

RICE—THE PULSE OF LIFE IN MYANMAR

PHOTO: GRANT SINGLETON

Smallholder farmers and researchers in lower Myanmar are partners in improving the country's agricultural profitability and productivity through adaptive research trials on rice-rice and rice-pulse cropping systems.

Smallholder farmers in lower Myanmar have struggled with low yield and income from rice farming. ACIAR's MYRice program has brought these farmers together to become partners in agricultural development.

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Myanmar was once considered the 'pearl of the orient'. In the 1960s, the nation was a leading rice exporter in the global rice market. Events in the country, however, closed off the nation from neighbouring trade and international activities and dampened its once-illustrious rice sector.

In recent years Myanmar has slowly reopened its doors to global trade and re-established connections with other countries. New plant varieties and agricultural expertise are now available to Myanmar farmers.

The country's economic growth hinges on the development of its agricultural sector, particularly the rice sector. The Ministry of Agriculture, Livestock and Irrigation (MOALI) is keen to regain the country's status as a major rice exporter and to increase the income of its rice farmers. So it is essential to increase the efficiency of production and rice quality.

ACIAR's MYRice project is aiming to do just that, working in partnership with MOALI and others. The project is looking at best practice management, new varieties and rodent management.

Rice is very important in Myanmar and is cultivated on 64% of the country's arable land—

more than eight million hectares. Rice farming involves more than five million rural households.

Myanmar has rich natural resources of land and water, yet rice farmers are well behind their Asian neighbours, with yields along the country's fertile Ayeyarwady Delta only reaching half of those along Vietnam's Mekong Delta.

People living in rural Myanmar have a large per capita consumption of rice—up to 154 kilograms per year. Rice provided 70% of their daily calorie intake in 2016. At the moment, most of the rice produced in Myanmar is used to feed the local people. In 2014 the population reached more than 52 million.

Increasing production will help Myanmar to be more competitive in the regional and global rice markets. As well as rice, MOALI is also looking at the production of pulses and other high-value crops, which are often grown immediately after the harvest of the monsoon rice.

The International Rice Research Institute (IRRI) is working closely with local partners to improve farm productivity and the profitability of smallholder farmers. The Department of Agriculture (DOA), the Department of Agricultural Research (DAR) and Yezin Agricultural University (YAU)—all under MOALI—are the main partners on the ACIAR MYRice project.

The MYRice project aims to diversify and intensify rice-based systems in lower Myanmar and

to assist smallholder farmers in the mid and upper Ayeyarwady Delta. These farmers grow rice in the monsoon season; in the dry season about one-third grow rice and two-thirds grow pulses.

SOLUTIONS THROUGH FARMER PARTICIPATION

With partners from DAR and DOA, the MYRice project identified two target townships: Maubin in the Ayeyarwady Region and Daik Oo in the Bago Region. (Regions in Myanmar are equivalent to states.) Forty-four trials were undertaken from the 2012–13 dry season to the 2016 wet season. These were on-farm participatory adaptive research trials, implemented with 2,990 farmer-partners.

This research with farmers focused on:

- short-duration and new high-yielding varieties of rice and pulses
- new best management practices
- community rodent management
- improved postharvest management.

A participatory varietal selection (PVS) approach was used to obtain immediate feedback from farmers—their reasons for their preferences and constraints to adoption. This close collaboration among farmers and national partners resulted in the release of two flood-tolerant varieties for wet season rice/rice systems, drought-tolerant varieties



LEFT: Learning Alliance members collectively assess technologies that will help improve their current postharvest systems.

PHOTO: CHRISTOPHER CABARDO; IRRI

POSTHARVEST GAINS

An assessment conducted by IRRI in 2013 revealed that farmers in rice/pulse areas practice manual harvesting, and then pile up the harvested crops for as long as three weeks while they prepare their land for pulses. Farmers rely on outdated local threshers that are unable to thresh wet rice and are not mobile. This means that quality deteriorates and the harvest sells for a low price.

The MYRice team measured the losses from the traditional post-production process and compared these with the best management practices introduced by IRRI. Rice grain losses from traditional practices—piling, use of heavy threshers, sun drying and storing—can reach up to 13%. Rodents also cause significant damage and farmers lose about 100 kilograms of rice every six months. This is enough to feed a family for more than a month.

The farmers who adopted best management practices reduced their losses to 3–7%. The grains processed using best practice also had higher milling recovery than the grains processed through traditional farmers' methods.

Best practice techniques include:

- threshing crops immediately after harvest using a lightweight thresher or a combine harvester
- systematic drying using a flatbed dryer
- storing the paddy and pulses in hermetic (air-tight) bags.

