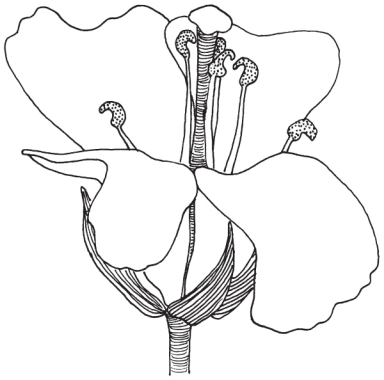
The Story of Fast Plants

The story of the Fast Plants begins many many years ago in the kingdom of Nepal. High up on a rugged mountainside of the Himalayas, a farmer walked out to check his newly planted field of barley.

It was late in the spring. The snow had recently melted and the ground was becoming warm again. The barley grass he had planted a week ago would grow and provide grain for cereal, and for the fried bread that he liked to eat. The farmer was intending to just check the field, as farmers do. He didn't expect to see any plants yet.

Imagine his surprise when he spotted patches of weedy looking *Brassica* plants, growing sturdily in the early spring sunlight. These weeds must have sprouted very fast. The farmer thought for a bit. It had been a long winter and a long time since his family had had any fresh vegetables to eat. It would also be three months before the barley he had just planted could be harvested. So instead of pulling up the weedy plants and throwing them away, he took some home for a salad for the family's supper.



Brassica Flower

In a few days, the farmer went back to his field. By this time, the little plants were flowering. The bright yellow flowers looked like sunshine on the mountainside. Each time he visited the field, the farmer took a few plants home for his family to eat. The remaining plants attracted many hungry honeybees. The honeybees spread pollen from one flower to the next, and that is how flowering plants reproduce. Soon the bright yellow flowers produced pods with plump seeds. The farmer and his wife pressed some of the seeds for oil that they could use in cooking. The farmer wisely kept the rest of the seeds to plant the following year. He knew that new plants come from seeds.

The next spring he scattered his field with two kinds of seeds, the *Brassicas* and the barley. Both of the crops grew fairly quickly, but the weedy *Brassica* plants came up first and were already flowering while the barley was still spreading its shoots across the ground. These little plants had high ***reproductive success*** because they produced many healthy offspring. The farmer harvested the *Brassicas* before the barley was tall enough to shade them from the sun. He was able to produce two crops on one piece of land, providing enough food for his family, and for the farm animals, the yaks.

Year after year, the farmer saved and replanted some of the *Brassica* seeds. The little weedy *Brassica* was an easy plant to grow, and required no special fertilizer. It was well-adapted to survive there on the mountainside.

Time passed. Soon, the farmer's grandchildren were farming the same crops on the terraced mountain field. And so it continued, generation after generation.

One day early in the twentieth century an American plant explorer visited the mountainside farm in Nepal. When she saw the field of weedy little plants, she recognized them as a kind of *Brassica*. She knew about the family of plants called *Brassicas*. Many common vegetables such as broccoli and cabbage are members of this family. Other *Brassicas* are mustard and canola oil plants.

