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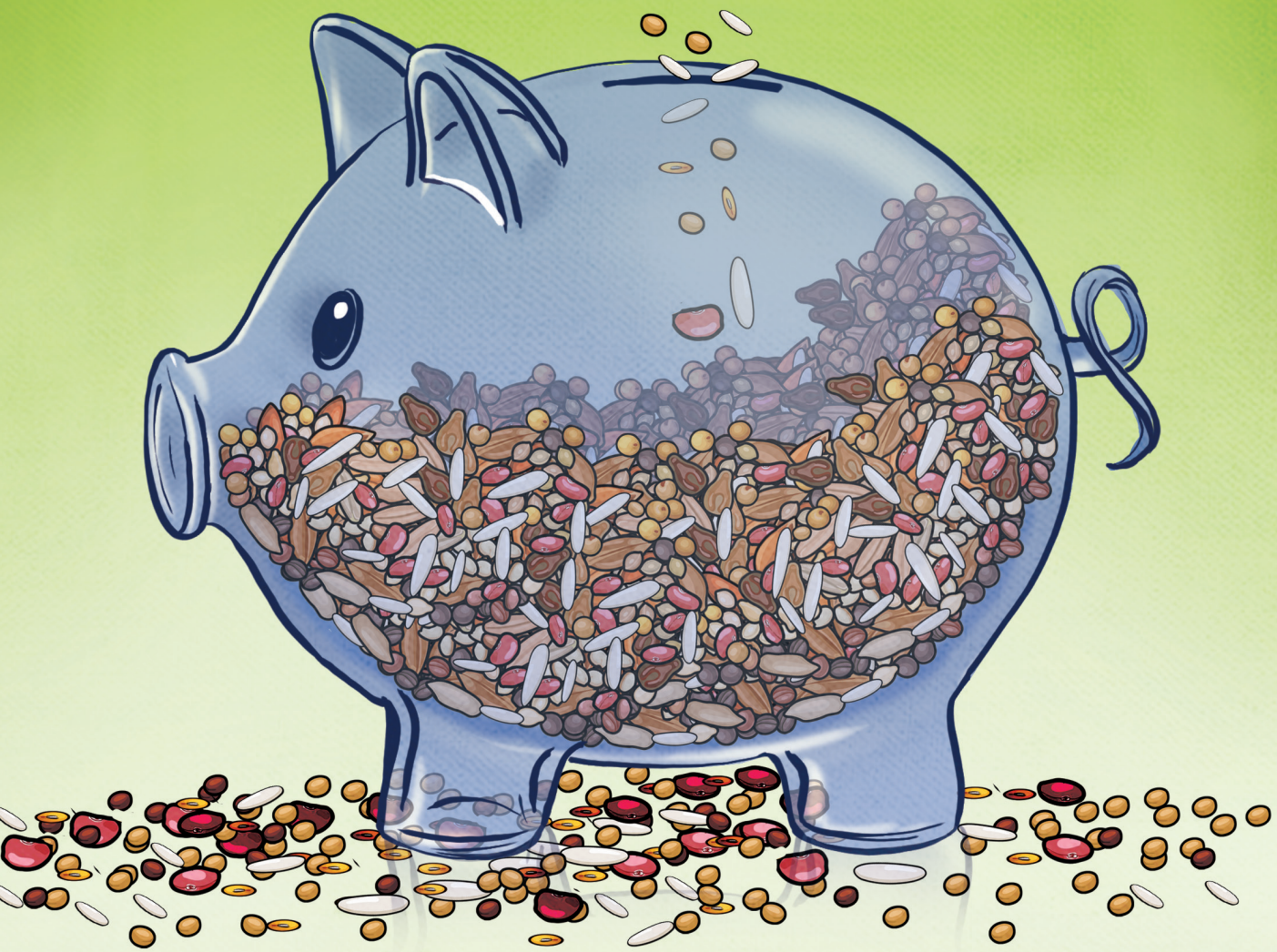
A DOWN TO EARTH SUPPLEMENT FOR THE YOUNG AND CURIOUS

A Piggy Bank of Seeds

Babbi discovers how community seed banks, by saving seeds today, can help feed the future and fight climate change.



