Growing Vegetable Transplants

J.E. Motes
Extension Vegetable Crops Specialist

Warren Roberts
Extension Vegetable Specialist

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Earliness, economy of space, and lengthening of the growing season may be obtained by transplanting many vegetables instead of sowing the seed directly in the field or garden. Moreover, with some kinds of vegetables, it is almost impossible to establish good stands from seed sown directly in the field or garden.

Growing transplants requires skill and care. Factors such as light, temperature, humidity, watering, and the physical condition and fertility level of the plant-growing media must be considered.

Growing Media

Media for growing transplants may range from a completely artificial material, such as vermiculite or perlite, to field or garden soil. In most instances topsoil from the garden is not suitable because it dries out rapidly, becomes hard, lacks good physical condition, and may be too fertile or not fertile enough.

There are many different soil mixtures suitable for growing transplants. Some suggested mixtures are:

1. 1/3 topsoil, 1/3 peat, and 1/3 sharp sand
2. 2/3 soil, 1/3 peat
3. 1/3 soil, 1/3 peat, and 1/3 vermiculite

Mix all materials thoroughly. Run a soil test so that necessary corrections in soluble salts, pH, and fertility level can be made. The soil mix is best prepared long in advance of use and oven-sterilized, steam-sterilized, or chemically fumigated to eliminate weed, insect, and disease problems.

Vegetable plant growers should be concerned with the source of soil for plant-growing mixes. Soil can be contaminated with herbicides that are toxic to seedlings and transplants. Select a soil free of potentially toxic chemicals.

Standard "soil mixes" for plant growers are available. Some standard brands are: "Jiffy Mix", "Redi Earth", and "Pro-Mix". These mixes contain various proportions of materials such as peat, perlite, vermiculite, and sand. Although slightly more expensive in terms of materials, these artificial mixes produce excellent transplants. Commonly, growth is more uniform, rapid, and easily controlled than in soil mixes. In addition, sterilization by the grower is not necessary when these commercially prepared mixes are used.

The following formula for a soil-free growing media is practical for growing transplants.

Material	*Amount for One Cubic Yard of Mix*
Shredded sphagnum peat moss (loose)	11 bushels
Horticultural vermiculite (sizes 2,3,4)	11 bushels
Dolomitic limestone (pulverized)	2.5-5 lb.
20% superphosphate (pulverized)	1.25-2.5 lb.
Potassium nitrate or calcium nitrate	1 lb.
Trace elements -	
a) Fritted trace elements (e.g. FTE)	1 oz. or
b) Borax (11% boron), plus chelated iron (e.g. NaFe, 138, 330)	0.5 oz. (Borax) + 1 oz. (chelate)

Fertilize with 15-15-15 at transplanting (4 to 6 oz./100 gal.) and then at weekly intervals (8 to 12 oz./100 gal.). If chlorosis develops, apply supplemental chelated iron at rates recommended on the product label.

In calculating the amount of media needed, 1 cubic foot of medium will fill approximately 275 pots 2 1/4 inches square or 20 packs measuring 5 by 8 inches by 2 3/4 inches deep.

Starting the Plants

Two basic systems are used for starting seedlings:

1. Seeding directly in small pots or growing containers.
2. Seeding into flats and later transplanting into growing containers.

The first method involves less handling of the small plants. Growers who seed in flats and transplant into pots may do so because of space limitations. Vine crops (cucumbers, muskmelon, watermelon, pumpkin, and squash) must be directly seeded into growing containers since they will not survive if transplanted as seedlings.

When seeding is done in flats, seeds are sown in rows two or three inches apart. Seed should be distributed eight to ten per inch in the rows. For depth of planting refer to Table 1.

For good germination the soil must be kept moist. To help maintain proper temperature (see Table 1) and moisture for

germinating seeds, the flats or pots may be covered with plastic until the seedlings break through the soil.

Growing On

As soon as seedlings emerge they should be grown at a somewhat lower temperature than that required for germination (see Table 1). The soil surface should be wet only as often as necessary to keep the young plants growing.

Low light, excessive nitrogen, and high temperature cause excessive stem elongation. Seedlings exposed to a high light level (full sunlight) will mature quicker and produce higher quality transplants.

Most growers begin transplanting seedlings when the first true leaves are forming, usually two to three weeks after sowing seed. Some prefer to begin when the plants are quite small. Set the seedling slightly deeper than it was growing in the seedling flat. Take care in firming the soil around the plant to avoid injuring the tender stems. Water seedlings thoroughly immediately after transplanting to prevent excessive wilting.

