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Seeding and Transplanting

Handling Growing Media

How soilless growing media is handled can greatly influence the air space and available water for plant roots. The major goal is to preserve the air space or porosity to insure healthy root growth.

Add water to peat-based mixes before filling plug trays to help create more aeration. A general rule of thumb is to squeeze the mix. Satisfactory filling moisture is achieved if the slightest bit of visible water appears between your fingers. Most growers work with a moisture level between 45 and 55 percent by weight. If mixing your own media, thoroughly mix components, but do not over-mix.

To prevent compaction that encourages damping off diseases and poor root growth, lightly fill containers, including plug trays, and brush the excess media off the top. Once filled, avoid nesting or stacking trays on top of one another. Stacking containers causes compacted media and reduced air space. This damage cannot be remedied after creating this compaction. Try to stagger trays.

When dibbling seed trays, try to avoid compressing the mix; gently press to ensure a small indentation for seeds.

Production Schedules

Starting seeds too soon, will result in overgrown transplants of poor quality. The following are guidelines for growing vegetable bedding plants. Note the number of weeks from seed to sale or transplant. This will vary according to different growing conditions and should serve only as a guide.

Table 17: Germination and Growth of Vegetable Transplants

Crop	Germination	Optimum Day	Minimum Night	Approx.	Approx. No.
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	Temperature* (°F)	Production Temperature** (°F)	Temperature** (°F)	No. Weeks to Sale**	Weeks to Transplant in Field*
Basil	70***	65 to 70***	62 to 65***	4 to 7	4 to 6
Broccoli	85	65 to 70	55 to 60	5 to 7	5 to 7
Cabbage	85	65 to 70	55 to 60	5 to 7	5 to 7
Cantaloupe	90	75 to 80	60 to 70	2 to 3	4 to 5
Cauliflower	80	65 to 70	55 to 60	5 to 7	5 to 6
Celery	70	65 to 70	55 to 60	8 to 10	5 to 7
Cucumber	90	75 to 80	60 to 70	2 to 3	2 to 3
Eggplant	85	70 to 75	60 to 65	6 to 8	5 to 7
Lettuce	75	65 to 70	55 to 60	5 to 7	4
Onions	75	65 to 70	55 to 60	6 to 8	10 to 12
Peppers	85	70 to 75	60 to 65	6 to 8	5 to 7
Tomatoes	85	70 to 75	60 to 65	5 to 7	5 to 7
Watermelon	90	75 to 80	60 to 70	2 to 3	3 to 4

References:

* Maynard D.N. and G.J. Hochmuth. 2007. Knott's Handbook for Vegetable Growers. Fifth Edition

**Tips on Growing Bedding Plants, Ohio Florists Association, 1987 and 1999 Editions.

***2017 Seed Product Information Guide. Ball Seed, PanAmerican Seed, Kieft Seed.

http://www.ballseed.com/PDF/15539_PIG_ENG_BSC_LR.pdf

Note: The greater the difference between daytime and nighttime temperatures, the more plants will stretch (stems elongate). See [Managing Plant Height](#).

Germination Tips

Warm temperatures and uniform moisture are needed to ensure successful germination and get the plants off to an even start. Many germination chamber systems are commercially available including custom built germination units. Growers often use bottom heat or root zone heating to provide warm, even temperatures. Rubber tubing or mats with hot water are placed on the bench top under the plants. A weed mat barrier is placed on the top of the bench to help spread the heat with skirts on the side to help contain the heat. It is important to remove flats from the germination chamber as soon as radicles break through the seed coat to prevent seedling stretching. Experience and experimentation with your total seeding system is the key to uniformity and success.

Celery

Celery seeds germinate best at 70°F with continuous light. To prevent bolting, maintain greenhouse

temperatures above 55°F.

Cole Crops (Cabbage, Broccoli, Brussels sprouts, Cauliflower)

To prevent premature seeding or bolting, avoid temperatures below 50°F. The cold temperatures cause the development of premature heads or "buttoning" in cauliflower and broccoli. Any stress or check in growth results in a "wirestem" and plants will not become well established in the field resulting in reduced yields and performance.

