



Research Program on Rice
Global Rice Science Partnership

Annual Report 2011

Rice in ice



The big freeze. Wrapped in arctic ice on the outside, the Svalbard Global Seed Vault holds a treasure trove of seeds more valuable than gold on the inside; including rice seeds from IRRI (inset).

Tucked away in a giant refrigerated vault, deep inside an ice-covered mountain in Svalbard, Norway, is the foundation of humans' food—seeds. Neatly packed and frozen to withstand hundreds of years of storage, and just about any conceivable destructive force known to humans, are duplicates of seeds of different crops from all over the world, including more than a hundred thousand seeds of different rice types from Asia and Africa.

Asia and Africa are home to the two commercially important species of rice: *Oryza sativa* and *Orzya glaberrima*, respectively. From these, tens of thousands of cultivated varieties of rice have been bred. More than 20 other species of rice, including from Australia and the Americas, also hold a trea-

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sure trove of untapped genetic diversity that could produce thousands more new rice varieties.

IRRI and AfricaRice realize that keeping the food supply coming means protecting a precious resource: rice's genetic diversity. Somewhere in the vast universe of rice diversity are genes or traits that could help overcome the challenge of producing more food on less land, with less water, and fewer inputs.

Protect diversity, protect food security

However, entire plant and animal species are facing extinction every day. This loss of genetic diversity, or genetic erosion, makes the food supply more vulnerable to outbreaks of pests and diseases. During the last century, 75 percent of crop genetic diversity has been lost according to the FAO.¹ For example, more than 1,500 local rice varieties in Indonesia have become extinct.² Further genetic erosion is what the Svalbard Global Seed Vault seeks to avert.

¹Food and Agriculture Organization of the United Nations. "Biodiversity for Food and Agriculture: Crop Genetic Resources." FAO. February 1998.

²World Resources Institute, IUCN-The World Conservation Union, United Nations Environment Programme (UNEP). 1992. Losses of Biodiversity and Their Causes. In: Global Biodiversity Strategy: Guidelines for action to save, study and use Earth's biotic wealth sustainably and equitably. World Resources Institute.



Global Crop Diversity Trust

"I'm not talking about losing [agricultural] diversity in the same way that you lose your car keys," says Dr. Cary Fowler, director of the Global Crop Diversity Trust (GCDT).³ "I'm talking about losing it in the same way that we lost the dinosaurs: actually losing it, never to be seen again."

³Fowler C. 2009, August. Cary Fowler: One seed at a time, protecting the future of food. [Video file]. Retrieved from www.ted.com/talks/cary_fowler_one_seed_at_a_time_protecting_the_future_of_food.html.

