



Myanmar and ICRISAT

Improving lives with better agricultural practices



Officials of DAR and MAS with the Director General of ICRISAT, Dr William Dar, during their visit to ICRISAT-Patancheru in February 2008.

- Improved soil and water conservation methodologies enabled double cropping.

Capacity Building

To develop human resources in Myanmar, ICRISAT has trained 121 researchers (including 62 women) in the past three decades (1981-2010). Most participants underwent hands-on training for 6 months on the improvement of legume crops and sorghum. Three graduate students also carried out thesis research (one Master's program and two PhDs) under the guidance of ICRISAT scientists. On-the-job group and individual training was given to scientists and technicians, and farmers' training programs were also conducted. ICRISAT also supported Myanmar's research infrastructure by providing equipment such as pulverizers and autoclaves to DAR, Myanmar. Additionally, two in-country training courses were conducted in Myanmar by ICRISAT scientists on grain legume improvement. Five Myanmar researchers spent three months at Suranaree University, Thailand for advanced training in rhizobium research and two researchers

spent three years there for their PhDs through the ICRISAT/ACIAR collaborative program (2007-10).

The rhizobium research facility at the DAR-Microbial Production Unit (MPU) was further strengthened through human resource development and by the addition of equipment. Four efficient chickpea rhizobial strains: CC2018, IC 2058, IC 76 and IC 2049 from ICRISAT; and four mother cultures of Australian inoculant strains: CBCB 1024 for pigeonpea, CB 1809 for soybean, CC 1192 for chickpea and NC 92 for groundnut, were added to the Myanmar collections through collaborative research.

Conclusion

Over the last few decades, ICRISAT has made major contributions towards reducing poverty, hunger, and environmental degradation in the semi-arid tropics, but there is still much to be done. Together with partners such as Myanmar, we plan to realize our goal to protect the environment and improve livelihoods of the poor and the marginalized farmers in these regions of the world.



The farmers of Kyauksae township have adopted chickpea-sunflower intercropping for eco-friendly management of pod borers.

Introduction

The goal of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is to harness the power of science and technology for development, food security, poverty alleviation and environmental protection, targeted at poor rural families in the semi-arid tropics of the world. ICRISAT's Inclusive Market-Oriented Development (IMOD) approach focuses on helping the farming poor in the drylands to move from subsistence to market-oriented agriculture, thus improving their incomes, health and livelihoods.

But ICRISAT cannot do this without the support and cooperation of several partners. One such partner is Myanmar. ICRISAT and Agricultural Cooperation, Myanmar signed a Memorandum of Understanding in 1986. The relationship, which began earlier, was strengthened by the participation of Myanmar scientists in the Cereals and Legumes Asia Network (CLAN) led by ICRISAT. This collaboration has been in the areas of crop improvement, natural resource

management, and in building the national research capacity of Myanmar through training of agricultural scientists and technicians.

Crop Improvement

ICRISAT has a mandate for genetic improvement of two cereals (sorghum and pearl millet) and three legumes (chickpea, pigeonpea and groundnut) that are specifically adapted to hot drylands. The annual rainfall in Myanmar in the central dry zone (CDZ) is between 700-900 mm and temperatures range from 14-34°C making the climatic conditions similar to that of southern India where ICRISAT is headquartered. The Myanmar and ICRISAT partnership has led to significant advances in most of these crops. The greatest impact of crop improvement research took place through ICRISAT's partnership with scientists of Myanmar's Department of Agricultural Research (DAR) and Myanmar Agriculture Service (MAS) under the Ministry of Agriculture and Irrigation.

About ICRISAT



The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a non-profit, non-political organization that conducts agricultural research for development in Asia and sub-Saharan Africa with a wide array of partners throughout the world. Covering 6.5 million square kilometers of land in 55 countries, the semi-arid tropics have over 2 billion people, and 644 million of these are the poorest of the poor. ICRISAT and its partners help empower these poor people to overcome poverty, hunger, malnutrition and a degraded environment through better and more resilient agriculture.

ICRISAT is headquartered in Hyderabad, Andhra Pradesh, India, with two regional hubs and four country offices in sub-Saharan Africa. It belongs to the Consortium of Centers supported by the Consultative Group on International Agricultural Research (CGIAR).

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ICRISAT-Myanmar pigeonpea scientists discussing the new hybrid.



Groundnut farmers of Myanmar selecting preferred varieties through Participatory Varietal Selection.



A farmer with his crop of hybrid pigeonpea that was developed through ICRISAT-DAR collaboration.



Trainees from Myanmar attending a session on pest monitoring looking at a pheromone trap.

Chickpea: During 2008-09, Myanmar produced 404,000 tons of chickpea from an area of 299,000 ha. The present average yield of chickpea in Myanmar (1.35 t ha^{-1}) is about 50% higher than the global average yield. ICRISAT has so far supplied 4865 samples of breeding material to Myanmar, of which six varieties have been released – Shwe Kyehmon (a selection from ICCX 730089) in 1986, Yezin 3 (ICCV 2) and Yezin 4 (ICCV 88202) in 2000, Yezin 5 (ICCV 3) and Yezin 6 (ICCV 92944) in 2004, and Yezin 8 (ICCV 97314) in 2009. Yezin 3 is the most popular variety in Myanmar.

The crop is cultivated in the CDZ of the country in Sagaing, Mandalay and Magway divisions. Yezin-3 covers over 60% of the area under chickpea in Sagaing (total area of 150,000 ha). Farmers in six villages in Kyauksae township (Mandalay division) widely adopted Yezin-3 in rice fallow and intercropped with sunflower as the trap crop. This technology not only reduced 50% of insecticide use against pod borer but also improved the environment.

