, and not the rice itself.

How frequently should I eat Malusog Rice to have sufficient vitamin A in the body?

It is ideal to eat Malusog Rice daily, as a substitute for ordinary rice, to have a continuous supply of vitamin A in the body. It is recommended to consume Malusog Rice regularly to make it effective. This means that in areas where the risk of vitamin A deficiency is high, households are recommended to replace the existing white rice with Malusog Rice to have a long-lasting result.

Will the beta carotene of Malusog Rice get reduced when stored for some time and as you cook it? How will you ensure its efficiency in providing enough vitamin A?

Because beta carotene has a natural tendency to degrade over time, the project team monitored beta carotene content at various stages of the project, from harvest to storage to cooking: estimating from 100 grams of milled Malusog Rice stored for two months in normal conditions, with 30% cooking losses in its calculations. Measurements at this stage show that there is sufficient beta carotene in Malusog Rice to meet the 30-50% EAR of vitamin A for young children and mothers or lactating women.

Will the color of Malusog Rice affect the rice wash as you rinse it before cooking?

No. Unlike other pigmented rice, the yellow color of Malusog Rice will not affect the rice wash as you rinse it. This is because the beta carotene, which gives the rice its yellow color, is found in the endosperm and not in the bran. The color of the rice wash will be just like ordinary rice.

NOTES

NOTES

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Philippine Rice Research Institute (PhilRice) is a government corporate entity under the Department of Agriculture created through Executive Order 1061 on 5 November 1985 (as amended) to help develop high-yielding and cost-reducing technologies so farmers can produce enough rice for all Filipinos.

The Institute accomplishes this through research and development work in our central and branch stations. In 2006, PhilRice CES received three management system certifications: ISO 9001 (Quality), ISO 14001 (Environmental), and OHSAS 18001 (Occupational Health and Safety Assessment Series) – where the latter has migrated into ISO 45001 (Occupational Health and Safety Management System) in 2023. From 2019 to 2020, all the Branch Stations received their ISO 9001 certification as their first step into adopting the Integrated management System currently being practiced at CES. These management systems unify the organization, resources, processes, and practices components into one system to help achieve the organization's purpose and mission.

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