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W. H. Brokaw, Director, Lincoln

Extension
Circular
1269

GROWING TOMATOES IN EASTERN NEBRASKA FOR COMMERCIAL CANNING

H. O. Werner, M. W. Felton, J. W. Fitts, and W. D. Tate

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High yields of No. 1 grade tomatoes are imperative for success in growing tomatoes for commercial canning. Generally the average cost of producing a ton of tomatoes decreases as the yield per acre increases. High yields depend to a great extent upon weather conditions; however, the grower can do many things to bring about maximum yields in the most favorable seasons or to assure the possibility of satisfactory yields in unfavorable seasons. Most fields of eastern Nebraska canning tomatoes have come into production too late in the season to permit all of the crop to ripen and frequently disease and insect damage has reduced quality and yield. To rectify this situation, varieties should be chosen carefully and attention should be given to such matters as source and quality of plants, fertility and location of land, time of planting, moisture supply, and insect and disease control.

I. Varieties

A. For production of early fruit (August):

Use determinate varieties - (good plants). Victor, Bounty, Red Cloud, Firesteel (semideterminate).

B. For midseason fruit (late August, early September):

Use midseason, indeterminate varieties such as John Baer and Sioux or make field or cold frame seedings of early, determinate varieties in April.

C. For late fruit - late September or early October:

Use Stokesdale, Marglobe, Rutgers, Baltimore, or the determinate variety Pearson.

D. General comments about varieties:

Every effort should be made to maintain rapid growth in plants of early, determinate varieties, in order that later growth will not be permanently stunted by the setting of an excessive amount of fruit on small plants. For this reason any fruits setting on very small plants should be removed promptly. Rank growing varieties are to be avoided on moist or rich soils. In general, Victor and Red Cloud are the earliest varieties; Red Cloud and Bounty produce relatively large early fruits; Firesteel produces fruits with excellent interior quality but they may ripen unevenly because of dark over-green shoulders. Red spiders may be more serious with these determinate than with the larger vine varieties.

Sioux produces the highest percentage of smooth, round, midseason fruits. Stokesdale is earlier than most of the late varieties, whereas Rutgers and Marglobe produce large fruits but many of them have deep stem-end cracks. Pearson is a late determinate variety with rugged dark green foliage; the fruits are large but tend to be more flat than those of most of the late varieties and some strains may produce a large number of fruits with hard cores.

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II. Plants to use: Use strong disease-free plants, the leaves and roots of which are in good condition at planting time. Plants should have been grown from disinfected seed of a carefully selected strain.

- A. First choice of plants is locally grown, hotbed or greenhouse plants that have been produced under proper conditions so they will be free of disease and growth will not have been retarded. Root pruning of these plants, about 10 days before setting into the field, will produce a more compact root system which will enable the plants to survive the shock of transplanting and thus result in better stands of plants which become established more quickly. For the early crop from early determinate varieties or the late crop from late varieties, seed should be sown indoors in mid-March. For a midseason or late crop - seed of early varieties may be sown in cold frames in April. For details of plant production methods see Extension Circular 1270.
- B. Second choice of plants in State Certified southern grown plants. Get these plants at least a week before setting them into the field, unpack them upon arrival and "heel in" the plants in moist soil in shallow trenches located where plants get light, thus permitting them to recover and establish new roots.
- C. Third choice is to seed directly into the field in April by dropping 3 to 5 seeds at each place and later thinning to one plant. This requires much seed, is less expensive than the use of plants, but it is frequently difficult to establish good stands of plants. The crop is frequently very late and not as heavy as when good plants are set into the field.

III. Soil and Location

- A. Do not use land where tomatoes were grown within the last 2 or 3 years.
- B. Avoid land that contains or is surrounded by weeds that may serve as hibernating places for tomato diseases or insects; such plants are buffaloburr, black night-shade, and ground cherry. Cleaning up or burning all trash in or along edges of fields may prevent later trouble with insects and diseases.
- C. Wind protection should be provided by windbreaks or interplanted rows of corn.
- D. On uplands:
 1. Deep soils are preferable. They should be supplied with moisture to a depth of at least 3 feet at planting time. If soil is moist to a depth of less than 3 feet, either look for another site or increase distance between plants.
 2. Fertility may be increased by applying 10 to 15 tons of well rotted manure or 100 lbs. of superphosphate (45% available) per acre. However, if the soil is not moist to a depth of at least 3 feet, it may be unwise to increase the fertility of the land. If sufficient moisture is not available for sustaining good growth the plants cannot profit by increased fertility and may actually be damaged by it. Phosphate may be applied in bands in the bottom of the furrow at plowing time or may be broadcast before plowing.

3. Slope of land. A north slope is preferable for late tomatoes, because it provides more favorable conditions for fruit setting and development in hot, dry weather.

South slopes may be best for very early tomatoes but yields are not likely to be as high as on north slopes.

E. On bottom land.

1. Well drained, silty soils of high fertility are best for large yields if proper varieties are used. On such land, early determinate or midseason varieties are best and large vine, late varieties should be avoided.
2. Light or sandy soils will produce early tomatoes but it will be best to increase fertility by the use of manure. Phosphorus applications may be desirable but should not be considered as substitutes for manure.

