



Indonesia Market Watch December 2023

Commercialising drought-tolerant rice seeds in Indonesia

2<sup>nd</sup> Edition

The Australia-Indonesia Partnership for Promoting Rural Incomes through Support for Markets in Agriculture (PRISMA) is a development partnership between the Government of Australia (Department of Foreign Affairs and Trade, DFAT) and the Government of Indonesia (Bappenas).



Kementerian PPN/ Bappenas



Australian Government



In July 2022, PRISMA published the first edition of "Commercialising droughttolerant rice seeds in Indonesia." The Indonesia Market Watch explored the potential to scale the use of high-yielding rice seed varieties. The first edition looked at the partnership with rice seed producer, PT Botani, the commercial arm of the renowned Bogor Agricultural University.

PT Botani produces a high-yielding rice seed variety, IPB3S, that only requires intermittent irrigation, making it suitable for growing in arid areas, highland areas, and regions where access to water is difficult.

The second edition is a timely update, re-emphasising the benefits of highyielding varieties (HYV) in dry El Niño conditions and sharing results from local trials in West Java from PRISMA partner and seed producer Agrosid/Primosid. The next step to achieve scale, in addition to the private sector partnerships, is advocacy to support changes in procuring seeds in the government's free seed program.

El Niño will bring drier weather to Indonesia for anywhere between 9 months to several years. Combined with erratic weather patterns caused by climate change, farmers in Indonesia are bracing for a turbulent period.

Meanwhile, agriculture is one of the biggest contributors to emissions and drivers of climate change. New technologies, such as climate-smart seeds, are needed to support a more sustainable agriculture system while helping farmers to become more resilient to weather shocks. HYV of rice seeds require less fertiliser (lowering emissions), have deep root systems that can withstand dry conditions, and produce higher yields. PRISMA is working with the private sector to expand HYV seed production and marketing, including better HYV seed accessibility for women farmers.

Recent trials from HYV rice seed producers and PRISMA partner Agrosid/Primasid<sup>1</sup> in West, Central, and East Java indicate which varieties can thrive in drier, rainfed fields.

# Lagging productivity

Rice, a staple food for more than 270 million people in Indonesia, provides a source of income and employment for many rural households. Indonesia's rice productivity is approximately 4.7 tonnes/hectare (ha),<sup>2</sup> which lags behind neighbouring countries like Vietnam, where average productivity is 6 tonnes per ha.<sup>3</sup> Yield growth has been weak over the last 20 years, increasing by less than 1 per cent per annum on average.

While many variables contribute to lagging productivity, a limited HYV supply limits farmer productivity and resilience. Growing the supply of HYV seeds (and farmer uptake) is especially important during the ongoing El Niño period and as the impacts of climate change become more severe. It is crucial to improve rice yields to reduce rural poverty and contribute to better food security as the Indonesian population grows.

<sup>&</sup>lt;sup>1</sup> Agrosid and Primasid are affiliated agro-chemical entities operating under the same ownership and administrative umbrella.

<sup>&</sup>lt;sup>2</sup> https://ipad.fas.usda.gov/countrysummary/Default.aspx?id=ID&crop=Rice

<sup>&</sup>lt;sup>3</sup> USDA Foreign Agricultural Service. Available online: https://ipad.fas.usda.gov/countrysummary/Default.aspx?id=VM&crop=Rice

## Growing rice is a thirsty business

Rice requires an estimated 2,500 litres of water to produce 1 kg of grain.<sup>4</sup> Water shortages can reduce rice yields by more than 40 per cent.<sup>5</sup> Water is sourced from rainfall or irrigation, with almost three-quarters of Indonesia's freshwater reserves allocated for agricultural irrigation. The availability of irrigation water has become increasingly limited due to erratic rainfall and long dry spells caused by El Niño and climate change.



# A drought-tolerant seed solution

PRISMA is working with the private sector to promote high-yielding rice seed varieties that can withstand climate fluctuations, including drier weather. PRISMA partners develop, market, and sell new varieties to establish viable markets for newer HYV seed, cultivating farmer demand and ensuring adequate supply.

Agrosid/Primasid is one of 5 rice seed producers PRISMA supports promoting HYV in East and Central Java. Through this partnership, Agrosid/ Primasid is increasing seed production and educating farmers on the benefits of using HYV rice seed through demonstration plots and with trained field staff and agronomists. Educating farmers stimulates demand for new varieties and opens new markets for Agrosid/Primasid. The partnership also supports training agronomists on how to engage more women farmers. A handbook was developed to provide practical tips on how to approach women farmers, the times that best suit them, and the information that they need to switch from lower-yielding to higher-yielding rice seed varieties.

Agrosid/Primasid promotes the Mapan P05 and Suppadi 56 rice varieties. These superior seeds can withstand heat stress and produce robust and extensive root systems, making them more drought-tolerant. Drought tolerance refers to the ability of plant species to develop adaptive traits that allow them to withstand or cope with droughtinduced stress. Both seed varieties can draw water from deep soil layers, making them suitable for water-saving farming techniques and cultivation in rainfed paddy fields with limited irrigation.

<sup>5</sup> World Bank. Indonesia Public Expenditure Review 2020: Spending for Better Results; World Bank: Washington, DC, USA, 2020; Indonesia Water Use, Resources, and Precipitation – Worldometer. Available online: https://www.worldometers.info/water/indonesia-water/ / (accessed on 27 March 2023).