"I am mostly impressed with the combine harvester, which I used to harvest rice last summer," says U Shwe Toe, one of the cooperators. Women involved in farming activities reported that they had more social and community activities when they began renting combine harvesters.

Since 2013 the use of combine harvesters has significantly increased in the village. Farmers have also tried using hermetic bags and 1 or 5-tonne GrainSafes to store their pulses.

Daw Tin Yee, a rice farmer for 25 years, stored her pulse seeds for nine months in a hermetic IRRI Super Bag. "After storage in the Super Bag, I noticed that the colour of the seed is better, the germination rate is higher and there was no insect infestation," she recalls. →

for dry season rice/rice systems and one variety suited for both wet and dry seasons.

Deputy Director-General of DAR and MYRice collaborating scientist, Daw Tin Tin Myint says the PVS approach "helped Myanmar's agricultural technicians and farmers to obtain a variety that suits their tastes and preferences. It's a leading technique for all participants to be involved in making decisions."

U Maung Maung Aye, a 52-year-old farmer from Phaung Wae Village, Daik Oo township, joined the trials on varietal selection for new green gram varieties. In the 2015 monsoon season he also participated in the trial for best-management practices in rice.

"We were taught new ways of planting pulses, such as line sowing," U Maung Maung Aye says. "I preferred it over our traditional practice of broadcasting seeds, because seed rates are lower using line sowing." He used 8 kg/ha with broadcast seeding, compared with 3.2 kg with line sowing.

In the 2015 monsoon season, husband and wife U San Pwint and Daw Aye Maw participated in the best management practice trials for rice, using new rice varieties Pyi Taw Yin and Sin Thwe Lat.

"We were planting traditional varieties such as Sin Thu Kha that yielded 80 baskets per acre (4 tons per hectare) and sold for 4,500 kyats (A\$4.40) per basket as grain. We also incurred more losses in the field compared to when we tried growing Pyi

Taw Yin, which yielded 95 baskets per acre (4.75 t/ha) and sold for 7,500 kyats (A\$7.35) per basket as seed," U San Pwint says.

DOA assistant director and MYRice collaborating scientist Dr Aye Min says that new and improved crop varieties enable farmers to obtain a higher yield and income, and to cope with the effects of climate change. "Farmers feel more secure and are able to save on input costs."

Trials on drum seeding and integrated weed management in the rice/pulse system in Maubin township indicated a benefit of US\$15/ha (A\$20/ha) for the monsoon crop compared with the farmers' practice of transplanting. Row seeding using a drum seeder provided farmers with an extra US\$100/ha (A\$132/ha) for the summer crop.

During the 2014, 2015 and 2016 wet seasons, 8,148 kg of seed for monsoon rice varieties was distributed to 352 farmers in the Ayeyarwady and Bago regions. For the 2015, 2016 and 2017 dry seasons, 5,124 kg of summer rice varieties was distributed to 204 farmers.

For the first time in 20 years, pulse farmers in Myanmar have had access to new pulse varieties and more than 340 pulse farmers have adopted them. The combined benefit from new varieties and new best practice management (pre and postharvest) indicate that productivity benefits will be greater than 40%.



PHOTO: ACIAR

Daw Tin Yee, a farmer from Maubin, joined the MYRice on-farm research activities and benefited from her learning.

The following season, Daw Tin Yee planted the stored Yezin 2 seeds and harvested 12 baskets per acre. "The trader also preferred Yezin 2 so I was able to sell it at 48,000 kyat (A\$47) per basket. I used the profit to renovate my house," she says.

The MYRice group also introduced community-level rodent management and reduced rodent losses by 25%. Farmers benefited by up to US\$81 (A\$107) per household. Another benefit was reduced contamination by faeces, improving human health.

BUILDING NETWORKS FOR CHANGE

The MYRice team established a multiple stakeholder platform called Learning Alliance (LA) to engage with different groups across the rice value chain. Farmers, traders, millers, DOA staff, and IRRI shared their knowledge and experience of technologies to optimise rice and pulse production.

The LA became an avenue for these groups to collectively assess their experiences from the best management practice trials and to identify opportunities to maximise the benefits. They visited the main wholesale market for rice, and the seed farms, where they learned about quality, different varieties and the process of selling in markets.

Alliance members also participated in a lightweight thresher demonstration on U Shwe Toe's farm to show how immediate threshing can reduce postharvest losses.

At the LA meetings, farmers from the best management practice trials also shared their experiences in using Sin Thwe Latt (rice) and Yezin (pulse) varieties with improved crop production management.

Recently, members organised farmer groups to develop postharvest services for the community in threshing, drying and storage. From the best management practice technologies used during the postharvest loss assessment trials, members chose the technologies they preferred to rent out and generate profit.