Cover Story

The Power of a Seed

Community seed banks help protect indigenous varieties of food crops which are often better at surviving climate change.

Summer holidays took Babbi to her grandmother's house in the rural regions of Uttar Pradesh. One afternoon, when the heat outside forced them indoors, Grandma opened her metal trunk and spread out the knick-knacks so that Babbi could choose one for herself. This was a ritual they followed. Every time Babbi came to visit Grandma she would get a gift from her grandmother's trunk. As an added bonus, Grandma always had a story to share about the gift.

Dr Vibha Varshney

As Babbi rifled through the spread of knick-knacks in front of her, a bunch of glass bottles caught her eye. They had all sorts of seeds in them. "What are these?" she asked, picking one up to examine. Grandma smiled and told her that this was part of the seed bank she had started when she was around twenty years old. "So can you imagine, some of these seeds must be around fifty years old," she added. Babbi was fascinated to see these seeds from her grandmother's past. She could recognize some of the seeds in the ten bottles as rice, *rajma* (kidney beans), mustard, and *arhar* (pigeon pea). The bottles also had faded labels indicating where the seeds were collected from.

But something still puzzled her. Looking at her grandmother quizzically, Babbi asked, "What is a seed bank?

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Aren't banks for money?" Grandma was more than happy to explain. "For farmers, saving good quality seeds for every year is very important. By planting the right seed, you can ensure that your crop grows well in the prevailing environmental conditions. Storing good seeds also helps farmers ensure a uniform crop and preferred taste of food for many years."

"Generally, farmers keep a part of their yield for planting in the next season. If the seeds have interesting and beneficial traits such as the ability to grow without water or in places where the heat is extreme, they are saved for more long term use."

Grandma picked up a small bottle lovingly. "I started my collection with this rice sample which can grow in drought conditions. You must have seen how rice is planted in a pool of water to ensure good growth. But this seed here grows in minimal water.

This is a wonderful variety to grow in areas where getting enough water is difficult. And I was not alone in collecting seeds. Nearly all the farmers in our village collected and preserved seeds. You know how you buy souvenirs when you travel, in those times, people would get seeds of the plants they wanted to grow on their land. Farmers spent decades perfecting the plant traits that suited them."

Gesturing to some of the other bottles, Grandma said, "I managed to collect quite a few seed varieties, as you can see. This rice variety can grow in saline water. This *arhar* dal grows perennially so you can harvest the pods just like you harvest fruits such as apple. This dal plant can survive for as long as five years, so farmers do not have to spend money on new seeds. The best thing is that you can also harvest the dal as the pods mature. If the whole plant has to be harvested together, you need to ensure that most of the pods on the plant are of the same age. This is difficult and often leads to wastage."

As Grandma finished explaining this, Babbi had another question ready. "If I plant these seeds, will they grow?"

"These seeds are quite old so we cannot be sure," Grandma said. "Also, I have just bunged them in a bottle but there are ways to ensure that seeds remain viable for a long time. These techniques too have been perfected over time by the farmers. They used traditional, low-cost storage methods to prevent moisture buildup and fungal contamination. Some farmers store the seeds in earthen pots, bamboo bins and wooden crates, lined with natural pest repellents, such as neem leaves or turmeric powder.

Even simple methods where seeds are stored in between the layers of ash and neem leaves to

Some farmers store the seeds in earthen pots, bamboo bins and wooden crates, lined with natural pest repellents, such as neem leaves or turmeric powder.

CLIMATE-RESILIENT SEED VARIETIES AVAILABLE IN SOME OF THE SEED BANKS OF INDIA

DROUGHT RESISTANT

SURVIVE & THRIVE WITH MINIMAL RAINFALL- IDEAL FOR DRYLANDS

- Rice
- Millets
- Finger millet (ragi)
- Pulses
- Maize
- Pigeon pea (arhar)
- Grass pea
- Bottle gourd (lauki)
- Oilseeds
- Tuber

HEAT RESISTANT

WITHSTAND HIGH TEMPERATURE

- Rice
- Millets
- Finger millet (ragi)
- Pigeon pea (arhar)
- Bottle gourd (lauki)
- Brinjal