Table 1 gives spacings for transplanting to other flats or containers. Later, individual plants, flats, or containers may be spaced further apart to improve plant quality.

Transplants should never be overwatered except to flush excess salts from the growing medium. Slight wilting of plants periodically is not harmful. Adjust water, temperature, and nitrogen fertilizer to control growth when plants are growing too fast.

Gradually harden plants for a week before transplanting them into the field or garden. Hardening prepares plants to withstand conditions such as chilling, high temperatures, drying winds, and water shortages. Withholding water, nitrogen fertilizer, and moderately lowering temperature are the best ways to harden transplants. Avoid overhardening transplants since this will cause the plants to resume growth slowly after being set in the field or garden.

A young transplant is much better than an old transplant. One of the most common errors made by transplant growers is to start plants too early in the season. When held, transplants become too old and woody and are slow to resume growth after transplanting.

For maximum season's yield, transplants should never have fruits, flowers, or flower buds before transplanting. An ideal transplant is young, growing fairly rapidly, but slightly hardened at transplanting time. It should never be overhardened nor too soft when transplanted. Rapid growth following transplanting assures a well established plant before fruit develops.

Follow these steps to produce disease-free transplants:

(1) Use disease-free seed or seed treated to rid it of disease-causing organisms.
(2) Use plant growing containers free of disease-causing organisms.
(3) Use a planting medium free of disease-causing organisms.
(4) Follow strict, "kitchen clean," sanitary practices.
(5) Keep plants and soil from remaining wet for long periods of time.
(6) To help prevent damping-off diseases, it may be necessary to use fungicide sprays or drenches.

Table 1. Vegetable Seed Sowing, Growing Temperature and Spacing Guide.

Kind of Vegetable	*Approx. No. of Seeds per oz.**	*Approx. No. of Plants to expect per oz.*	*Time Needed to Grow Plant (Weeks)+*	*Seed Planting Depth (Inches)*	*Temperature Range for Germination (°F)*	*Plant Growing Temperatures °F ++* Day	Night	*Minimum Space forTransplants (Inches)[a]*
Cabbage	7,000	4,000 - 5,000	5 to 7	1/2	70 - 80	60 - 70	50 - 60	1 1/2 x 1 1/2[b]
Cauliflower	10,000	3,000 - 4,000	5 to 7	1/4 to 1/2	70 - 80	60 - 70	55 - 60	2 x 2[b]
Broccoli	10,000	4,000 - 5,000	5 to 7	1/4 to 1/2	70 - 80	60 - 70	50 - 60	2 x 2[b]
Brussel Sprouts	8,500	4,000 - 5,000	5 to 7	1/4 to 1/2	70 - 80	60 - 70	50 - 60	2 x 2[b]
Head Lettuce	20,000	7,000 - 10,000	5 to 7	1/4 to 1/2	60 - 75	60 - 70	50 - 60	1 1/2 x 11/2[b]
Onions	9,500	4,000 - 5,000	8 to 10	3/8	65 - 80	60 - 70	45 - 55	------
Celery	70,000	10,000 - 15,000	10 to 12	1/8	60 - 70	65 - 75	55 - 65	1 1/2 x 1 1/2[b]
Tomatoes	10,000	3,000 - 4,000	5 to 7	1/4 to 1/2	70 - 80	70 - 80	60 - 65	2 x 2[b]
Peppers	4,500	1,000 - 1,500	6 to 8	1/4 to 1/2	75 - 85	70 - 80	60 - 70	2 x 2[b]
Eggplant	6,000	1,500 - 2,500	6 to 8	1/4 to 1/2	75 - 90	70 - 80	65 - 70	2 x 2[b]
Cucumber	1,000	400 - 500	3 to 4	3/4 to 1	70 - 95	70 - 90	60 - 70	3 x 3[c]
Muskmelon	1,000	400 - 600	3 to 4	3/4 to 1	75 - 95	70 - 90	60 - 70	3 x 3[c]
Watermelon	225 - 300	150 - 175	3 to 4	3/4 to 1	70 - 95	70 - 90	60 - 70	3 x 3[c]
Squash (Summer)	225 - 300	100 - 300	3 to 4	3/4 to 1	70 - 95	70 - 90	60 - 70	3 x 3[c]

* Varies with variety and seed sample

\+ Depends upon type of plant-growing structures used and heating facilities available

++ Reduce day termperatures 5° to 10°F during cloudy weather.

[a] Depends on size of plant desired, type of container, and the length of time plants are to remain in the flat or container.

[b] For growing in flats.

[c] Seeded directly into individual containers.

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