EQUAL OPPORTUNITY AND INCREASED CAPACITY

Collecting data on gender is part of the MYRice project. Gender equality outcomes are measured via large household surveys at the beginning and end of a project, and seasonal farmer diaries.

Gender equity was examined at one of the project's townships using the framework of the Women's Empowerment in Agriculture Index (WEAI).

Participatory varietal selection trials recorded the preferences of male and female farmers based on agronomic characteristics, and cooking and eating qualities of rice varieties tested on-farm. Feedback identified the most preferred rice varieties and their seed multiplication and distribution in the community.

Female farmers such as Daw Aye Nyein not only became active cooperators, but also successful

seed growers. "I was able to pay off my loans because of the profit I earned," she says.

The MYRice project raised awareness among the project partners of the benefits of research and development on gender equality for agricultural smallholder communities.

MYRice is supporting two PhD students and Master of Science thesis grants for 17 DOA and DAR staff. The DOA partners who were mentored on farmer participatory research have gained project implementation skills and are now taking the lead during farmer meetings and field days.

SUSTAINABLE ADOPTION PATHWAYS

The MYRice team is ramping up plans to further scale-out best management practices and high-yielding varieties of rice and pulses. The project is also collaborating with other ACIAR initiatives in the country, such as MYPulse (legumes), MYFish (fisheries), and MYLife (livelihoods).

"The support for, and appreciation of, the project's benefits to smallholder farmers from the Government of Myanmar has strengthened due to the impressive results of field demonstrations and the process of participatory engagement with farmer groups," says Dr Grant Singleton, IRRI scientist and MYRice program manager.

"We are very pleased with the results of our collaborative research in Daik Oo. It is now time to expand the project in 2017," says U Hla Myint, DOA regional director of Bago. He and his counterpart

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PHOTO: ACIAR

The MYRice project team captures consent of a farmer using the signature function in CommCare.

in the Ayeyarwady Region, U Tun Aung Kyaw, met with their staff to identify outreach priorities for the next year.

During the MYRice project meeting in October 2016, U Hla Myint said: “In 2017, we will expand MYRice to 63 new villages from four districts. This will require a large investment of resources—my extension staff’s time and operating funds. The regional government is willing to provide the main investment in this outreach.”

A similar commitment was made by U Tun Aung Kyaw. Initiatives from the MYRice project are a great contribution to Myanmar’s goal to regain its position as a significant contributor to regional and global food security through rice. Strong collaboration and engagement among MOALI, IRRI, non-government organisations and private-sector partners are also highly important.

Boosting competitiveness in the domestic and international rice markets is critical. Methods learned in the MYRice project and access to new rice varieties will assist and will help pave the way towards the sustainable development of the Myanmar agricultural sector. ■

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MAD IN MYANMAR

The age-old method of collecting paper-based data in the field is all too familiar to researchers around the world. There are many inefficiencies with paper-based methods, including the time it takes to get the data into a usable form and the increased chances of introducing errors during transcription from paper to digital format. One of the greatest deficiencies in a paper survey system is the inability to provide real-time feedback to the farmers who give up their time to complete the questionnaires.

Since June 2015, ACIAR has funded the mobile acquired data (MAD) evaluation, which seeks to understand how digital data-collection apps affect ACIAR projects.

The first piece of MAD research, led by the R&D support company AgImpact, was a desktop review of the vast array of ‘off-the-shelf’ mobile data-collection apps. The most suitable apps were short-listed and trialled in a field pilot in Indonesia. The pilot not only identified the most suitable app for ACIAR-type projects (CommCare) but also demonstrated that apps have the ability to improve the relationships between stakeholders in the data-collection process. The use of apps had a positive influence on how farmers, field researchers and project leaders shared data. The ability to share research findings with farmers in near-real time was a very positive experience for farmers.

Following the field pilot, the MAD research team partnered with nine ACIAR projects to better understand the issues of adopting apps at scale. AgImpact provided CommCare adoption support and, in return for the support provided, the projects agreed to share information on the time and resources necessary to adopt apps and whether they believe the adoption of apps adds value to research projects. These findings will be important for future ACIAR projects looking to adopt apps.

The MYRice project in Myanmar is participating in the MAD series. The project is looking at sustainable methods to diversify and intensify rice production in the Ayeyarwady Delta. The MyRice team, led by the International Rice Research Institute, has adopted the open-source mobile application CommCare to monitor changes in farm productivity and share findings with farmers in near-real time. Some of the app features the MyRice team are using include GPS capture, auto-calculations and the freehand drawing function. ■

MORE INFORMATION: Information and videos on the ACIAR MAD evaluation series can be found at www.agimpact.org/resources or by contacting project leader Stuart Higgins, AgImpact, stuart@agimpact.org