

## Special Tips for Flowers

A great way to germinate seeds for flowers (both annual and perennial) is to direct sow them in fall. Many flowers require the freeze/thaw cycles in order to germinate. Remember to dead-head your flowers after they bloom and broadcast the seed for more flowers the following year. If you want to limit the number of flowers next year, completely remove the seed heads. The packet instructions will give you complete directions for that particular variety.

## Troubleshooting

**The most common causes of seeds not germinating are:**

- Soil was too heavy, too wet or too cold.
- Soil was allowed to dry out or kept too wet.
- Seeds were not given enough time to germinate before sower gave up, especially seeds with slow or erratic germination.

**The most common causes of seedling loss are:**

- Damping off, caused by over watering or fungi.
- Using containers that don't hold enough soil. Containers need to be at least 3" deep and filled to the top with seed-starting mix.
- Using potting soil, common garden soil, or previously used soil. It's best to start fresh each year to avoid fungi, etc.
- Insufficient air circulation.
- Planting in previously used containers that were not properly cleaned. Wash containers in a solution of 1 part bleach to 10 parts water before re-using.
- Overcrowding. If you've planted too many seeds and they're all germinating, gently thin (cutting with a small scissors works well) the weakest out leaving a few of the strongest to grow.
- Introducing seedlings to full sun or outdoor conditions too quickly (not "hardening off").

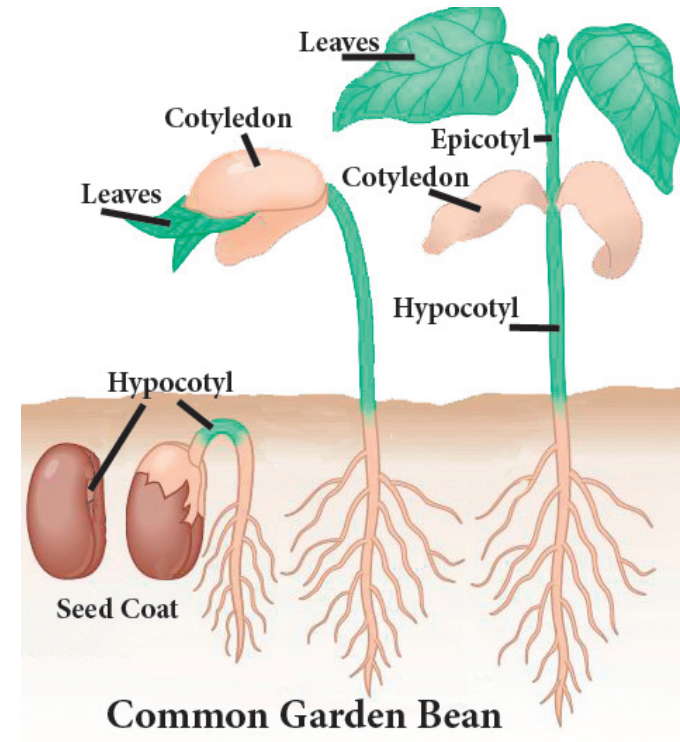
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# Guidelines for Successful Seed Germination



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## Preparation

1. Start seeds at the right time. Seeds generally remain in flats or pots for 3-4 weeks after germination. Seedlings are then transplanted into larger, individual containers to develop for 5-6 weeks more. Seeds should be started 8-10 weeks before average last frost date in your area to set plants in the garden at the beginning of the frost-free period in spring. After the frost-free date and throughout warmer weather (until about midsummer) you can sow seeds directly outdoors in a seedbed or frame.
2. Before sowing seed, refer to packet information regarding pre-germination treatments or special seed-handling techniques required for what you want to grow.
3. Plan sowing according to how many plants you want. Sow more seeds than the number of plants wanted. Consider color scheme, bloom time, dimension of plant, soil and water requirements. Don't plant something that requires little water in with plants that need much more water.

