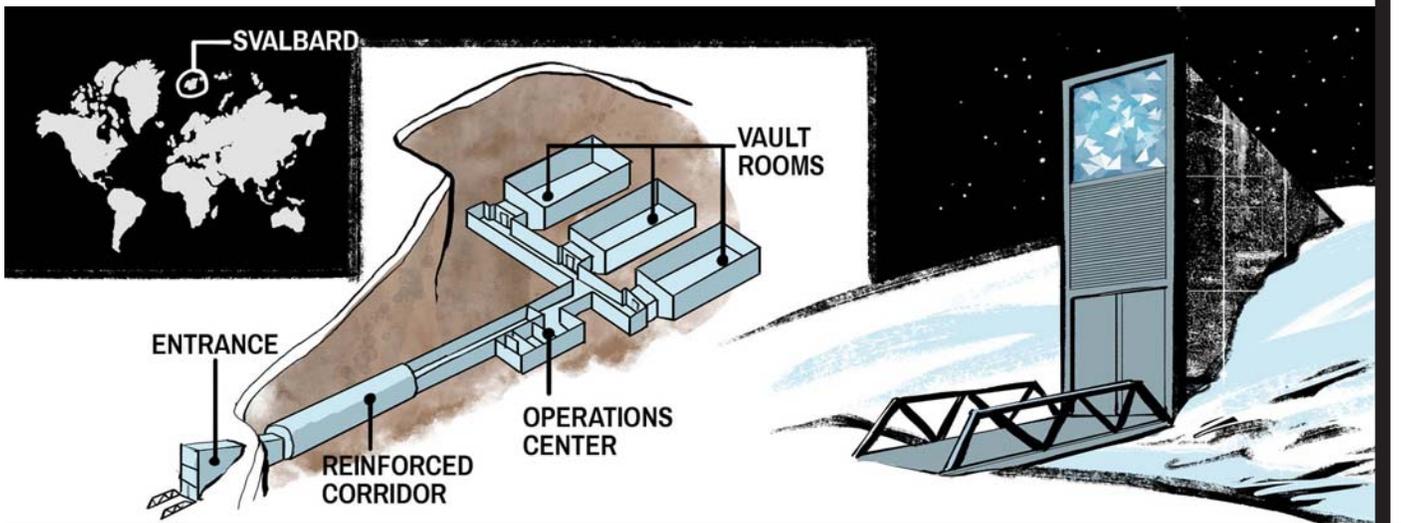




THE SVALBARD GLOBAL SEED VAULT

— A NOAH'S ARK FOR SEEDS



Did you know that more than 7000 plant **species** have been eaten by humans over the years? That's a huge assortment. It's even greater when you consider that within each species there are many different **varieties**. Take rice, for example. There are more than 100,000 varieties of this species alone!

Now think about the plant foods you eat, from bananas to rice, potatoes, and apples. How many of all the varieties that exist do you eat? Probably not very many. That's because modern agriculture relies on fewer than 150 species of plants, and just a small selection of the varieties within each species.

Scientists warn that this reliance on a small number of

crops means that many species and varieties of plant foods are becoming extinct. That means that the world is losing agricultural **diversity**. And that's a problem, because without plant diversity, we could one day face starvation.

DID YOU KNOW?

In 1903, U.S. farmers planted 578 varieties of beans. Today, just 32 varieties remain in gene banks.

WHY SAVE THEM ALL?

Why do we need 100,000 varieties of rice?

The fact is that we don't know what will be the best variety in the future. The strains that we grow today may not thrive in the years to come. They may

be eaten by insects, harmed by new diseases, or affected by climate change.

But other varieties of seeds may contain unique disease-resistant **genes**, or ones that are more adaptable to changing climates. If we ever need to use these sometimes-hidden traits, we must ensure that those seeds survive.

That's why many countries have gene banks to collect and store seed samples. There are some 1400 such collections around the world. They are a resource for researchers and plant breeders working on developing new crops to feed future generations.

COLLECTIONS AT RISK

Recently, however, some national gene banks have been

DEFINITIONS

DIVERSITY: variety

GENES: patterns of chemicals within cells that carry information about the qualities passed to a living thing from its parents

SPECIES: a plant or animal group whose members all have similar general features and are able to produce young plants or animals together

VARIETIES: subspecies of plants or animals



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destroyed. In some cases, war or political troubles have been to blame. That has been the case in Iraq and Afghanistan. Other seeds have been lost due to mismanagement, accidents, or equipment failures.

The solution to this problem? The Svalbard Global Seed Vault.