FLOOD TOLERANT

STAY STRONG EVEN IN WATERLOGGED FIELDS

- Rice
- Green gram
- Wheat

WIND RESISTANT

RESIST STRONG WINDSTORMS

- Rice

DISEASE/PEST RESISTANT

IMMUNE TO PESTS AND DISEASES

- Rice
- Millets
- Green gram
- Oilseeds
- Tuber
- Field bean (val)
- Lady's finger

SALINITY RESISTANT

GROWS WELL IN SALTY SOILS

- Rice
- Millets

The Indian Seed Vault is in the cold areas of Ladakh. It has just around 200 seed varieties. But there are others like the Svalbard Global Seed Vault in the Arctic Archipelago of Norway, which holds over 1.3 million seed varieties from almost every country.

prevent moisture buildup and pests works well. Others used glass bottles and ash to ensure dry conditions for the seeds. The seeds were cultivated regularly to ensure availability of new seeds each year."

"There are seed banks that store seeds at extremely low temperature to maintain viability. For example, the Indian Seed Vault is located in the cold areas of Ladakh. This one has just around 200 seed varieties. But there are others like the Svalbard Global Seed Vault in the Arctic Archipelago of Norway, which holds over 1.3 million seed varieties from almost every country. Seeds here are stored at a very low temperature of –18 degrees Celsius and the bank is often referred to as the doomsday vault as it can protect us in an uncertain future."

As Grandmother rattled out story after story about seed banks, Babbi was filled with awe. She had never imagined a seed could be so precious. She thought back to all the times she had eaten a fruit and thrown away the seed without a second thought.

At that moment, Babbi decided that she too would start a seed bank of her own. But she was not sure if this could still be done and she asked grandma whether community seed banks still existed. Grandmother nodded her head in an affirmative. "The non-profit that your aunt works with recently did a study on seed banks in the country. Their online survey found that even now, across 71 different crops, about 887 climate-resilient varieties are available. And all of these in just the 40 or so seed banks they studied in 15 states. These included seeds which are heat resistant, drought resistant, wind resistant, disease resistant, salinity resistant, flood tolerant, and so on. In fact, the report found that due to climate change, there is now renewed interest in community seed banks."

"You know, community seed banks are not just about saving seeds, they are also a farmer's insurance against hunger, inflation, and climate shocks," Grandma added. "These seeds are so valuable that there are restrictions to take them from one country to another without permission and there are strict penalties on people who break this law."

Babbi opened one of the bottles and took a deep breath to take in the smell of the old seeds. The stories really touched her to the core, and she asked Grandma if she could have the bottles. Grandma was happy to give them to her and promptly found a box to keep the bottles in. But she was curious to know what Babbi would do with them and asked her to explain. "First, I will read up about these varieties and then I will try to grow a few in flowerpots at home. These seeds are like a time capsule and trying to grow them would be like being you when you were young," Babbi smiled. "And then, I will also try to find seeds to add to this collection," she said and gave Grandma a tight hug.

The author heads the Biodiversity and Food Unit at the Centre for Science and Environment, New Delhi.

Readers Writers

Water vs Oil: Try the Lotus

The Lotus Effect is a phenomena where the lotus flower repels water due to its oily surface so the water molecules roll around, collecting dirt before sliding off the leaf.

Riddho Roy

Have you ever wondered what happens when you mix water and oil? I was curious to know why they don't mix so I did an amazing experiment to find out—and discovered something truly magical.

I took a plastic (polyethylene) paper and put some oil on the plastic paper. Then, I dropped a single but large water droplet onto the oily surface. Guess what? The water droplet didn't mix with the oil! Instead, it did something incredible.

The water droplet started to move and change shape—like it was alive! It formed tiny beads and rolled around the plastic avoiding the oil. I was amazed! I showed my parents and my friends. I told them that I can cut water! How was this even possible?!

My parents explained that this phenomena is called the 'Lotus Effect'. The oily surface is hydrophobic (water-repelling), causing the water droplet to behave in this unique way. The water molecules stick together, forming beads that can roll around. Then I remembered that I have seen a similar thing earlier when we visited a lotus pond near Alibaug. The water droplets danced around the oily surface of the lotus leaf.