IV. Transplanting to the Field.

- A. Time: Tomatoes should be planted as early in the season as serious danger of frost has passed - this is about May 1 to 10. Such early planting is necessary in order to get a good set of fruit before hot weather occurs in July. About 45 days are required in this part of the state for fruit to develop from flower to ripe fruit. If frost seems likely to occur after the plants have been set to the field, protect the plants by covering each plant with a shovelful of soil, uncovering them after danger has passed.
- B. To utilize all rainfall, plant rows on contour lines. If planting by hand, set plants in lister furrows.
- C. Method of transplanting: To prevent drying out of plants, the roots may be puddled in thin mud. In transplanting it is not advisable to wet the upper part of plants since this will encourage the spread of disease. Unless soil is moist, apply at least half a pint of water to each plant when it is set. This is especially important on windy days. If available, 2 lbs. of ammonium sulphate or ammonium nitrate and 2 lbs. of superphosphate to 50 gallons of water may be used to stimulate early growth. Set plants deeply and pack the soil firmly around each plant. If a transplanting machine is used, follow machine to be sure every plant is set properly.
- D. Planting distance: Early determinate varieties - 3x4 feet with irrigation, 4x4 or 4x5 on dryland. Late indeterminate varieties, 4x5 feet with irrigation, 4 or 5x6 on dryland. Increase planting distances on soils of low fertility or on unirrigated uplands if soil is not moist to at least 3 feet.
- E. Mosaic is a serious disease that is very easily spread from plant to plant by hands of planters. Tobacco should not be used by anyone when working with tomatoes as mosaic is carried in some tobacco. Hands should be washed thoroughly before plants are handled. Washing hands at intervals during planting operations is also advisable. Weak, yellowish plants should be discarded.

F. Cut Worms: If cut worms are feared or appear to be prevalent, spread poisoned bait in the field two or three days before transplanting tomatoes or as soon as they are found to be doing damage. This bait is made as follows: 2 level tablespoonsful of Paris green or white arsenic or sodium fluosilicate thoroughly mixed with 3 quarts of dry bran and 1 quart of water. This can be improved by adding about 1/2 cup of molasses. Pieces of paper wrapped around each stem for an inch above and below the surface of the ground provide effective protection.

V. Care of Field after Planting:

- A. Cultivate only as often as necessary to keep down weeds and keep soil surface rough so it will retain rain as it falls. Avoid deep cultivation close to the plants. On flat or bottom soils throw up low, wide ridges so fruits will not be on wet ground.
- B. Irrigation: With determinate varieties, produce large plants as rapidly as possible by irrigating as frequently as necessary to maintain readily available moisture in the soil close to the plants at all times. Be sure that these plants have sufficient moisture available as the fruit is ripening. With indeterminate late varieties, apply water more cautiously to avoid stimulating excessive growth. Soil moisture may become a limiting factor when fruit is setting and ripening. Make deep, narrow ditches so as to have plants on wide ridges.

C. Spraying or dusting to control insects or diseases:

1. Insects that may cause damage are:
 - a. Corn ear worm, blister beetles, and tomato horn worm. They may be controlled by spraying or dusting with cryolite. For the corn ear worm use a cryolite-cornmeal bait prepared as follows: Mix 1 lb. cryolite with 9 lbs. cornmeal and add enough water to moisten as with grasshopper bait. This should be spread in the late afternoon using 20 to 25 lbs. per acre.
 - b. Red spiders frequently do serious damage in hot, dry weather. They are most likely to be found on the early, determinate varieties. Control can be obtained by dusting with dusting sulfur or spraying with wettable sulfur 1 lb. to 9 gals. of water.
2. To control certain diseases causing early defoliation, it may be necessary to spray with copper fungicides, particularly during wet years.
 - a. Diseases controlled by spraying. Leaf spot diseases (causing a defoliation starting at base of plant and working upwards) may be controlled by spraying or dusting at ten-day or two-week intervals beginning with appearance of the disease and continuing as long as necessary. Use Bordeaux mixture (4-2-50) or any of several commercially available, insoluble-copper sprays and dusts.
 - b. Diseases not controlled by spraying:

Mosaic. The introduction and spread of this disease must be prevented by appropriate precautions during plant production and transplanting. See Section IV - E, and Extension Circular 1270.

Bacterial canker and bacterial spot. Successful control depends upon the use of disease-free plants (see Ext. Cir. 1270) planted in fields which have not grown tomatoes for 2 or 3 years and where they may not come in contact with tomato plants refuse from the previous year's crop.

Fusarium wilt. Control calls for disease-free plants (see Ext. Cir. 1270) in wilt-free fields. If all available land is infested with the wilt organism, tolerant or resistant varieties must be used.

3. Dusting as a precautionary measure is an advisable and practical procedure.
 - a. In dry weather, use dusting sulfur mixed with cryolite for controlling insects. Apply with a power or hand duster at the rate of about 30 lbs. per acre. Be sure that all leaf surfaces are covered. Apply dusts at intervals of three weeks unless an outbreak of insects is discovered.
 - b. In damp seasons, it may be advisable to dust with a copper dust and cryolite to control leaf diseases and insects.