



In the cultural descriptions in the catalog or other planting and growing information, there is information on direct seeding and transplanting. Direct seeding is the sowing of seeds directly into the garden or field. Most root crops such as carrots, parsnips, burdock, and radishes should only be direct seeded for the highest chances of success.

## BENEFITS OF DIRECT SEEDING

- No disturbance to the root system. Disturbing a plant's root system through starting seeds and transplanting can result in transplant shock. A plant that experiences transplant shock often takes several days to acclimate and resume growing. When directly sown, a crop is in place for its entire lifecycle, from seeding to harvest.
- Avoids plants being root bound. Transplanted crops are typically confined within a container prior to being placed in the field. This can result in root-bound seedlings, which are more prone to transplant shock.
- Fewer materials than transplanting. Direct seeding is a simpler approach to planting. It does not require a heated space to start seedlings in, or any seed starting supplies.

## MATERIALS

- **Bed preparation tools:** There are a number of tools available for preparing a bed for direct seeding. Which ones you need may depend on the size of your garden or field. For more details on which may be best for you, please see the Bed Preparation section.
- **Soil probe thermometer:** The best way to ensure the soil is at the optimal temperature for germination. Place a probe thermometer in the soil. Once the temperature is *at least* at the minimum germination temperature, it is okay to sow.
- **Seeds:** Know which varieties you want to plant, and order the proper quantity of seeds.
- **Seeder:** Like with the bed preparation tools, there are many seeders. Which crop you are seeding and how precise you want to be can factor into which seeder you use.

There are a number of push-type seeders. Most make use of different plates or rollers to calibrate one seeder to be used for seeding many different crops. Others have a small range of crops they're compatible with, based on seed size. There are also jab-type planters that are used for sowing large seeds. All have hoppers for carrying seed. Select a seeder that makes the most sense for the size of your planting area. Small sowings may be hand sown.

- **Labels or stakes:** Use to indicate the start of rows, the date seeded, and include the variety planted in each row.
- **Watering supplies:** These can range from a simple watering can to drip line, soaker hose, and overhead irrigation. The size of your planting area, water pressure, and your access to a water source dictates which watering method you choose.

- **Weeding tools:** Proper bed preparation can aid in reducing weed pressure during the growing season but some hand weeding is almost always required. There are many hand tools, as well as flame weeders, to increase efficiency.
- **Fertilizer:** If needed, we recommend a soluble fertilizer, such as a liquid seaweed or fish fertilizer.

## BED PREPARATION

Proper bed preparation is very important. Most seeders perform at their best when the soil is firm and smooth. Additionally, it allows for better seed-to-soil contact, which promotes better germination rates, stronger root development, and more vigorous growth.

1. **Outline the beds.** Outlining the beds prior to preparation ensures the lines are straight and even. If the beds are consistently sized, it allows you to fit more beds into one area. A couple of stakes and enough twine for the length of the bed is a simple way to mark the beds.



2. **If necessary, add amendments.** Soil amendments can include composted manure, sphagnum peat moss, lime, and gypsum, to only name a few. The purpose of amending the soil is to achieve the proper nutrient profile and pH for your crops and also improve the soil structure. Performing a soil test prior to planting can guide you toward which amendments to use.

The string in the foreground was used to ensure the beds were even across the front; the stakes in the background were used to ensure each bed was even and spaced evenly in relation to the others.

3. **Prepare the soil.** This helps to incorporate any amendments you may have applied. Tilling can also remove or incorporate plant debris from the previous year, destroy weeds, and decrease the number of insects that may have overwintered in the soil. Do not till when the soil is wet, as that may promote compaction and damage soil structure. On a small scale, tilling can be completed with a broadfork. The Tilter and the Tillie are electric tools that till larger areas. For quite large areas, use a gas-powered rototiller or a rototiller attachment for a compact, garden tractor.

Beds were formed using the Tillie, smoothed with a Bed Preparation Rake, and firmed with a Seed Bed Roller.

4. **Level and smooth the bed.** This is most easily achieved by using a rake, such as the Bed Preparation Rake. Leveling and smoothing the bed allows any seeders to move easily without hitting any bumps.
5. **Firm the bed.** For precision seeders with very fine moving parts, a firm bed prevents soil from getting caught in the wheels. This can also help further smooth the bed. The Seed Bed Roller, with additional weight placed in the rack on top, is recommended.
6. **Remove weeds.** If possible, wait a few days for any weeds to emerge. Use a flame weeder or manually remove any weeds prior to planting. Smooth the bed again, if necessary.
7. **Seed the crop.** Select the best seeder for the crop and size of the area you're planting – for more details on seeders, the Materials section. Plant the crop.