The Norwegian government built this vault in 2008 at a cost of \$9 million (US). It is a **repository** of seeds from all over the world. It can withstand global warming, earthquakes, and even nuclear attacks. It is meant to be a back-up system for world agriculture.

Nations send copies of their seed collections to this vault. That way, if they lose their original collections, they have 'spare' copies. Each country still owns the seeds and no one can access anybody else's seeds. Storage is free.

Recently, the vault has been useful to scientists in Syria. A long-time conflict there has prevented Syrian scientists from accessing seeds from their country's bank. So in 2015 and 2017, they took some seeds from the Svalbard vault. They grew new plants to study, and to replace the seeds they took.

STEP INSIDE

Svalbard, where the vault is located, is a remote, Arctic **archipelago** between mainland Norway and the North Pole. But there's an airport in Longyearbyen, a town on the same island as the vault.

Only the entrance to the vault is visible. Inside the steel doors, a five-metre-wide tunnel leads 120 metres into a mountain to three underground chambers. Each has shelves stacked high with plastic totes full of sealed envelopes of seed samples. The chambers can store 4.5 million samples, with 500 seeds in each.

The vault is highly secure. The chambers are kept at minus 18 degrees Celsius. The low temperature and limited access to oxygen delays the aging of the seeds. Even if the power fails, **permafrost** surrounding the facility ensures that the temperature inside never rises above minus 3.5 degrees Celsius. And at 130 metres above sea level, the vault is safe from rising sea levels.

"The Seed Vault will be able to repel the worst that climate change can throw at it," says Marie Haga, head of the Crop Trust, a nonprofit group working to preserve crop diversity.

Still, global warming is affecting Svalbard. In 2016 some permafrost melted, and water leaked into the entrance. It never threatened the seeds, but Norway said it would spend \$13 million (US) on upgrades to avoid future leaks and further strengthen the vault.

ONGOING UPDATES

The Seed Vault itself should last forever. But after tens, hundreds, or even thousands of years, some seeds won't sprout. Before this happens, the stored samples will be planted. Fresh seed will then be harvested for storage.

New seed varieties arrive all the time. Most recently? The Bambara groundnut, a new drought-tolerant crop for Africa. The black-eyed pea, a major protein source in Africa and South Asia also arrived. So did the Estonian onion potato.

GIFT TO THE WORLD

This year, the Seed Vault is ten years old. It now holds a million samples that may help feed everyone in the future.

"If crops don't adapt to climate change... neither will we," says crop scientist Cary Fowler. "By conserving [these seeds] we may, quite simply, be saving ourselves." ★

DEFINITIONS

ARCHIPELAGO: a group of islands

PERMAFROST: ground that stays permanently frozen

REPOSITORY: a place where large quantities of things are stored or kept safe



ON THE LINES

Answer the following in complete sentences:

1. How many species of plants have been used in human diets over the years?

2. How many species of plants does modern agriculture rely on?

3. Explain why relying on a small number of crops may be a bad idea.

4. Why do scientists say it is important to maintain agricultural crop diversity?

5. Where is the **Svalbard Global Seed Vault** located?

6. How many seed samples are stored in the vault? Who built the vault and when?

7. Describe the safety features of this seed vault.

8. Explain how this seed vault works.



BETWEEN THE LINES

Making an inference: An *inference* is a conclusion drawn from evidence. A plausible inference is supported by evidence in the article and is consistent with known facts outside of the article.

What inferences can you draw from the fact that the Norwegian government spent \$9 million (US) to build the Svalbard Global Seed Vault for the benefit of all countries?

JUST TALK ABOUT IT

1. Read *The Lorax* by Dr. Seuss, or view the original version of the video based on the book.
 - a) As you see it, what is the theme, or message, of this story?
 - b) In what ways might this story relate to the topic of this article? Give reasons to explain your response.
2. Respond to this article. What connections can you make to this story? What feelings does the article evoke? For what reasons are you in favour of the Svalbard Global Seed Vault? For what reasons are you opposed? Explain.

ONLINE

Note: The links below are listed at www.lesplan.com/en/links for easy access.

1. View Longyearbyen and Svalbard webcam at <https://www.webcams.travel/webcam/1448542688-longyearbyen-svalbard>
2. Find out more about the life cycle of a seed plant at <https://www.pbslearningmedia.org/resource/lspso7.sci.life.stru.seedplant/life-cycle-of-a-seed-plant/#.WvILFcgh31I>
3. Read more about Canada's seed banks at http://pgrc3.agr.gc.ca/about-propos_e.html
4. Visit the Crop Trust website to take a virtual tour of the Svalbard Global Seed Vault at <https://www.croptrust.org/> ★