

# All About Seeds, Growing Seedlings and Transplants

## LESSON FOUR

### What's Ahead

In this lesson, you'll learn:

- the parts of a seed;
- how seeds grow;
- good seed sources; and
- how to grow healthy transplants and move them to your garden.

### What's a Seed?

The seed is made up of three major parts: the embryo, the endosperm and the seed coat.

The embryo is actually an immature plant in an arrested state of development; it will grow to form the plant. Most seeds also contain a built-in food supply called the endosperm. The endosperm is made up of proteins, carbohydrates and/or fats. The third part is the hard outer covering, called a seed coat. This protects the seed from disease and insects. It also

prevents water from entering the seed and causing the seed to germinate before it's supposed to.

### How do Seeds Grow?

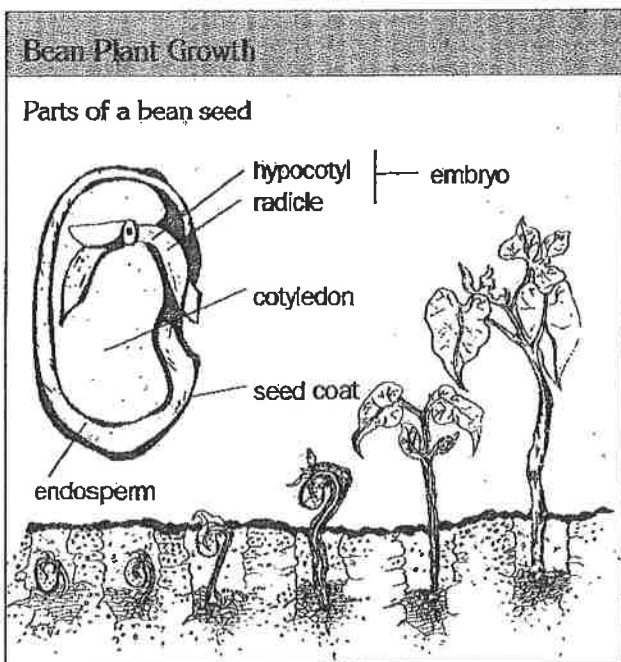
The seed's first step in growing is germination. The radicle emerges first, and from it roots will develop. Above the radicle are the "seed leaves," or cotyledons. These serve as a food supply. They are usually different in shape from the true leaves that the mature plant produces.

Plants with one cotyledon are called monocotyledons. Grasses are the most common "monocots." Plants producing two cotyledons are called dicotyledons or "dicots." Most "broadleaf" plants, i.e. vegetable seedlings, are "dicots."

### Getting Good Seed

Good seed must be free from disease. Diseases can be carried both inside and on the outside of the seed coat. Those on the outside can be controlled by seed treatment. That's why many vegetable seeds are treated with fungicides. Internal diseases can be controlled by treatment, too. Your best bet is to buy seed that has never been infected.

Good seed must be true to its varietal name. Varieties of a particular vegetable can have different yields, quality, disease resistance and ripening rates. Early ripening is helpful for long-season vegetables, such as corn and melons, because Maine's growing season is short. You may want later ripening varieties to extend your harvest season. However, these varieties may need extra protection in our colder climate.



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### ▶ KEY POINT 1:

The seed has three parts: the embryo, the endosperm and the seed coat.

### Sources for Seeds

Vegetable seed growing is a highly specialized business requiring knowledge and skill. That's why smart gardeners buy their seeds from reliable sources. Some gardeners save seeds from crops to plant next season, especially varieties that may be hard to find. However, you'll probably have better luck if you purchase seed to plant.

