Growing Organic Vegetable Transplants

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Introduction

Transplanting, or indirect seeding, is the process of growing seedlings in a greenhouse or other controlled environment before placing plants outdoors. The plants are grown in a protected environment until they are the right size or the weather is optimal and they are ready to be planted in the field where they grow to maturity. Transplants are not always a favored method of establishing crops in a field. That depends on the vegetable, the environment the transplants will be grown in, and the economic returns that may be expected.

Advantages of using transplants

- Seeds are not wasted because seeds growing in a greenhouse environment have a higher germination rate than those growing in the field where various environmental factors can lead to low survival rates.
- When transplants are planted in the field, they are likely to be more uniform since they start off in the field at the same growing stage. Harvest ing times are reduced because the plants will likely ripen at the same time.
- The harvesting season is longer because trans plants yield earlier harvests. This is good news for growers who wish to grow warm-season crops in cooler climates.
- Plants get a "head start" in the greenhouse when it is too cold to plant outside. They will be ready to plant when the weather is ideal, and the crop will be ready to sell or eat earlier than usual.

Disadvantages

- Running a greenhouse involves additional expenses.
- Additional expertise and time are needed to coordinate sowing dates with planting dates in the field.
- Transporting bulky flats or cell packs between the greenhouse and the field requires more work.

Growing the transplant

Containers

Transplants are usually grown in flats, called plug trays, that range in size from 24 to 648, which refers to the number of plants per flat. The larger the number of cells per flat, the smaller each individual cell is and the less time a transplant can grow in that cell. The flat size chosen will depend on what vegetable is being grown and the size the plants have to reach before they need to be transplanted. Some vegetables grown in flats will need to be transplanted to larger cell packs if the plants get too large for the smaller cell size.

Seeds

The National Organic Rule states that if organic seeds cannot be located a grower may use untreated seeds. Seeds that have been treated can be used only if the treatment is on the National List of Allowed Substances that can be used in organic crop production (http://www.ams.usda.gov/nop/NOP/standards/ListReg.html). A seed that is treated can be used only if required by federal or state phytosanitary regulations. Seeds used to grow bean sprouts, however, are required to be organic under all circumstances.

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Media

Media used to grow transplants should serve as a reservoir of nutrients to the transplant, provide adequate gas exchange between the root and the atmosphere, have good water drainage, and be able to support the transplant. Under the National Organic Rule, potting mixes cannot contain prohibited ingredients including starter fertilizers and wetting agents. Organic potting mixes are available, but a grower can also mix his or her own. If a grower chooses to make a mix, there are a variety of materials to mix together to meet the needs of a transplant. For more information, please refer to ATTRA publications listed below.

Sowing

Immediately after sowing, the flats should be watered with a fine mist or watered from the bottom by being placed in a tray of water. This keeps the seed from washing out of the flat or being buried in the media. After sowing, the media should not be allowed to dry out. This can be accomplished by covering the flat with a sheet of glass. As soon as the seeds germinate, moisture should be decreased to avoid damping-off. Damping-off is a fungal disease caused by excessive moisture and low temperatures (68° F). Keeping the media warm (77° F) can increase germination rates as well as avoid damping-off.

When the plants have two or three true leaves, it is time to transplant them either into the field or into a larger peat pot or cell pack. This depends on the species and how large the plants need to grow before they are placed in the field.

Fertilization

The food stored in the cotyledon of a seed is all that a seed needs to germinate. However, once the seeds germinate, it is necessary to supply the growing seedlings with nutrients. Since synthetic fertilizers are not allowed under organic production, growers must find alternative organic methods of supplying nutrients to their transplants.

Organic growers can feed their transplants by incorporating fertilizers such as compost into the media or by adding soluble materials such as fish powder or fish emulsion fertilizers with the irrigation water. Foliar feeding can be used to supplement these methods. For more information, go to **Sources of Organic Fertilizers & Amendments** http://attra.ncat.org/attra-pub/orgfert.html#animal.

Irrigation

Avoid over- or underwatering transplants. Overwatering can result in succulent plant tissue that may lead to disease. Underwatering plants can stress a plant, leading to death or stunted growth. Keep an eye on the transplants to make sure they do not dry out. In general, more water is needed when the plants get bigger, when the temperature gets warmer, or when there is more sunlight.

Hardening

When a plant is ready to be placed in the field, it needs to be acclimated to field conditions to reduce shock or stress to the transplant. Hardening is accomplished by giving the plants less fertilizer and water and/or lowering the temperature seven to fourteen days before transplanting them to the field.

Factors affecting transplant success

Root regeneration

Generally, crops that are easy to transplant form new roots quickly and are efficient in absorbing water (tomato, broccoli, cabbage, and cauliflower). Plants that are moderately easy to transplant include celery, eggplant, and peppers. These plants form new roots quickly but do not absorb water as efficiently. Sweet corn, cucumber, and summer squash are difficult to transplant because their root systems are slow to regenerate after being injured during transplanting.

Transplant age

A transplant is considered ready for transplanting to the field after four to six weeks of growth in the

greenhouse. At this stage, the transplant is still young and actively growing. However, the time to transplant may depend on the type of vegetable being grown as well as the variety. For a list of times to transplant some common vegetable crops, please refer to http://www.imok.ufl.edu/veghort/docs/age_072202a.pdf.

Container size

Although growing transplants in containers with smaller cell sizes increases the number of plants that can be grown, it is not clear what effect smaller cell sizes will have on field performance. In general, the smaller the cell size, the less room a root has to grow. Restricting the growth of a transplant's roots can cause the roots to compete for nutrients and decrease the amount of air present in the media. Knowing when roots become restricted can help a grower know how long to keep the transplants in a specific size of container.

Resources and References

- Lorenz, O.A., Maynard, Dan. 1988. **Knott's handbook for vegetable growers. 3rd ed**. Wiley, New York.
- **Organic potting mixes for certified production** http://attra.ncat.org/attra-pub/potmix.html
- **Organic plug and transplant production** http://attra.ncat.org/attra-pub/plugs.html
- Scott, NeSmith, Duval, John. 1998**. Transplant Production and Performance: The effect of container size**. HortTechnology. 8(4): 495-498. http://www.imok.ufl.edu/veghort/docs/cell_size_072602a.pdf
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- Vavrina, Charles S. 1998. Transplant age in vegetable crops. HortTechnology. 8(4): 550-555. http://www.imok.ufl.edu/veghort/docs/age_072202a.pdf