



# What **needs** do **crop plants** have?

## the importance of life cycles

Successful crop production – and therefore, healthy food production – is not just a simple cycle of working the soil, planting seeds and then harvesting the crop. Quality grains and seeds depend on the knowledge that farmers have, not only about a plant's life cycle, but also the life cycle of weeds and insect pests common to their crops. Knowing these life cycles allows farmers to monitor, intervene and support the growth of their crops.

## CASE IN POINT: CANOLA

Canola plants grow nearly every day of the growing season, from when they are planted until harvested. Growth begins with the seed, then leaves, stems, flowers, pods and seeds, in a cycle.

Like any plant, the growth and development of a canola plant is continuous. However, it can be divided into different growth stages.

The environmental conditions in which the plant grows has an effect on how fast a canola plant grows. These factors include:

- ◆ Air and soil temperature
- ◆ Amount of moisture in the soil
- ◆ Presence of pests

Air temperature is one of the most important environmental factors that influences the growth and development of canola.

The stage that the plant is in also determines how sensitive it is to its environmental conditions. For example, canola that is flowering is much more sensitive to extreme temperatures, like those that are more than 30 degrees Celsius, than it is during earlier growth stages.



What have you learned about the stages in a plant's life cycle? Do these stages apply to all plants?

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Why is it important for farmers to monitor environmental conditions like temperature and rainfall?

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Some information and photos from Canola Encyclopedia. Canola growth stages. Canola Council: Online. [www.canolacouncil.org/canola-encyclopedia/growth-stages/](http://www.canolacouncil.org/canola-encyclopedia/growth-stages/)



In a canola plant, the root grows downward and develops root hairs that anchor the developing seedling. The new stem is called a **hypocotyl**. It begins growing up through the soil, pushing two heart shaped leaf-like organs called **cotyledons** or seed leaves. The seed coat is usually shed in the process.

Canola seeds have two cotyledons, and are described as **dicotyledonous**, or dicots. When exposed to light, the cotyledons unfold and become green.

Match the photos on this page with the growth stages pictured in the previous page. How would you describe and label each growth stage?



GROWTH STAGES OF CANOLA



## CASE IN POINT: DRY BEANS

Bean seeds are comprised of two **cotyledons** – two halves. Each cotyledon contains a food source for the growing plant. New bean plants can live from stored food in the cotyledon for several days, if necessary, until they can reach nutrients in the soil.

Bean seeds **germinate**, or sprout, when water dissolves or cracks open the hard casing around the seed or embryo. Warmth is required for germination. As it germinates, the bean sends out a tiny root called a **radicle**.



## GROWTH STAGES OF BEAN PLANTS

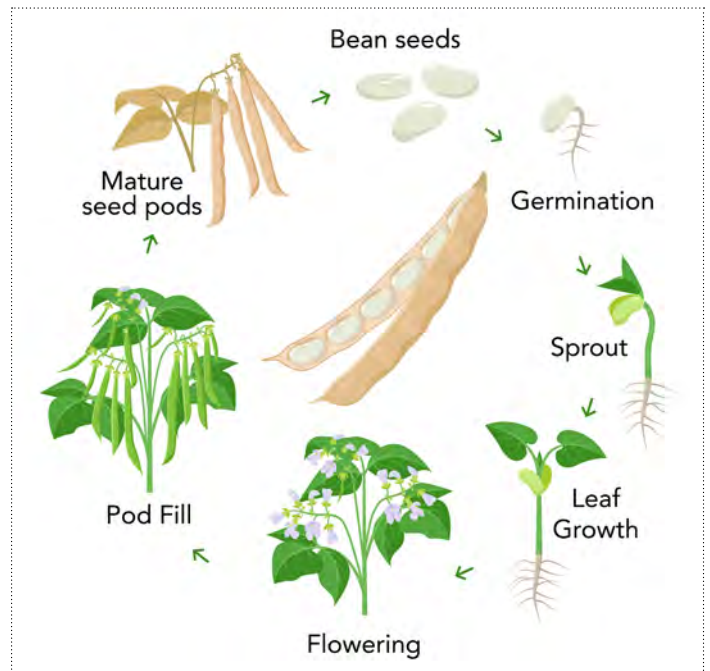
After the casing cracks open, the roots emerge from the bean seed. These roots reach out for moisture and nutrients in the soil. These roots look like slim white threads.

As these roots grow deeper into the soil, they pull water and nutrients into the seed. This starts the growth of the leaves.

As a single stem pushes outward from the seed, two small, rounded leaves emerge. These leaves are also referred to as **cotyledons** because they are connected to the seed. They emerge above the ground. These leaves provide photosynthesis for the seedling and drop off as soon as the mature leaves grow.