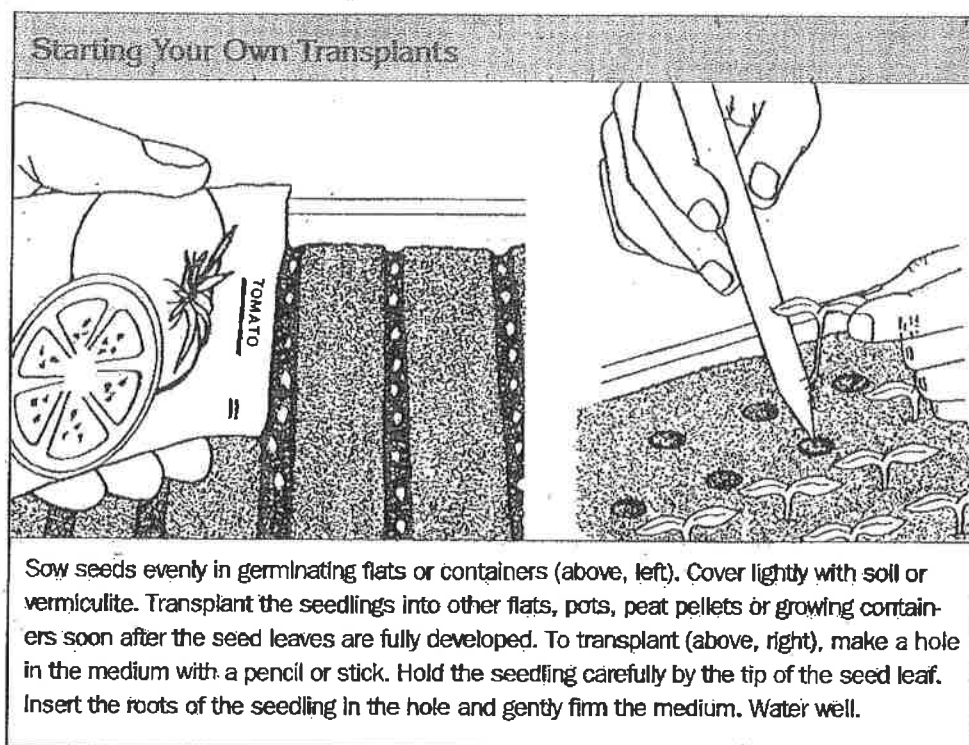
Seeds of hybrid vegetables should never be saved, as they will not breed true. Hybrid seed is created by crossing two inbred parents that may not look like their offspring.

### Growing Your Own Transplants

Do you want to grow some crops that need a long season, such as tomatoes, peppers or melons? Do you want to get an extra early harvest from your lettuce or cabbage? If so, you may want to start your plants in a greenhouse, hotbed or sunny window in the early spring. Then they'll be ready for transplanting into the garden when the weather warms.

Here's a list of vegetables that would be good candidates for home-grown transplants:

tomatoes	broccoli
peppers	lettuce
cabbage	melons



Sow seeds evenly in germinating flats or containers (above, left). Cover lightly with soil or vermiculite. Transplant the seedlings into other flats, pots, peat pellets or growing containers soon after the seed leaves are fully developed. To transplant (above, right), make a hole in the medium with a pencil or stick. Hold the seedling carefully by the tip of the seed leaf. Insert the roots of the seedling in the hole and gently firm the medium. Water well.

cucumbers  
cauliflower

winter squash

Growing transplants requires some dedication and skill. If you have the time, interest and space, it can save you money. However, if you only need a few transplants, it may be cheaper for you to buy transplants from a commercial greenhouse or garden center.

When starting plants, consider the soil. Use a good plant-growing soil that is loose and crumbly, will not form a crust and will hold moisture but not get water-logged. Ordinary topsoil from your garden is not good for starting transplants. It tends to cake and not allow water to drain when used in containers. Garden soil may also contain disease organisms that will affect young seedlings indoors.

▶ **KEY POINT 2:**

The seed leaves are the first leaves of the plant. They provide food for the plant.



Most gardeners buy growing media (with soil or soil-less) from garden stores or seed companies. Whatever mix you buy, be sure that it is free of diseases, insects and weeds, and is lightweight. This will reduce the potential for “damping off,” a common fungus disease.

Here are some suggested steps to start transplants:

1. Make holes in the bottom of transplant containers for drainage, if necessary.
2. Fill the container with moist growing media until it overflows, then pat it down gently. The soil should be level with the top of the container.
3. Make rows two inches apart and 1/4 inch deep across the container. Sow tomato and pepper seeds two to three seeds per inch. Sow lettuce and cabbage one to two seeds per inch. Use the seed packet or a card folded into a “V” to sprinkle the seed.
4. Cover the seed with media no deeper than twice its thickness. Press lightly. Many gardeners like to put paper (or a plastic bag) over the container to keep moisture in and help seeds germinate.
5. Place the containers in an area warm enough so the soil will be about 65 to 75 degrees F.
6. When the seedlings emerge, remove the cover and place the containers in full sunlight.

7. When seedlings get larger, transplant them into other containers to prevent overcrowding. This will also help them develop a well-branched root system. Overcrowded plants will look leggy or spindly. You can transfer the seedlings after the two cotyledons have separated, and before the true leaves emerge.

Select only the most vigorous seedlings for transplanting. Handle them gently by their leaves, not stems, and replant them slightly deeper than they grew in the seedling container.

Transplant Troubleshooting Guide		
Symptom	Problem	Solution
Leggy or spindly	Not enough light; overcrowded	Provide more light; thin the number of plants; lower temperatures
Seedlings fall over at soil level and die	Damping-off disease	Use only sterilized soil, sterile pots and tools; keep soil level with top of pots
Insect damage	Aphids; white fly; or leafminer	Remove or disinfect house plants before starting vegetables

Water each container regularly to keep the soil from drying out. An occasional watering with starter solution (dilute fertilizer or commercial mix made for transplanting) may be helpful if your plants are growing slowly and lack firm, rich green foliage. However, the starter solution should not touch the plant because it may injure it.