<sup>&</sup>lt;sup>4</sup> Yoshida, S. (1981). Fundamental of Rice Crop Science. International Rice Research Institute.

# The benefits



## Local trials show promising results

PRISMA has conducted impact studies to better understand the Suppadi seeds. The studies found that Suppadi seeds thrive in irrigated highlands and rainfed environments, demonstrating a greater resilience than highland in-bred rice plants.

In Majalengka district, West Java, for example, Suppadi had an average productivity of 5.6 tonnes/ha in upland intermittent irrigation and rainfed fields, compared to 4.6 tonnes/ha for local varieties and 4 tonnes/ha for retained seeds.

Similarly, Mapan rice crops, typically seen in irrigated paddy fields in lowland areas, demonstrated success in areas with inconsistent irrigation and rain. The results of studies in Central and East Java showed that the average yield of Mapan is 6.9 tonnes/ha, compared to 4.1 tonnes/ha for older in-bred varieties such as Ciherang.

By using the Mapan and Suppadi varieties, farmers no longer face the dilemma of choosing between drought-tolerant varieties with low yields or HYV with limited tolerance to water stress.



#### Reducing greenhouse gas emissions

Typically, rice cultivation uses inorganic fertilisers with high greenhouse gas emissions, particularly those derived from nitrogen like urea. However, after cultivating Mapan and Suppadi, farmers have reduced the use of urea, resulting in lower emissions per tonne of rice produced by 40 percent compared to local varieties.<sup>6</sup>



#### Decreasing workloads and shifting farmer behaviour

The cultivation of Mapan and Suppadi has led to a shift in farmers' practices, resulting in less intensive labour. Spacing plants further apart reduces seed usage and attention needed for each plant. The plants also have higher foliage that serves as natural protection from swooping birds. Farmers' savings in time and effort in planting and protecting crops have given them more opportunities for family and community engagement.

Overall, Agrosid/Primasid found the demonstration plots, showing the higher-yielding seed varieties' results, combined with the promotional activities it conducts, especially the agronomist support, have helped to shift farmer behaviour. The flavour of the rice is another important factor, and Suppadi and Mapan are similar to what farmers are used to and enjoy.

<sup>6</sup> Based on PRISMA's impact assessment.



## A good idea reaches germination

In 4 years, PRISMA's interventions have resulted in more than 90,000 farming households adopting high-yielding rice seeds and increasing their yields. This was achieved by working with 5 seed companies promoting HYV and producing over 1,500 tonnes of seed. With PRISMA's support, these companies have expanded to new markets in Central and East Java and implemented inclusive approaches, including for people with visual impairments.

PRISMA supports its partners to design packaging that complies with universal design (UD) principles. UD principles improve the clarity and readability of packaging, which is especially important for an ageing farmer population with high rates of vision impairment.

For Agrosid/Primasid, Mapan and Suppadi increase smallholder farmers' productivity by 1 to 2.8 tonnes/ha under irrigated and rainfed conditions. This has led to income increases of 31 percent per farming household.<sup>7</sup> This means farmers can reinvest in quality inputs to improve their livelihoods further. More than 19,600 rice farming households have benefited from using Agrosid/Primasid's high-yielding rice seeds.

PRISMA will continue to assist Agrosid/ Primasid in sharing the learnings on expanding its HYV rice market with other rice seed producers and the government.



## Future carbon potential

The Indonesian Financial Services Authority (OJK) recently issued a regulation on carbon trading through a carbon exchange. The exchange is part of Indonesia's endeavour to cut emissions by more than 30 percent by 2030 and achieve net-zero emissions by 2060.

The exchange allows farmers (large and small scale) to verify and sell verified carbon credits. Methodologies enabling smallholder farmers to verify their emission reductions have been developed in other countries. Australia's Business Partnerships Platform has supported an **initiative** in Vietnam with Gold Standard and the International Rice Research Institute to develop a new methodology for verifying carbon emission reductions. The methodology opens a new source of income from the sale of carbon credits and could be applied in Indonesia.

While the carbon trading infrastructure is being established, introducing new technologies such as HYV seeds, smart irrigation, and improved fertiliser calculations offer smallholder farmers the best avenues for reducing emissions and improving productivity. PRISMA is assisting rice seed partners in exploring and developing climate-smart agriculture products and practices.

## The way forward

The Indonesian Government (GOI), as outlined in the Climate Resilience Development Policy 2020-2024, has acknowledged the vulnerability of the agriculture sector, especially its potential impact on reducing rice production.

PRISMA continues to support the GOI to boost the procurement of HYV in its free seed programs. PRISMA partners with research firms to develop evidence-based recommendations and policy briefs for the Ministry of Agriculture. Events with rice seed producers and the government support the dissemination of the policy briefs. PRISMA will continue to present the case for HYV into 2024.



### Advocacy inroads

In 2023, The Ministry of Agriculture recognised the contributions of PT Agrosid and another PRISMA partner and rice seed producer, PT Botani, in their efforts to expand the use of HYV. These 2 PRISMA partners were awarded the 'best crop display' award in the most significant national staple seeds expo event, "Gebyar Benih Nasional."







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