

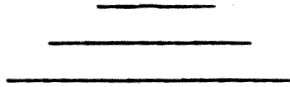
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**VEGETABLE
PLANT
PRODUCTION**

By

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The practice of transplanting certain vegetable crops is extensively used in Oklahoma. The principal purpose is to advance the season of maturity. This is important in order to have the crops develop and mature under favorable weather conditions, rather than be exposed to excessively high temperatures and drought periods of the late summer.

This publication reports general information concerning seeding, transplanting, and growing vegetable plants. Information concerning hotbeds and cold frames is contained in U.S.D.A. Farmers Bulletin 1743.

Importance of Using Good Plants

The right kind of plants, when properly handled, can make as much difference in time of maturity, quality, and yield as any other factor. Commercial growers are concerned about early production as well as high yields because of the higher price usually received for the earlier harvests.

Cauliflower, broccoli, and head lettuce can be successfully grown in the spring by using good plants and setting early. High, early yields of vine crops such as cucumbers, muskmelons, and watermelons can be obtained economically by starting hills of plants in pots or plant bands and transplanting to the field.

The production of vegetable plants for transplanting is not a difficult operation but does require adequate facilities and careful attention for consistently good results. The principal factors involved are light, temperature, moisture, space, soil, disease and insect control, and proper timing. The following suggestions are based on observations made during experimental tests of plant-growing methods. Results of these tests are being published separately.

Time of Seeding

In general, approximately eight weeks are required to grow plants in the hot bed. Best results can be expected when seed are planted in different sections of the State as follows:

- Southeast - Cabbage and head lettuce - January 1.
- Tomatoes, peppers, and egg plant - February 1.
- Sweet potatoes - March 1.

Southwest - Cabbage - January 15.

Tomatoes, peppers, and egg plant - February 15.

Sweet potatoes - March 10.

Central - Cabbage and head lettuce - January 20.

Tomatoes, peppers, and egg plant - February 20.

Sweet potatoes - March 21.

Northern - Cabbage and head lettuce - February 1.

Tomatoes, peppers, and egg plant - February 25.

Sweet potatoes - March 25.

Seeding Media

When plants are to be transplanted into flats or individual containers within a few days after germination, it is desirable to seed in soil or other material that will crumble easily, hold moisture, and stay porous enough to provide good aeration. A mixture of one part sand, one part peat moss, and one part sandy loam soil is very satisfactory. The soil should be sterilized to kill insects, diseases, and weed seeds. Steam sterilization is most desirable; however, fumigation with methyl bromide is very satisfactory. In recent years, vermiculite (mica rock expanded by heat treatment) has been used extensively as a seeding medium, and has given good results.

Seeding and Transplanting

Seeds planted in special seeding soil or vermiculite should be planted in rows at a rate of 10 to 15 seeds per inch. With rows two inches apart, as many as a thousand seedlings can be started in a standard sized flat (14" x 20"). The furrows are opened to a depth of 1/4 to 1/2 inches for planting most vegetable seeds. It is best to water the flats after planting by placing them in a shallow pan and allowing the moisture to soak up through the seeding medium. This is important when using vermiculite. Rapid germination of a high percentage of the seed will be secured if the flats are placed in a room or cabinet where a uniform temperature is maintained. Seed of such warm temperature crops as tomatoes, peppers, and egg plant germinate best at temperatures around 80° F. Cabbage, onions, lettuce, etc. should be germinated at about 70° F.

The seed flats should be covered to prevent rapid drying until seedlings start to come up. It may be necessary to water the seed flats again three or four days after the initial watering. The second watering should be done in the same manner as the first. Flats should be uncovered and exposed to full light as soon as seedlings start to emerge.

Seedlings should be transplanted into pots, bands, flats, or beds as soon as the cotyledon leaves are well expanded and before the first true leaf appears. This stage is reached in seven to ten days after the seed is planted. Seedlings are easily separated because lateral roots have not developed to any extent at this age, and a minimum check in growth results from the transplanting.

Transplanting the seedlings is accomplished by making holes in the soil, with a dibble (pointed stick). Grasp the seedling by a cotyledon leaf and lower it into the hole. The top of the seedling should be 1/4 to 1/2 inch above the soil surface. Close the hole by pressing the dibble or a finger into the soil about a half inch from the seedling. The soil should be pressed together against the plant roots. A common mistake in transplanting is made by pressing the soil down with three or four fingers rather than using one finger or the dibble, thus closing only the top of the hole, and leaving the roots suspended in the lower part.