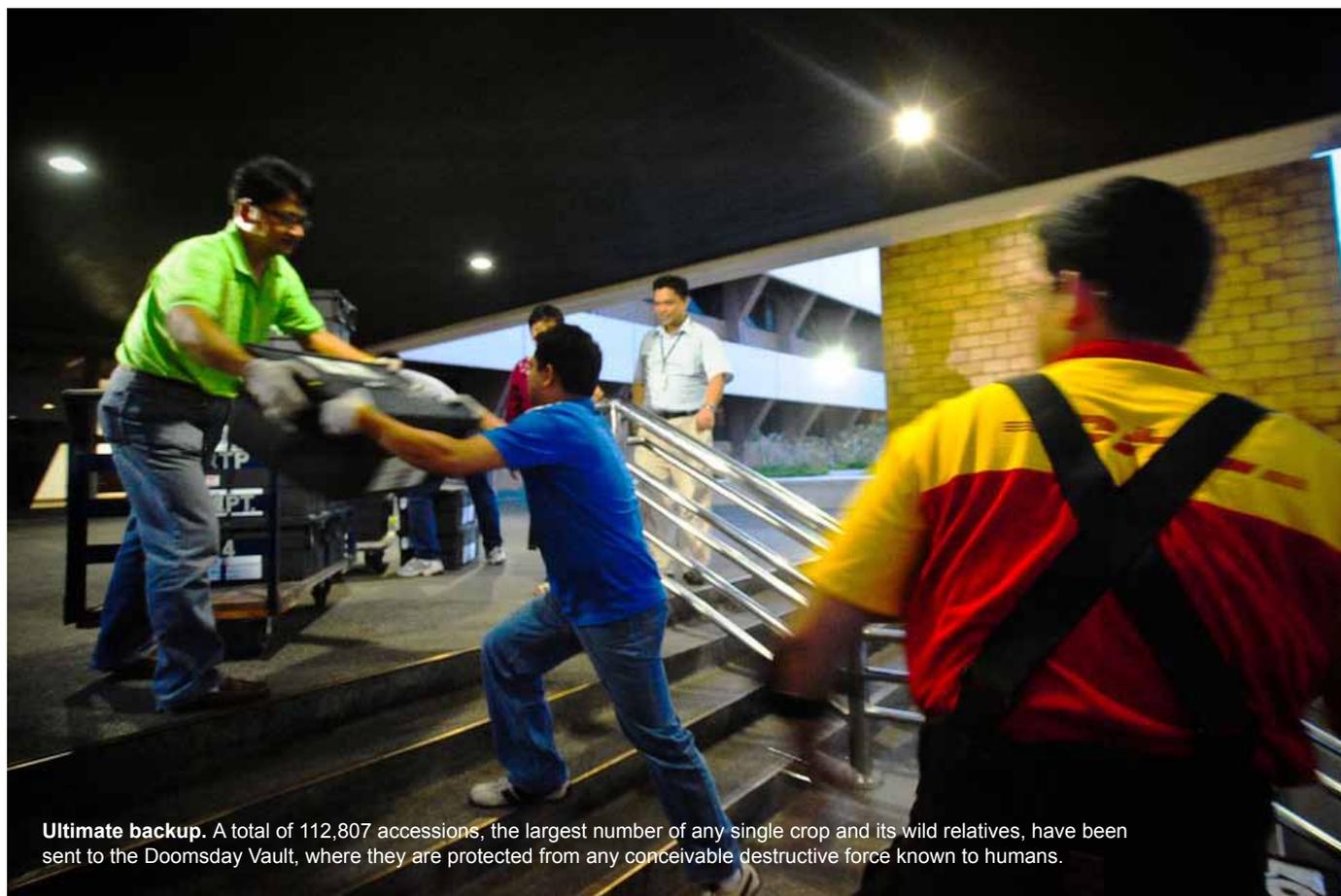
Frozen assets

IRRI and AfricaRice are supporting a global effort to protect the world's crops from catastrophe and conserve them for future generations by contributing rice seeds to the frozen cellar located just over a thousand kilometers away from the North Pole.

"We conserve 20,000 accessions made up of 10 species of *Oryza* in our genebank. Africa has a wealth of genetic resources that must

be conserved," says Dr. Kayode Sanni, head of AfricaRice's Genetic Resources Unit. In recent years, AfricaRice sent duplicates of its collection to the Vault.

For its part, IRRI has more than 113,000 accessions of rice in the International Rice Genebank (IRG). "The IRRI-IRG is earthquake-proof, typhoon-proof, and flood-proof," explains Ruairaidh Sackville Hamilton, evolutionary biologist and head



Ultimate backup. A total of 112,807 accessions, the largest number of any single crop and its wild relatives, have been sent to the Doomsday Vault, where they are protected from any conceivable destructive force known to humans.

of IRRI's T.T. Chang Genetic Resources Center. "We also have an independent backup power supply to protect against power cuts, and we keep a supply of spares in stock to deal rapidly with equipment failure."

Since 1980, IRRI has also been keeping another backup of the IRRI-IRG collection at Fort Collins, Colorado, in the United States.

IRRI deposited 70,180 accessions for the inauguration of the Vault in 2008. After sending an additional batch of rice seeds to Svalbard IRRI now has 112,807 accessions kept in the Vault, the largest number of any single crop and its wild relatives.

"The collection kept in Svalbard is our ultimate backup," Dr. Sackville Hamilton said. "We cannot think of

a more secure system to safeguard this vital resource."

A freezer for human survival

The forbidding frozen mountains, the isolation, and the polar bears that provide extra layers of security are just some of the reasons why the world's agricultural heritage found itself a fortress in Svalbard.



Rice seed being prepared at IRRI for depositing at Svalbard. See video on YouTube (<http://youtu.be/icjptLjIKx8>).

The technical conditions of the site are virtually perfect. The location inside the mountain increases security and unparalleled insulation properties, according to the Global Crop Diversity Trust. The area is geologically stable, humidity is low, and it has no measurable radiation inside the mountain. The Vault is 130 meters above sea level, far above the point of any projected sea-level rise.

Food for the next generation

Backing up and protecting the world's diverse agricultural heritage gives this generation, and the next, some options to get around food security roadblocks. As the human population grows, and while the resources that are needed to meet the corresponding demand for nourishment become scarcer, these seeds could hold the key to food security in the future. 🍌

Chris Quintana/IRRI (2)