This happens because the oil molecules on the plastic surface are arranged in a special way, making it difficult for water molecules to bond with them. This creates a barrier, forcing the water droplet to separate and move around the leaf.

This experiment showed that even everyday materials can hold secrets and surprises. Who knew that mixing water and oil on a plastic paper could be so fascinating? We learned that science is all around us, waiting to be discovered.

The Lotus Effect is a self-cleaning property of the lotus flower where it has the ability to repel water and dirt. This is because the surface of the lotus leaf is rough at a microscopic level and even at a nanoscopic level (which means really, really tiny).

The surface isn't smooth; it's covered with tiny bumps and also coated with a waxy layer. When water lands on the leaf, instead of spreading out and soaking in, it forms little droplets that easily roll off because the bumps and wax make the surface super water-repellent.

As these droplets roll off, they pick up dirt and dust stuck on the leaf, cleaning it naturally. This is called the "lotus effect."

What I learned?

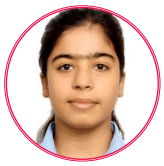
- Water and oil don't mix.
- Oily surfaces can repel water.
- Science experiments can be fun and surprising!

I am excited to try more experiments and uncover more secrets of the natural world. Who knows what other magic awaits us?

Experiment conducted by Riddho Roy, Class 2, Delhi Public School, Panvel, Mumbai and authored by his father, Rajib Roy, Superintending Engineer (Production), Department of Production Engineering, Institute of Production Engineering & Ocean Technology, ONGC, Navi Mumbai.

The Plastic You Ate Last Night

How our daily waste habits are putting plastic on our plates and how a rewarding model can eliminate it.



Aditi Rastogi

According to the Central Pollution Control Board, India generated over 3.47 million tonnes of plastic waste in 2019–20, and continues to rise unchecked.

A 2021 study conducted by Indian Institute of Technology, Delhi had detected microplastics not only in rivers and lakes, but also in treated drinking water in major cities like Delhi and Mumbai. This reveals that even water deemed safe for households and consumption isn't entirely plastic-free.

Globally, the World Wildlife Fund's No Plastic in Nature report has estimated that the average person could be ingesting up to 5 grams of microplastics per week—roughly the size of a credit card.

Yes, that means you may have eaten plastic last night! This is not just because of faraway ocean waste, but very likely due to the garbage piling up in your own neighbourhood. Studies into Indian urban cities revealed the ugly truth—microplastics present in overflowing landfills and sewage clogged with plastic. Over time, this mismanaged waste breaks down into microplastics that seep into the soil, water, and air, and eventually, into our food.

This alarming crisis is not just about plastic. It is about responsibility. Until our mindset towards waste accountability changes, laws will fail.

Although there is a strict need for stringent laws and policies, we also need a solution that motivates action in individuals, not through punishment, but by rewarding it. A system that makes responsibility feels worth it.

What is the Plastic Reward System?

This is where the 'Plastic Reward System' steps in. It turns waste management into a value-driven process for both citizens and industries. The Plastic Reward System encourages industries and communities to treat plastic as a resource instead.

At the industrial level, companies that recycle plastic into useful products like 3D printer filaments or convert it into fuel through pyrolysis receive tax credits. Those who exceed their targets can even sell extra credits to other companies, creating a plastic credit market. This transforms waste management into a viable, profitable model.

At the community level, schools, resident groups, and local cooperatives can set up plastic collection points and track the gathered amount of waste. Their efforts earn plastic credits, redeemable as cash incentives, school supplies, or community benefits. Whether it's recycled bricks, tiles, or bags, innovation at the ground level is encouraged and celebrated. This system transforms plastic from a nuisance into a shared mission. It builds a culture where doing the right thing isn't just expected, it's rewarded.

Plastic is just the symptom. Responsibility is the cure—and that starts with all of us.

The author studies in Class XII, Birla Vidya Niketan, New Delhi.

THE DARK NIGHTMARE

The nightmare is coming true. Of plastic swamping our cities, choking our lives, shutting the light out...

Yogendra Anand/GT