Pigeonpea is the major export grain legume crop of Myanmar. Traditionally, long-duration (>200 days) pigeonpea varieties are cultivated under a wide range of cropping systems. At present the crop is being cultivated on 612,000 ha in Sagaing, Mandalay, and Magway divisions of the central dry zone, and it accounts for about 16% of the total area under legumes. Annually, over 777,000 t of pigeonpea is produced with an average yield of 1.2 ton ha^{-1} , the highest among all the pigeonpea growing countries.

Hybrid Pigeonpea in Myanmar

Fifteen hybrid lines supplied by ICRISAT were screened at Zaloke, Myingyan, and Sebein

research stations during 2008-09, of which seven were promising. The first hybrid seed (A x R) production of ICPH 2671 was initiated at Tatfone and Pankone research farms and produced 1069 kg ha^{-1} and 1169 kg ha^{-1} of hybrid seed, respectively. These seeds were used in mother and baby trials during the 2009-10 cropping season. The hybrid ICPH 2671 was found to be 53% superior in yield over the control in six townships of Sagaing and Mandalay divisions. Though this hybrid has produced better yield, its purple color was not liked by farmers. Further screening of hybrids resulted in the identification of two promising hybrids – ICPH 3461 and ICPH 2740 – with good yield and with the preferred seed color. During 2009-10 seed production of these selected hybrids was undertaken using a row ratio of 3 female:1 male, which produced 1596 kg ha^{-1} of ICPH 2740 and 2931 kg ha^{-1} of ICPH 3461. These hybrid seeds were used in the on-farm trials in Sagaing and Mandalay divisions during the 2010-11 season. Thus, hybrid seed production was established successfully in the country.

Groundnut: Myanmar produces 1,305,000 tons of groundnut annually with an average yield of 1.55 ton ha^{-1} from an area of 844,000 ha. Mandalay, Magway and Sagaing are the major groundnut producing divisions in the country. Five ICRISAT-bred varieties (ICGV-87160, -93382, -94301, -94361 and -91167) and two varieties that have one parent from ICRISAT, were released in Myanmar between the years 1991 to 2010 (as Sinpadetha 5, 7, 8, 9, 10, 11 and 12). The released varieties bear improved traits such as resistance to foliar diseases, early maturity, high-yield and drought tolerance.

Sinpadetha 5 recorded 20% yield advantage over Japanese Small. Sinpadetha 7, an early

maturing Spanish variety that matures in 100 days, was released in Myanmar in 2000 for general cultivation. Varietal screening at different locations brought out significant improvement in identifying resistance sources for foliar diseases with good yield potential.

Sorghum: ICRISAT has supplied more than 2500 breeding lines and varieties to Myanmar from 1980 to 2000. These were tested at Yezin, Myingyan, and Ma Hlaing. From this material, nine varieties – Shwe ni 1 (1980), Shwe ni 2 (1981), Yezin 1 (Schwe phyu 1, 1984), Yezin 2 (Schwe phyu 2, 1984), Yezin 3 (Schwe phyu 3, 1984), Yezin 4 (Schwe phyu 4, 1984), Yezin 5 (1996), Yezin 6 (1996) and Yezin 7 (1996) were released during 1980-1996. By the mid-1990s, all the sorghum area under improved cultivars was sown to ICRISAT-bred varieties in Myanmar. The productivity has been raised from 0.66 t ha^{-1} in 1995-96 to 0.94 t ha^{-1} in 2008-09, which can be partly attributed to the efforts of the joint Myanmar-ICRISAT sorghum program.

Pearl millet: is a relatively minor crop in Myanmar, grown on about 20,000 ha. The drought and heat tolerant nature of this crop, however, may find niches in Myanmar for more rational water use and sustainable crop production. During 1980-2000, more than 230 samples of pearl millet breeding lines and populations have been supplied for field evaluations in Myanmar. These included some of the most widely cultivated varieties in India, such as WC-C75, ICTP 8203, and Raj 171.

Farmer Trials

Through farmer participatory approaches in the past three years (2007-10), 88 mother and 541 baby trials were conducted covering three legume crops in the CDZ of Myanmar from which Sin 7,

Sin 8 in groundnut; Kyawechan shwedingar, ICPB 2043 and ICPL 96061 in pigeonpea; and Yezin 6, Yezin 3 and Yezin 4 in chickpea were selected and multiplied by farmers.

During this project period, ICRISAT supplied 215 advanced breeding lines (102 groundnut, 50 chickpea, and 63 pigeonpea) to DAR to further strengthen the ongoing breeding programs in these three crops. The concept of village-level seed banks was initiated during 2008. These farmers started seed production by 2009 at three villages with two groundnut (Sin 7 and 8), two pigeonpea (Monywa shwedingar and ICPL 96061), and two chickpea (ICCV 97314 and Yezin 4) varieties covering 14 hectares.

Natural Resource Management

Collaborative research was initiated in 1995 at the Dryland Research Center, Nyaung Oo (Alfisols) and the Agricultural Research Center, Zaloke (Vertisols) in Myanmar. The dry zone region of central Myanmar ($677,000 \text{ km}^2$; population 11 m) is characterized by low and erratic rainfall, land degradation and less diversified agricultural production systems with low inputs. The salient outcomes of the collaborative research efforts are:

- ▶ Enhanced crop productivity (pigeonpea, soybean, groundnut, and mungbean), and income increased through efficient natural resource usage. Early-maturing (70-76 days) and high-yielding ($1.6\text{-}2.2 \text{ t ha}^{-1}$) sesame and high-yielding pod rot resistant groundnut cultivars were introduced. Improved production practices resulted in higher grain yields in sorghum in the chronic drought prone areas of Nyaung Oo.