Millions of farmers now have access to climate-smart rice. These new and improved rice varieties, developed by the International Rice Research Institute (IRRI) and its partners, can withstand flooding, drought, and salinity in soil and water.

IRRI is also developing rice that can thrive despite pests, extreme heat or cold, and problematic soils. These, as well, are on their way to farmers' fields.

Rice science for a better world

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 some 40 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.

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IRRI

Climate-smart rice

Drought

Drought is the most widespread and damaging of all environmental stresses, affecting 23 million hectares of rainfed rice in South and Southeast Asia alone.

IRRI has developed and released drought-tolerant varieties that are now being planted by farmers in several countries. These include Sahbhagi dhan in India, Sahod Ulan in the Philippines, and the Sukkha dhan varieties in Nepal. Field trials suggest that the average yield advantage of drought-tolerant varieties over drought-sensitive ones is 0.8–1.2 tons per hectare under drought conditions.

Flooding

Rice plants normally die within a week in submergence. Farmers in countries with rice areas prone to flooding—such as the Philippines, Bangladesh, and India—collectively lose millions of tons of rice per year because of floods.

IRRI discovered *SUB1*, the gene for flood tolerance, and incorporated this gene into several popular rice varieties. Field trials have shown that rice varieties with *SUB1* have a yield advantage of 1–3 tons per hectare following flooding of 10–15 days.

Flood-tolerant varieties have been released and are now being planted across Asia. These include IR64-Sub1 (Submarino 1) in the Philippines; Swarna-Sub1 released as improved Swarna in India, BRRI dhan51 in Bangladesh, and INPARA 3 in Indonesia; and Samba Mahsuri-Sub1 released as Samba-Sub1 in India and BINA dhan12 in Bangladesh.

Salinity

Millions of hectares of land in Asia and Africa that were once suitable for rice production are currently unproductive because of high or increasing salt content in soil and water. Rising sea levels and decreased flow in rivers bring saltwater further inland, contributing to soil salinity. Rice productivity in salt-affected areas is very low, at less than 1.5 tons per hectare.

Several salt-tolerant varieties have been developed and released in Asia. In the Philippines, field trials of Salinas varieties suggest a yield advantage of at least 2 tons per hectare compared with non-tolerant varieties in salt-affected areas. A gene for salinity tolerance, called *Saltol*, is also being incorporated into popular rice varieties in countries across Asia. CSR 43 in India and BINA dhan8 and 10 in Bangladesh are popular salt-tolerant varieties.