Eggplant

Eggplant seed can be directly sowed into 50 cell trays to shorten the time needed to produce transplants by approximately one week. Eggplants are susceptible to chilling injury and should not be grown below 40°F. Any stress or check in growth will result in tough woody stems and transplants that will have a tough time getting started later in the field or garden.

Tomatoes

Exposure of tomato plants to temperature below 60°F will likely result in rough fruit (catfacing) on the first few clusters. Transplant young seedlings into 2" to 3" containers when they have two true leaves and grow on until planted in the field. For earliest production, some growers finish their transplants into 6" or larger containers.

Peppers

Germination is very slow at lower temperatures. Seedlings develop well at 75°F daytime and 65°F night temperatures. Seeds may be directly sown into 72-cell trays for early production. Peppers are prone to damping off diseases especially if the media is compacted. Jalapeno pepper varieties may require much more time in the greenhouse than bell peppers to achieve adequately size plants.

Cucurbit Crops

Cucurbits do not transplant well, and are best to sown in the final container. After germination, excess plants can be thinned. Cucurbit transplants should be field set with a maximum of two true leaves and before plants get leggy when exposed to high daytime temperatures.

Transplants

Transplants can be grown in all types and sizes of containers. Seeds are sown in open seed flats or in single-cell (plug) trays. Before sowing, decide whether germination and finishing will occur in the same container or whether seeds will be sown in one container followed by transplanting to a finishing container.

Germinating and growing small plugs requires more attention to detail and is probably best done by local, specialty propagators. Trays for transplants vary in size from 32 cells to 500 cells. The number of plants in a tray depends on the cell size needed for each plant. Large cell sizes such as 32, 50 or 72 are often used for vine crops and early harvests. Plants are less stressed in larger cells if it is necessary to hold plants for several days before transplanting in the field. Mid-size cell sizes such as 72 and 128 are suitable for tomatoes, peppers, eggplant, and Cole crops. Small cells such as 128,

200 or 288 may be used for crops such as lettuce or onions. Before making a decision, consider your available labor, and amount of greenhouse space, and the cost and benefit of each production method. Plug seedlings should be transplanted as soon as possible after they have reached finished size.

Some growers will produce their vegetable transplants for sale to home gardeners in biodegradable pots such as coconut husk fiber (coir) pots, fiber or jiffy peat pots or composted manure (Cowpots) pots or 80% wood fiber, 20% peat (Fertil) pots. Cowpots and Fertil pots are OMRI listed.

Purchased plugs: Purchase transplants from a reputable local supplier to minimize the potential of importing severe disease and insect problems that are common in other regions of the country. Open and unpack the boxes immediately upon arrival and check the physical condition of the plants. Inspect plants for root and foliar diseases and for insects and mites. Report any damage or discrepancies immediately to your supplier (most companies want to hear within 24 hours). Photographs are also helpful.

Place plant trays on benches and water thoroughly with plain water (no fertilizer); be sure that plugs on the edges of the trays are thoroughly watered. Plugs can dry out quickly due to the small volume of growing medium; check the trays 2 or 3 times daily for watering. After the initial watering, apply a general-purpose fertilizer (such as 20-10-20) at 50 to 60 ppm of nitrogen at every other watering. Allow plants to acclimate to the greenhouse conditions for 24 to 48 hours before transplanting.

Transplanting to a finishing container: Water the plug trays thoroughly 2 to 3 hours before transplanting; this aids in removing the plugs from the trays. Prepare your cell packs or pots by filling them with pre-moistened growing medium and pre-dibbled holes for the plugs. Lightly fill containers and brush off excess. To prevent compaction, do not pack down or stack ("nest") filled flats.

Take special care during transplanting to handle plants gently and avoid planting too deeply. Stems of tender seedlings can be easily injured when workers grasp or "pinch" the stems too tightly. This often leads to stem cankers causing plants to wilt and die. Plant plugs at the same depth as the original plug. Some transplants may have elongated stems and it is tempting to bury the stem. Resist the temptation, except for more adaptable tomato plants.

See information under the specific crops for additional information on transplant production and planting.

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