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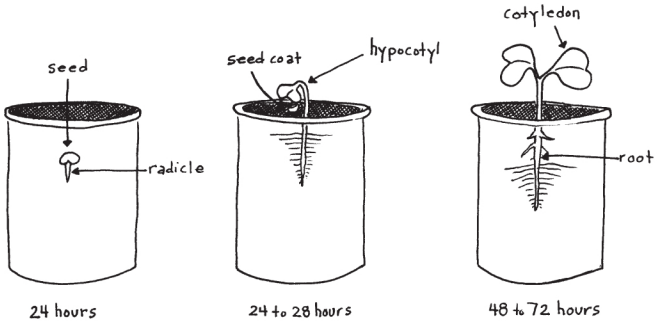
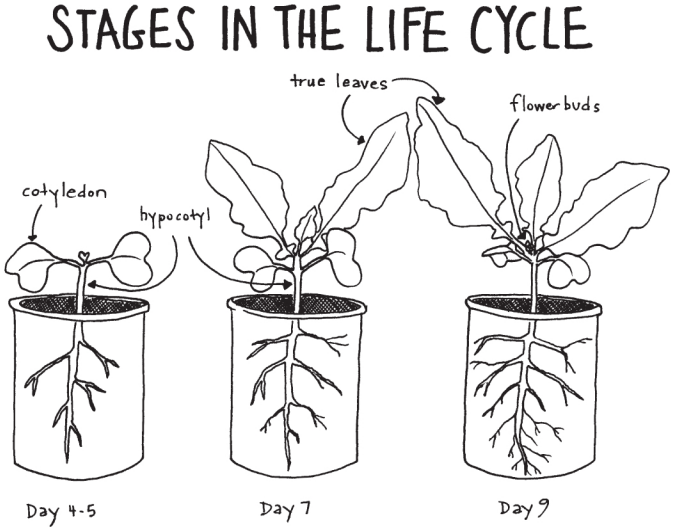
The little *Brassicas* on the Nepalese farm had been grown for hundreds of years in the same location. Because of their isolation, they represented a unique plant stock. That is, these plants had genetic information that was different from other *Brassica* plants anywhere else. The scientist considered them a new plant variety. The explorer knew the importance of saving this different plant type. It is important because different varieties of plants might have the genetic code for variations in traits that can survive environmental stresses. She collected some of the seed of this *Brassica* variety to take home to the US. The seed was stored in the United States Department of Agriculture's *Brassica* seed bank at Iowa State University in Ames. The seed was stored in the collection for many years, though no one seemed particularly interested in it.

However, in the late 1980's a plant scientist at the University of Wisconsin was seeking new genetic material for his research on *Brassicas*. He was trying to discover how to breed vegetable *Brassicas* like cabbage, broccoli, and turnips so that they wouldn't get particular diseases. Plants in the *Brassica* family can get diseases with names like "black leg," "soft rot," and "yellows." These diseases are caused by fungi, bacteria, and viruses. Plants that don't get these diseases are called ***disease resistant***.

The scientist heard about the *Brassica* seed collection in Iowa and wrote to the curator, asking for samples of different kinds of *Brassica* seed varieties. When the seeds arrived, he planted them outside in a field called a research plot. There, in the middle of the research plot, appeared the little, weedy *Brassica* from the mountains of Nepal. That scientist was Paul Williams.





Paul noticed the little *Brassica* right away because it flowered much more quickly than any other *Brassicas*. Some *Brassica* plants are slow to flower, and don't grow very quickly. This means that if a scientist is trying to crossbreed different plants with one another, the research can take a long time. For example, it can take a year to crossbreed cabbages. But this *Brassica* grew very quickly, and from this, Paul got an idea. What if he could use this plant in his research to develop a really fast flowering plant that he could use to test for disease resistance?

He knew he would have to change the plant's environment to discover how quickly he could make the plant grow. Paul saved the seeds of these first plants, then planted those in a

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greenhouse. He grew the new plants under constant light, and with only a small amount of soil. Changing the amount of light and soil introduced an environmental stress. For some of the plants with particular traits, these conditions encouraged plants to grow quickly.

Paul selected from everything he grew the plants that were shortest and sturdiest, that flowered the fastest, and that produced the most seed. He saved seeds from those plants. He was selecting plants with the greatest *reproductive success*. Then he planted those seeds, and grew more plants.

Paul continued to grow generations of *Brassica* plants until he created a "model plant" that he could use to crossbreed with disease-resistant *Brassicas*, and test his results quickly. He called his model plants "Fast Plants." After thirty years of selecting and breeding Fast Plants, Paul developed a new type of plant that germinates in just one to two days. His plants produced flowers in just fourteen days!

In the same way that he had learned about *Brassicas* from the work of other people who came before him (the Nepalese farmer, and the plant collector), this scientist passed on the knowledge of Fast Plants to other scientists. These other scientists discovered different uses for the plants in their research. Today, scientists, students, and teachers are all working with Fast Plants. They are studying how plants grow, and how they produce new generations of plants. Thus the weedy little *Brassica* from Nepal became the great, great…grandmother of the Fast Plants.

Some students will go on to become plant geneticists, molecular biologists, and plant breeders, and they will write the next chapter in the story of Fast Plants.

How do you think it will end?