Vegetable Transplant Production

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Choosing the correct vegetable variety is the most important decision a produce grower can make. Many varieties are adaptable to a wide geographical region but many heirlooms grow and yield best in certain regions of West Virginia. There are hybrid and open pollinated types of vegetables available for growers. Open pollinated vegetables are varieties which breed true to type each growing season. Seed from open pollinated vegetables can be saved from one growing season to the next. Heirloom varieties are mostly open pollinated. Open pollinated varieties can have a diversity of sizes, shapes and yield characteristics, but generally will not consistently have optimal disease resistance relative to hybrid varieties. Hybrid varieties are the offspring of two dissimilar parents and tend to possess superior vigor relative to open pollinated vegetable varieties. Seed collected from hybrid varieties can not be saved from one growing season to the next since the offspring will not show the same characteristics as the plant from which it was collected. Hybrid seed tends to be more expensive than open pollinated seed.

Seed quality is extremely important for obtaining a uniform stand of vegetables. Remember the old adage "Good seed doesn't cost, it pays'. There are many seed companies which sell quality seed. Some seed companies tend to be superior with respect to certain types of vegetables. Choose seed which is undamaged and uniform in size (Figure 1). Small seed such as lettuce, onions and carrots can be purchased as pelleted seed for easier seeding. Pelletized seed generally does not store well and should be used within the current gardening season. Raw seed left over from the garden season should be stored in a plastic containers, ziplock bags or jars and placed in a cool, dark and dry environment such as a refrigerator or basement for use the following year. High temperature and humidity ages seed. Most vegetable seeds when stored in the correct environment will be viable for 2-3 years after purchase. A quick germination test can be performed before sowing to test seed viability.

Figure 1. Quality seed results in high quality, uniform germination and vigor of transplants.

Many vegetables can be established as transplants (Table 1). Transplants will accelerate early harvest and result in a uniform yield. Using transplants reduce labor for thinning and ultimately saves seed costs. Transplants can be purchased from commercial greenhouses or grown in the home or your own greenhouse. Transplants should be stocky with short internodes, a thick stem, free of diseases or insects with a healthy root system (Figure 2).

Vegetables are generally classified as warm- or cool-season vegetables. Cool-season vegetables are hardy or frost-tolerant and the seeds germinate at lower soil temperatures relative to warm season vegetables. Cool season vegetables include many popular vegetables such as beets, broccoli, cabbage, lettuce, kale, cauliflower, kohlrabi, leeks, onions, peas, spinach and radish. Many cool season vegetables can be grown in the spring and fall in West Virginia. Depending on location within the state and whether season extension tools (e.g., row covers, low tunnels or high tunnels) are used, most cool season vegetable crops are transplanted 2-6 weeks before the last spring frost. For fall production, cool season vegetables are transplanted 4-8 weeks before the first fall frost. To determine how late to plant in the fall in your region, there is a simple formula used by growers: *No. of days from seeding to harvest + avg. harvest period + fall factor (2 weeks) + frost sensitivity*. So, for example, cucumbers are 55 days from seeding to harvest + 14 days for the lower light/temps of fall + 21 days of harvest + 14 day frost buffer = seeding 104 days before the first frost date (October 15) or approximately July 1.

Warm season vegetables are not frost tolerant and must be transplanted after the last frost of the season. Transplanting before the frost-free date requires row covers, hot caps or low tunnels to prevent damage to the plants. Warm season vegetables include crops such as beans, tomatoes, melons, peppers, sweet corn, squash and eggplants.

Before transplanting, it may be necessary to condition or harden off the plants. Conditioning the plants can be accomplished by reducing the amount of fertilization a week before transplanting. The plants can be placed in the open for a couple hours each day if the temperatures are not too cold (>50°F). Brushing the transplants once per day or allowing a fan to blow air on the plants will also help in conditioning them for transplanting in the open field.

Table 2. Vegetables which can be transplanted in West Virginia.

Crop	Transplant age	Optimum germination temp. (°F)	Transplant hardiness[z]	Container size[y] for transplant production
Asparagus	10-12 weeks	65-70	Good	72-cell
Beets	4 weeks	65-70	Special care	128-200-cell
Broccoli	4-6 weeks	65-70	Good	50-72-cell
Collards	4-6 weeks	65	Good	50-72-cell
Cabbage	4-6 weeks	65	Good	50-72-cell
Cauliflower	4-6 weeks	65-70	Good	50-72-cell
Celery	10-12 weeks	65-70	Fair	128-cell
Corn (Sweet)	2-4 weeks	70-75	Fair	50-128-cell
Cucumber	2-4 weeks	70-75	Fair	50-cell
Eggplant	4-8 weeks	70-85	Good	50-cell
Kale	4-6 weeks	60-65	Good	50-128-cell
Kohlrabi	4-6 weeks	65	Good	50-75-cell
Leek	4-8 weeks	60-65	Fair	128-cell
Lettuce	2-6 weeks	60-65	Fair	128-cell
Melons	4 weeks	70-75	Good	50-72-cell
Onion	8 weeks	65-70	Good	128-200-cell
Peas	4 weeks	60-65	Special care	50-72 deep insert
Pepper	6-8 weeks	70-75	Good	50-72-cell
Pumpkin	2-4 weeks	70-75	Fair	50-cell
Squash	2-4 weeks	70-75	Fair	50-cell
Tomato	6-8 weeks	65-75	Good	36-50 cell

[z]Refers to survival of transplant after transplanting.

[y]Number of cells per tray.

Figure 2. Early-season transplant production requires supplemental lighting.

(Photo credit: D. Hatfield)

Table 2. Optimal seeding and transplanting date for vegetable crops in West Virginia.

Vegetable	Seeding date[z] for transplants	Transplant age (weeks)	Transplanting date
Asparagus	February	12	April
Beet	January-February; August	6	March-April August-September
Broccoli	February-March or July	6-8	April/July 1-July 20
Cabbage	February-March or July	6-8	April/August
Cantaloupe	March-April	6-8	April-June
Cauliflower	February-March or July	6-8	April/July 10
Corn, sweet	March-May	4	April-July 3
Cucumber	April or July	3-4	May or July 1-15
Eggplant	April-May	6-8	May-June
Kale	February or September	4-6	March- October
Leek	January-February	10-12	April-May; August*
Lettuce	January-May	5-6	April-September
Pea	January-February; August	4	February-April; August 5
Squash	May-June	2-3	May-June
Tomato	March-May	6-8	May-June
Watermelon	April	4-6	May-June

[z]Transplants for spring and fall production.
*overwinter

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