

Harnessing Biofortified Rice Technologies for the Growth of Rice-Based Farmer Producer Organisations

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Introduction

Rice is a staple crop feeding billions across the globe. Though it is a rich source for calories, its nutritional value is often limited for the essential nutrients like iron, zinc, and vitamin A. This is an important issue to be addressed in the developing regions where rice is the main staple food crop. Genetic enhancement of rice crop with enhanced nutrients through biofortification approach is often advocated and is considered as one of the promising approaches that is sustainable, targeted and cost effective to address the malnutrition problems in developing nations that are dependent on monotonous dietary habits dominated by cereals as major source of their staple food. The integration of biofortification technologies into rice cultivation presents a golden opportunity from the consumer perspective as the rice is rich in the essential nutrients like either iron or zinc. This article is an attempt to discuss how biofortified technologies can be an opportunity for the growing number of rice-based farmer producer organisations in India.

Importance of biofortified technologies

Biofortification in simple terms refers to the enhancing the genetic potential of any food crop with enhanced nutrients. Biofortification is the process of increasing the nutrient content of crops through plant breeding efforts, agronomic practices, or biotechnology. Biofortified products significantly provide micronutrients with low cost compared to nutrient rich foods like fruits, vegetables and animal based food products (Natsios, 2021). Biofortification offers a great potential for improving nutritional intake of families who primarily depend on low nutrient staple crops grown by them. The recent disruptions due to the Covid-19 pandemic have brought forth the importance of biofortified crops in providing resilience and strengthening the immune system through higher concentration of micronutrients. Globally, the smallholder farmers are being benefited through the availability of several varieties (200) of 11 biofortified crops (FAO and Harvest Plus 2019).

Emergence of Farmer Producer Organisations

Farmer Producer Organizations (FPOs) are playing a vital role in transforming India's agricultural sector by empowering smallholder farmers. They are mainly envisioned to pool the limited resources so that farmers can access better markets and negotiate/bargain for higher prices by reducing the dependency on market intermediaries and finally resulting in higher incomes for the shareholding primary farmer members. FPOs play a vital role in helping its member farmers to access quality inputs like seeds, fertilisers, low cost machinery, farm services, access to knowledge on latest agricultural practices/ technologies, capacity building and access to group based credit options, insurance and subsidies, collective procurement and marketing. There are many successful FPOs that have extended their businesses beyond production to post-harvest management by creating storage and processing facilities to reduce losses and integrate activities to add value to agricultural produce. Many FPOs have proven successful in diversifying their group activities in value-added processing and selling their products in both national and international markets. Overall, FPOs are essentially helping member farmers especially small holder farmers by improving their livelihoods, enhancing agricultural productivity, and bringing community level development. The FPOs USP, namely its collective strength provides a solution to the challenges of fragmented land holdings, information access, quality input access, market access, and financial exclusion.

Why Should Rice based FPOs harness Rice Biofortified Technologies?

Though Farmer Producer Organizations in general are increasingly playing a pivotal role in the agricultural value chain by adopting various business interventions that improve the economic well-being of farmers, there are limited options for the rice based FPOs compared to other sectors like horticulture based FPOs. Being a traditionally grown and consumed product, the market space for rice is already flooded with a variety of rice based products. Rice based FPOs are looking to tap into emerging markets that demand

nutritious food, increase the value of their produce from nutrition perspective and thereby increase their incomes for their members. In this context, biofortified rice technologies provide an opportunity for the rice based FPOs to venture into the agri-business value chain with a new product option.

The success story of Emadhuwan Farmers Producer Organization (FPO) East Champaran, Bihar with the biofortified wheat crop is a case for emulation by other farmers collectives and in other crops. Recognizing the superior nutritional value and foreseeing market demand for zinc wheat, Emadhuwan FPO created its crop production and business activities towards promotion of biofortified crops. With the technical support from HarvestPlus, expertise from KVK, NGO and state department officials, the initiative with biofortified wheat seed, FPO could bring out a turnover of USD 62,772, a net benefit of USD 3621 benefitting 400 shareholders (Abhilash M and Pandey T N 2024).

Rice biofortified technological options for rice based FPO's

The rice based FPOs need a business opportunity to bring value to their company prospects. This is possible only when they have a marketable product with unique value for the consumers in terms of its nutritional quality or other aspects. Farmer Producer Organizations should include biofortified technologies in their varietal options to enhance not only the nutritional quality of the crops they produce but also to improve the health and well-being of its consumers, especially by marketing in the regions where micronutrient deficiencies are prevalent. Biofortified crops, such as those enriched with iron, zinc, and vitamin A can be marketed as a cost-effective way to combat malnutrition and increase the value to their marketed product. Moreover, promoting biofortification aligns with the growing global focus on sustainable agriculture and food security, providing FPOs with a competitive edge and a positive impact on public health to attract funding from the international bodies and CSR funding options of the MNCs.

Under National biofortification breeding programme a number of varieties such as DRR Dhan 45, DRR Dhan 48, DRR Dhan 49, DRR Dhan 63, CR Dhan 311, CR Dhan 315, CR Dhan 411, Chhattisgarh Zinc Rice-1, Chhattisgarh Zinc Rice-II and Zinco Rice MS, (Yadava et al., 2022) with high zinc and protein were released and notified for different states. Among these

options, rice based FPOs can select appropriate biofortified rice variety based on the farmers and consumer's preference and strategize their business plan with production and marketing, seed production and value addition.

1. Production and marketing of biofortified rice

Deploying these biofortified varieties for production and marketing by the rice based FPOs can provide FPOs with a unique market niche for the biofortified rice product, potentially increasing their income through premium pricing for the value the nutritious product brings to the consumers. The FPOs wishing to diversify their product portfolio and expand their market options and thereby willing to improve the FPOs revenue stream should encourage cultivation of biofortified rice varieties by its farm members. Marketing their product under their own brand can increase farmer income for member farmers.

2. Seed Production of biofortified rice varieties

Seed Production of biofortified rice varieties offers an excellent entrepreneurial activity for FPO members. The research organizations are looking towards progressive farmers and FPO members for quality seed production of the biofortified rice varieties to expand the area under the cultivation of these rice varieties to ensure maximum reach of biofortified rice grains to particularly the vulnerable population and also for mid-day meals for schools and in Anganwadi feeding programs.

3. Value added products from biofortified rice varieties

Rice is consumed in various forms at different meal times in most of the Indian homes. One of the easiest and low-cost way for value added products from biofortified rice varieties is to make the all-time popular rice by-products, viz. rice flakes/flattened rice (poha) extensively used in several recipes and mostly consumed as breakfast and snack item. Puffed rice (murmura) has versatile uses as a breakfast dish and as a quick snack with seasonings and toppings of one's choice and also as a fireless cooking option. Biofortified rice (high zinc, protein) can be an essential component of functional foods, infant mixes and more importantly gluten free food products. The FPO members with optimal investments can plan to set up processing units to cater to the market demands for these rice by-products by labelling them as **Naturally Nutritious** products.

Conclusion

Biofortified rice technologies introduce a path to sustainable growth for rice-based FPOs, By taking up biofortified rice cultivation by its member farmers, they can deliver social, economic, and environmental benefits while contributing to global nutrition security. FPOs can play a better and responsible role in creating a healthier, more resilient future for farmers and consumers alike. FPOs can explore partnerships with agricultural research institutes, seed companies, and NGOs promoting biofortification.

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