## SOWING TO THINNING

Before seeding, ensure that soil temperature and moisture are adequate to promote consistent and even germination. Identify your plant hardiness zone or contact your local Cooperative Extension Service to determine appropriate planting date to avoid late-spring and early-fall frosts that can damage or destroy your crop. Seeds planted in soil that is too wet may rot or germinate poorly.

### Temperature –

Very generally, 55–65°F/13–18°C is an acceptable range for most crops, though some prefer cooler or warmer temperatures. Checking the soil temperature with a soil probe thermometer prior to sowing can be helpful.

#### **A note on temperature:**

There can be differences between air temperature, often called “ambient temperature,” and soil temperature. For direct sowing, focus on the correct soil temperature.

### Special Pre-Sowing Treatment –

Certain crops, especially many flowers, have an extra step prior to sowing the seed. These help the seed overcome dormancy barriers and can include: soaking seed, stratifying the seed, or scarifying the seed.

An example of a crop that requires a pre-sowing treatment is sweet peas, which should be soaked for 24 hours prior to sowing. Should soaking the seeds not be sufficient to break dormancy, the seeds should then be nicked with a small file or rubbed with sandpaper.

Many, but not all, pelleted seeds have been primed during the pelleting process to increase germination uniformity and break thermal or light dormancy.

### Sowing –

Sow each crop at its appropriate sowing rate, depth, and spacing between rows. When direct seeding, the sowing rate is typically higher than when seeding for transplants. Direct seeding exposes the seeds to the elements and seeding heavier can ensure there are enough seedlings for a good stand.

For seeding depth, generally, most small-seeded crops can be sown  $\frac{1}{8}$ – $\frac{1}{4}$  inch deep and larger seeded crops  $\frac{1}{2}$ –1 inch deep.

### **Crop-Specific Information:**

There's a lot of general information on seed starting that applies to all crops. However, for crop-specific information, such as timing, seeding depth, temperature, and light requirements, please refer to the information in our catalog, on the website, or on the back of the seed packet.

### Watering –

Once sown, water so that there is adequate and even moisture. Mist or lightly water small seeds to prevent displacing them. Ensure even and consistently moist, but not overly wet, conditions, until germination. Small seedlings are delicate and need consistent moisture to germinate; a dry period can kill the seedlings. Note that pelleted seeds require more water initially to split or dissolve the pellet and allow for germination.

## POST-GERMINATION

### Watering –

Water as necessary to prevent the soil from drying out. This could be as often as once per day, or not at all depending on rainfall, temperature, and sunlight levels.

### Weeding –

Weed regularly. Weeds can compete with crops for nutrients, water, and space. It is critical the keep the crop weeded until the seedlings are large enough to compete with weeds.

### Mulching –

Mulching can reduce weed pressure and conserve moisture. Once the seedlings are well-established, a layer of mulch can be added. Mulching materials can be straw, grass clippings, leaves, and many other readily-available materials – make an effort to select something that does not harbor weed seed in it. Alternatively, prior to sowing, plastic mulch can be placed on the bed. However, there are only certain seeders, the jab-types, that can sow through plastic.

**Thinning** – Thinning is the process of removing specific seedlings in high-density stands once they have their first set of true leaves. This allows the other seedlings more room to grow and have better access to nutrients. Thin the crop to the correct stand by cutting or pinching out the stem to prevent disturbing the root system of the remaining seedlings. Thinnings can be left in the soil or composted.

**Fertilizer** – If needed, after about 4 weeks post-germination, apply a soluble fertilizer. Follow the instructions on the label. Fertilize about once per week. If the crop looks green and healthy there is no need to fertilize.

## ISSUES

- **Poor stands:** This can be caused by a number of things: the soil could have been too cold or damp at time of sowing; if using a seeder, it may not have been calibrated correctly to the size of the seed, leading seeds being planted too shallow or deep; insects, birds or other animal pests could have damaged the planting; and too much water could have caused the seed to rot, just to name a few of the possibilities.
- **Bird and other animal pests:** One of the earliest challenges when direct seeding crops is to prevent the seeds from being eaten by birds, mice, and other small rodents. Shield newly-sown seeds with bird netting or row cover if birds are an issue. Repel rodents by applying Plantskydd®.
- **Slow maturity:** Transplanted crops receive ideal conditions during the germination and seedling stages, leading to faster growth. When direct seeding, you are limited by the start of acceptable planting temperatures at the beginning of the season. Ensure an early planting for long-season crops, or grow transplants.
- **Competing with weeds:** Newly-germinated and young seedlings may have trouble competing with weeds, as they won't have extensive root systems to reach nutrients or a large canopy to shade out weeds. Being attentive to weed pressure can prevent weeds from overcoming the crop.
- **Elevated risk of insect pressure:** Small seedlings are at a greater risk to insect pressure than transplanted seedlings. Their leaves are more tender and feeding by insects can do a lot more damage on a small plant. Row covers may offer some protection, plus additional warm, for direct-sown crops.

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