



# Breeding for better rice varieties | GSR project updates in Asia and East and Southern Africa

## Green Super Rice (GSR)

*Rice cultivars that can produce high and stable yields with less inputs (water, fertilizers, pesticides). Thus, GSR varieties are climate-smart and can help farmers protect the environment—and themselves.*

Climate change poses a big challenge to smallholder farmers who already have limited land and financial resources. Unpredictable weather patterns make them even more vulnerable to crop losses. Giving farmers access to GSR varieties that can withstand multiple stresses from climate change can help mitigate its impact on their livelihood.

GSR varieties are a mix of more than 500 promising rice varieties and hybrids that are tolerant of different abiotic stresses, such as drought, floods, and salinity. They have been proven to perform well even with less inputs, such as fertilizers and pesticides, that are costly and, sometimes, harmful to people and the environment.

## Project objectives

Building on the successful development, testing, and release of GSR varieties in Phases 1 and 2, the GSR project, which was funded by the Chinese government and the Bill & Melinda Gates Foundation, has the following objectives:

- To develop the second generation of GSR inbred and hybrid rice varieties for African and Asian countries through a shuttle breeding approach, with national partners that leverage China's capacity for molecular marker-assisted breeding;
- To resequence 3,000 rice accessions from the core collection of rice germplasm and parental lines in the GSR breeding programs and develop a genotyping platform for rice molecular breeding programs worldwide;
- To test and release newly developed and promising GSR varieties in target African and Asian countries;
- To develop highly efficient systems for seed production and dissemination of developed GSR rice varieties in target African and Asian countries;
- To develop appropriate crop management technologies with NARES for newly developed GSR varieties in different target environments;
- To build capacity in both GSR breeding technology and seed production for target African and Asian countries;
- To assess project impact; and
- To manage the GSR project both effectively and efficiently.



## Project updates

- Thirty-three GSR inbred varieties have been released and adopted by farmers in Asia [Bangladesh (2), Sri Lanka (1), Pakistan (3), Indonesia (2), Lao PDR (5), Cambodia (2), Vietnam (2), and the Philippines (11)] and East and Southern Africa [Rwanda (1), Uganda (1), and Mozambique (3)].
- Twenty-two GSR hybrid varieties released and adopted by farmers in Asia [Pakistan (9), Bangladesh (3), Indonesia (4), Vietnam (1), Cambodia (2)] and East and Southern Africa [Tanzania (3)].
- A total of 1 million ha is expected to be covered by the end of Phase 2, out of which nearly 0.7 million ha of rice area is being grown to GSR varieties in the Philippines alone.
- Vietnam released Gia Loc 101 (08Fan10) and Gia Loc 102 (Zao Xian 788), the planting of which has been expanded to 25,000 ha around An Giang Province.
- In India, 13 GSR varieties are nominated in national coordinated trials and several of these promising GSR materials will be released soon.
- The Bangladesh Rice Research Institute and the Bangladesh Rehabilitation Assistance Committee distributed mini-kits containing 2 kg of GSR seeds (BRRIdhan69 and Hua565) to more than 260 farmers. High-yielding BINAdhan17GSR was released for the aman (wet) season and area planted to it is likely to expand rapidly.



- In Bangladesh, a weed-competitive GSR variety called BRRIdhan69 has just been released. The variety can produce up to 8.2 t of rice/ha and can thrive over weeds in the early nursery stage. It is also suitable for India's northeastern regions during the boro (dry) season.
- The 3,010 rice accessions of the rice germplasm core collection from 89 countries have been sequenced with an average sequencing depth of 15x, with the data posted in two major public cloud computing platforms of Amazon and Aliyun, freely available to the scientific community worldwide.
- A versatile 55,000 SNP Affymatrix chip is being developed from the 30 million+ SNPs discovered from the 3K rice genomes, which will be available for the rice community at nominal cost.

## Partners

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## International Rice Research Institute (IRRI)

The International Rice Research Institute (IRRI) is the world's premier research organization dedicated to reducing poverty and hunger through rice science; improving the health and welfare of rice farmers and consumers; and protecting the rice-growing environment for future generations. IRRI is an independent, nonprofit research and educational institute founded in 1960 by the Ford and Rockefeller foundations, with support from the Philippine government. The institute, headquartered in Los Baños, Philippines, has offices in 15 rice-growing countries in Asia and Africa, and about 1,180 staff members of 41 nationalities.

Working with in-country partners, IRRI develops advanced rice varieties that yield more grain and better withstand pests and disease as well as flooding, drought, and other destructive effects of climate change. More than half of the rice area in Asia is planted to IRRI-bred varieties or their progenies. The institute develops new and improved methods and technologies that enable farmers to manage their farms profitably and sustainably, and recommends rice varieties and agricultural practices suitable to particular farm conditions as well as consumer preferences. IRRI assists national agricultural research and extension systems in formulating and implementing country rice sector strategies.