The stalk – called the **hypocotyl** – stabilizes the seed and cotyledons firmly in the soil.

Within the leaves are cells containing chlorophyll, which transforms sunlight into usable energy for the plant.



## LIFE CYCLE OF A BEAN PLANT

The plant transforms warmth, moisture, sunlight and carbon dioxide into nutrients for plant growth. New leaves emerge as the plant continues to grow.

Flowers form within six to eight weeks after germination. Beans are self-pollinating. After pollination, seed pods develop. The pods are left on the plant to mature and dry. If they are not harvested, the pods will naturally split and drop the beans onto the ground. These beans become the seeds for new plants.



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How do you think bean pods and seed sizes can vary with different varieties of dry beans?

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The growth stages and life cycle of a bean are illustrated on the previous page. Match the photos on this page with two bean plant growth illustrations on the previous page.



## CASE IN POINT: WHEAT

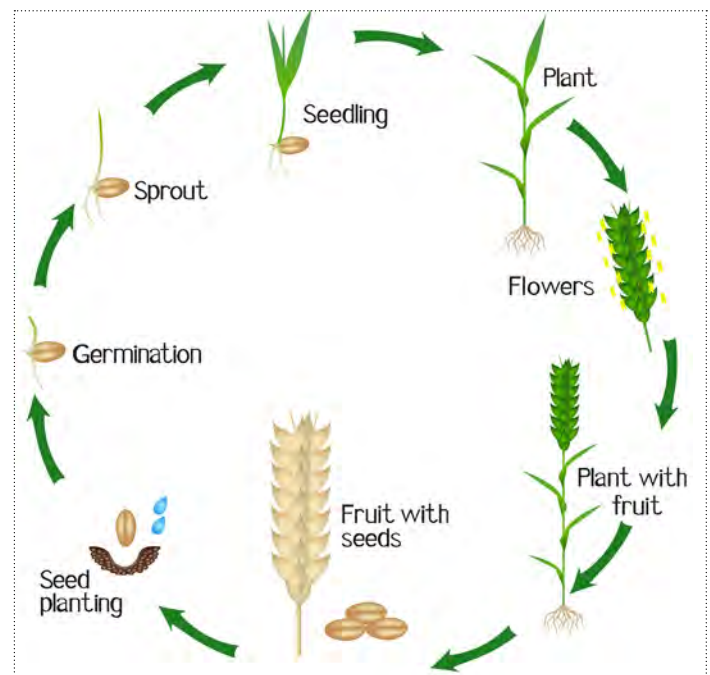
Wheat needs temperatures between about 21 and 25 degrees Celsius to germinate. Wheat seeds germinate when the seed coat is broken and the roots start to form. The seedling usually emerges within seven days. Until the first leaf grows, the seedling depends on energy and nutrients stored in the seed.

The first shoot, also called **tiller**, grows up from the ground. Tillers continue to grow and produce leaves. The head of the wheat plant grows from the top of the stem.

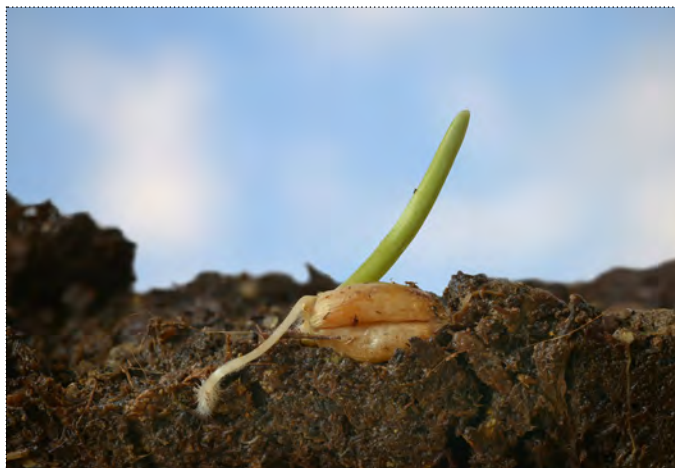


After the head emerges from the stem, the plant starts reproductive growth, or flowering. Wheat is self-pollinating and pollination normally lasts about three to five days. The number of kernels in each head is determined by the number of flowers that are pollinated. High temperatures or drought conditions during the heading and flowering stage can reduce the number of kernels produced by each head.

After pollination, the wheat plant starts to ripen. The plant turns to a straw colour and the kernel becomes very hard. Harvest can start when the kernel is hard and has reached a suitable level of moisture.



LIFE CYCLE OF A WHEAT PLANT



Match the photos on this page with the growth stages pictured in the previous page. How would you describe and label each growth stage?