## Getting Started

1. Sow seeds in a light, loose seed-starting mix, covering them with 3-4 times their thickness.
  - Large seeds can be soaked overnight in water, then planted singly.
  - Small seed is just lightly and barely covered with soil.
  - Fine seed is sprinkled on the surface of dampened mix, tamped down GENTLY and watered with a fine misting or from below.
2. Plant flat seeds edgewise.
3. Plant winged seeds with wings uppermost, or gently remove wings first.
4. Keep soil moist...not too wet—and don't allow it to dry out.
5. Seeds from temperate regions often germinate best at cool temperatures (50°F-65°F).
6. Seeds from tropical regions like warm temperatures (70°F-85°F).
7. Germination temperature should be the soil temperature, not the air temperature.
8. Germination may be helped by gentle bottom heat plus air circulation.
9. Seedlings are best transplanted on a cool, moist or cloudy day. It's best for many seedlings to be transplanted up to the cotyledons (seedling leaves).

## Special Cases

Seeds requiring cold treatment can be sowed outdoors in the fall. To start indoors, mix seeds with 2-3 times their volume of moist peat, sand or vermiculite. Place mix in plastic bag, seal, place bag in refrigerator for length of time specified on packet. Check moisture after 30 days. Remove seeds from refrigerator and sow according to directions.

For seeds with hard, impermeable shells, nick or scratch seed coat opposite hypocotyl with a file or medium-grit sandpaper.

Hot water treatment—Soak seeds in at least 4-5 times their volume of hot water and leave to cool. Let soak 2-24 hours. Nicking or sanding before soaking often speeds swelling and germination.

Double dormancy—Some seeds need alternating seasons of cold-warm-cold, others need warm-cold-warm. Planted outdoors, they will germinate after the second season. Indoors, give cold treatment as above for 3-6 weeks, remove from refrigerator for an equal amount of time, then return to the refrigerator for 3-6 weeks (or give warm-cold-warm treatment in the same way). Stir seed periodically for air circulation and check moisture.

## *Soil Temperatures for Seed Germination\**

Vegetable	Min. Temp	Temp Range	Optimum Temp	Max Temp	Days to Germination	Required temperatures for Outdoor Transplanting		
						Day Temp	Night Temp	Time (weeks)
Asparagus	50°	60°-85°	75°	95°	21-30	70°-80°	65°-70°	8-10
Bean	60°	60°-85°	80°	95°	7-14			
Bean, Lima	60°	65°-85°	85°	85°	10-14			
Beet	40°	50°-85°	85°	95°	7-14			
Broccoli			70°		5-7	60°-70°	50°-60°	5-7
Brussels Sprouts			70°		5-10	60°-70°	50°-60°	5-7
Cabbage	40°	45°-85°	85°	100°	7-10	60°-70°	50°-60°	5-7
Carrot	40°	45°-85°	80°	95°	10-21			
Cauliflower	40°	45°-85°	80°	100°	3-10	60°-70°	50°-60°	5-7
Celery	40°	60°-70°	70°	85°	14-21	65°-75°	60°-65°	10-12
Chard, Swiss	50°	50°-85°	85°	95°	7-14			
Corn	50°	60°-95°	95°	105°	7-10	70°-75°	60°-65°	3-4
Cucumber	60°	75°-95°	95°	105°	7-10	70°-75°	60°-65°	3-4
Eggplant	60°	40°-80°	85°	95°	7-12	70°-80°	65°-70°	6-8
Lettuce	35°	40°-80°	75°	85°	7-14	70°-80°	50°-55°	5-7
Muskmelon	60°	75°-95°	90°	100°	7-10	70°-75°	60°-65°	3-4
Okra	60°	70°-95°	95°	105°	8-12			
Onion	35°	50°-95°	75°	95°	10-14	60°-65°	55°-60°	10-12
Parsley	40°	50°-85°	75°	90°	10-21			
Parsnip	35°	50°-70°	65°	85°	14-21			
Pea	40°	40°-75°	75°	85°	8-10			
Pepper	60°	65°-95°	85°	95°	14-21	65°-75°	60°-65°	6-8
Pumpkin	60°	70°-90°	95°	100°	7-10			
Radish	40°	45°-90°	95°	05°	3-7			
Spinach	35°	45°-75°	70°	85°	7-10			
Squash	60°	70°-95°	95°	100°	9-12	70°-75°	60°-65°	3-4
Tomato	59°	60°-85°	85°	95°	5-14	70°-75°	65°-75°	5-7
Turnip	40°	60°-105°	85°	105°	6-7			
Watermelon	60°	70°-95°	95°	105°	7-10	70°-80°	65°-70°	3-4

\* All temperatures are °F.