The plants should be watered soon after transplanting. Watering at this time is important. Apply water gently by using a sprinkling can, or a hose equipped with a nozzle. Water sufficiently to thoroughly wet the soil to the bottom of the flat or container. This settles the soil and brings it in contact with the roots of the plant.

Spacing of Plants

An important factor in the production of high quality plants is the amount of space provided each plant in the flat or container. Plants provided with adequate space are stronger and more vigorous than those grown in a limited space, and thus are better able to adapt themselves to the change in environment when transplanted.

High quality plants are relatively expensive because of the extra space required in plant beds, the labor required for thinning or transplanting, and the cost of individual containers. Most plants should be allowed a minimum of four square inches of bed space. Plant bands and pots for starting vine crops should be at least 2 inches in diameter.

Soil for Growing Plants

Although a friable soil is desirable for growing plants, it should be cohesive enough to hold together so that plants can be removed from flats, beds, or containers, with a block of soil retained on the roots. Sandy loam or sandy-silt loam soils that have a high organic matter content are preferred. It is advisable and frequently necessary to add organic matter to the soil to improve the texture. Compost, well rotted manure, and peat moss are most commonly used. If soils are very cohesive, some sand in addition to the organic matter can be added to help improve the texture.

The soil in many parts of Oklahoma is relatively low in phosphorous. In preparing soil for growing plants, it is desirable to add two to three pounds of 20% superphosphate to each 100 square feet of bed space. Two ounces per cubic foot of soil is adequate for soil used in flats and containers.

Soil should be sterilized or fumigated to kill insects, nematodes, weed seeds, and diseases. Methyl bromide fumigation is very effective and conveniently accomplished. The cost of the chemical varies from 50 to 85 cents for each cubic yard of soil treated.

Care of Plants

Temperature and moisture are of primary importance in the care of plants. Plants of cool season crops like cabbage and lettuce grow best when night temperatures are between 50 and 55° F. Warm season plants, such as tomatoes and peppers, grow best when night temperatures are 60 to 65° F. The temperature during the daytime should be 5 to 10 degrees higher on cloudy days, and 10 to 15 degrees higher on clear days.

Plant beds and greenhouses are ventilated principally to keep the temperature down to the proper level when the sun is shining and to dry the plants off after watering.

The rate and type of growth made by plants can be influenced a great deal by the amount of moisture supplied. An abundance of moisture stimulates growth but causes the plants to be weak and succulent. To produce stalky plants, it is necessary to water carefully, and only when the soil becomes fairly dry. It is best to water on a clear day, and early enough in the day to allow plants time to dry before dark. When water is applied, a sufficient amount should be put on to moisten the soil three inches deep in the bed, or to the bottom of flats or containers. This will encourage good root development throughout the soil. Light, frequent applications of watering results in a concentration of roots in the upper layer.

Plants should be hardened sufficiently to withstand outside conditions before being transplanted to the field. Hardening is accomplished by providing conditions which reduce the rate of growth. Exposing plants to lower temperatures and reducing the moisture supply are the two ways by which this is usually done. Apply only sufficient water to prevent the plants from wilting seriously. Plants grown in flats or containers in greenhouses can be moved to cold frames for hardening. Cold frames provide cooler temperatures but give protection in case of severe weather. A hardening period of 7 to 10 days is generally sufficient. Excessive hardening will result in a serious check in growth.

Plants may need an application of nitrogen fertilizer if the soil is low in this element. Frequently, the available nitrogen supply in the soil is used up in three to five weeks. Plants reflect an inadequate supply of nitrogen by a pale green color, and a reduction in the rate of growth. A convenient way to apply

nitrogen is to dissolve one-half ounce of ammonium nitrate or ammonium sulphate in a gallon of water and sprinkle this solution on the plants just previous to watering. High nitrogen fertilizers for foliage sprays are available under various commercial trade names and work very well when used according to directions.

Pest Control

Insect and disease problems are held to a minimum by careful watering and by sterilizing or fumigating the soil. When in the seedling stage, all plants are subject to attack by damping-off organisms. Damping-off organisms can be controlled by sterilizing the soil before planting, and by watering early enough in the day to allow the soil to dry before night. Spraying with Fermate or Captan is helpful in stopping the spread of diseases if any appear.

The most prevalent insect pest is aphids (lice). They can be readily controlled with nicotine sulphate or parathion. Aramite and parathion are effective for controlling red spiders.