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**KEY POINT 3:**  
Cooler temperatures, less  
water and more light can all  
help “harden-off” plants.

Melons, cukes and squash can be difficult to transplant. Grow them from seed in large containers so that they can go right to the garden without disturbing the root system.

Sow three to five seeds in each container. When the seedlings emerge, thin them to one to two plants per unit.

Your plants need 14 to 16 hours of light each day to grow well. You may have to add “sunlight” with a cool white fluorescent lamp.

### Transplanting Outdoors

Vegetable transplants should be healthy and vigorous, with good roots. You’ll need to “harden them off” before transplanting. To do this, gradually reduce the growing temperature or water supply. Many growers harden-off plants by placing them outside during nice weather in the shade two to three weeks before planting them. Gradually increase the amount of direct sunlight each day. Take the plants indoors if temperatures dip below 40 degrees F.

Have the garden soil ready before you transplant. Transplant on a cloudy day, in late afternoon, or in early evening to prevent wilting. It helps to water the plants several hours before transplanting. Handle plants carefully. Avoid disturbing the roots or bruising the stems.

Dig a hole large enough to hold the transplant roots. Set the

plant slightly deeper than it was growing and at the recommended spacing (check the seed packet). Press soil firmly around the roots of transplants. Pour about a cup of starter fertilizer solution around the plant. You can make a starter solution by mixing at half strength the fertilizer recommended for the plant during the normal growing season. Diluted fish emulsion may also be used.

After transplanting, protect the plants and encourage new growth by covering them with milk jugs, hot caps or rowcovers. Water the plants once or twice during the next week if there is less than two inches of rainfall. Remove hot caps when plants become crowded or start to flower.

### Timing Your Transplants

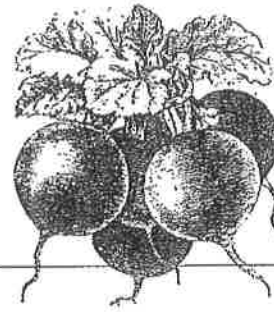
Seed your transplants early enough so they will be ready for planting outdoors at the right time. Here’s a list of suggested starting times for Maine:

**Peppers:** Start eight to 10 weeks before planting.

**Broccoli, cabbage, cauliflower, tomatoes:** Start four to six weeks before planting.

**Cucumber, melon, pumpkin, winter squash:** Start two to three weeks before planting.





## Summary

In this lesson, you've learned about seeds and transplants. Now try to answer the **Study Questions** and check your answers. The **Study Activities** will help you expand on your new knowledge. In Lesson 5, we'll discuss ways you can boost your garden's soil for a bountiful crop.

## Study Questions

1. Describe how a seed germinates.
2. How do you harden-off a transplant before planting outdoors?
3. Name the parts of a seed.

(See answers at bottom of page.)

## Study Activity

### Germination Check

Most seed companies print the germination percentage of the seeds on the seed packets.

However, you can test seeds for germination before you plant them. This is a good idea if you have any doubt as to the viability of the seed or if you have saved last year's unused seeds. Here's how.

Count out 20 seeds; place between two paper towels that have been soaked in water and wrung out so that they are damp, and place in a shallow dish. Cover with another dish, inverted, to prevent evaporation of moisture. At 60 to 70

degrees F, the viable seeds will begin to sprout in a few days. Count the seeds that germinate and divide by 20. Then multiply by 100. This is the percentage of germination. Don't count seeds that produce weak, tardy sprouts. They often fail when planted in the soil.

Example: 15 seeds germinate.

$20 \text{ divided by } 15 = .75 \times 100 \text{ percent} =$

75 percent

Germination is 75 percent.

Increase your seeding rate to get the number of plants you want. For example: If germination rate is 75 percent, and you want 20 plants, you'll need 27 seeds.

(20 divided by .75 equals about 27.)

## Other Resources:

Check with your county Extension office for these publications:

Bulletin #2078, Home Vegetable Gardening

Bulletin #2106, Natural Gardening

Bulletin #8039, Vegetable Gardening

### Study Question Answers

1. The hypocotyl is the first part of the plant to emerge. It develops into a root and a shoot. The top part of the hypocotyl bears the plants "seed leaves," which are different from other leaves of the plant and serve as the plant's food supply.
2. Reduce the growing temperature, withhold water or increase light intensity.
3. The embryo, the endosperm and the seed coat.

