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GROWING CANNERY BEETS

By

A. G. B. Bouquet
Horticulturist (Vegetable Crops)

Federal Cooperative Extension Service
Oregon State College
Corvallis

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Wm. A. Schoenfeld, Director
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Importance of Crop

Oregon is among the leading states of the union in the production of beets for canning, ranking about fourth in total tonnage, but first of all states in tonnage per acre. The Northwest beet pack is conceded to be of unusually high quality. Beginning in 1919 with a pack of 3,608 cases in Oregon, the pack for 1937 was 307,530 cases, which had dropped to 111,163 cases in 1938. Approximately 166,000 cases of beets were canned in Oregon in 1939. The acreage in Oregon in 1939 was estimated at 530 acres or about one-fourteenth of the total U. S. acreage.

The U. S. pack in 1938 was 2,740,000 cases, but the expectations were that the 1939 pack would not exceed 1,500,000 cases. In the United States the leading states packing beets are Wisconsin, New York, Michigan, Oregon, New Jersey, Utah, Colorado and Washington. Out of a pack of over 2,000,000 cases for the entire country, thus far not more than 450,000 cases have been packed in the West.

Climatic Relations

The beet is essentially a cool season crop, growing best under moderate temperatures and fairly high humidity. The quality as well as the color of the roots suffers through the influence of high temperatures and periods of drouth. Roots should grow steadily if not rapidly. Low temperatures in the early spring may cause a premature development of seed stalks during the first instead of the second year. The plants themselves will not suffer in hot weather if there is sufficient soil moisture. However, it is thought that high temperatures more or less induce inferior development of the desirable dark red color of the roots. Dry weather with warm temperatures following cool and moist days also contributes somewhat to the development of beet canker, which is discussed in future paragraphs. Most of the beets for canning are grown in Western Oregon and harvested before the progress of very much hot weather. However, in some parts of the Northwest where the temperatures are not so high, the period of harvest may extend through the late summer into the fall.

It is considered by some that beets harvested and canned in the fall have a better color and quality than those maturing at another season of the year. In Wisconsin the crop is canned largely in the fall, the seed being sown during the fore part to the middle of the summer. However, crops of fine beets are harvested at seasons other than the fall.

Soils

Comparatively little data are at hand to show the influence of different soils upon the character, quality and color of beets. Some canners are of the opinion that the sandy loam bottom lands are the best for producing good quality roots which are smoother, more uniform and of finer texture and flavor. Experimental work at the Oregon Experiment Station seems to indicate that the lighter

sandy soils are productive of somewhat lighter colored roots than the heavier types of soil, but this question needs further investigation and substantiation. The difference in soil types is reflected largely in the differences of yields in tons per acre and quality of roots. Peat or organic soils are capable of producing a high tonnage, and this is likewise true of silt or sandy loam soils which are irrigable. The smallest yields come from unirrigated uplands. It is usually easier, moreover, to get a good stand of plants on a free, friable soil of sand, silt loam or peat type than it is on one of heavier structure. An important factor in the soil type is that it should be comparatively free from weeds, for the crop is intensively cultivated, with the rows close together.

The beet plant is sensitive to acidity and if grown on a soil that is more acid than pH 6, liming or the use of ^{an}alkaline fertilizer may be advisable.

Fertilizers

Soils for beets should be well balanced in fertility for a good growth of leaves and roots. A six ton crop of beets is stated to contain in the roots 31 pounds of nitrogen, 12 pounds of phosphorus, and 63 pounds of potash. Land manured a year previously is better than that to which manure has recently been applied even though it is rotted. Fresh manure is undesirable. Cover crops are useful in providing organic matter, but they should be well rotted before seeding begins.

Commercial fertilizers may be unnecessary on land of unusual fertility but in many cases the plants may need stimulation by means of a complete fertilizer such as of a 4-12-8 analysis. In view of the variation in soil types and fertility, however, no commercial fertilizer can be said to be profitable until it has demonstrated its usefulness by trials on the particular piece of land to which it is applied.

If fertilizer is applied at the time of seeding it should preferably be two inches away from the seed row and slightly below the seed level. In this way a reasonably small amount of fertilizer can be oftentimes efficiently used. Other forms of placement include broadcasting several days before planting or a side dressing distributed in a band two inches or so from the row and placed slightly below the soil surface after the plants are two or three weeks old. (See Extension Bulletin 524).

Varieties and Strains of Seed

The Detroit Dark Red is the most widely grown variety for canning. The differences in strains of this variety, however, make it imperative that a high class strain of the variety be grown. In some strains there are too many light colored roots, color being a hereditary character transmitted by roots selected for seed. Good strains have comparatively few roots of light color. Some strains are moderate in performance with no extreme colors, either very light or very dark, but having too much apparent zoning. The best strains show a majority of roots with no zoning. Some strains have a good color of roots but the shape may be undesirable. The important characters of beets for canning include a comparatively small, erect top with a small narrow collar, roots globe shape, symmetrical in outline, with a small tap root, a uniform interior color which is not too dark, and zones so inconspicuous that the flesh seems to be of a consistent deep, blood

red color. They should also be of good edible quality and flavor. A high degree of resistance to downy mildew is also an important character of a strain of beets.

Other varieties of beets which have been grown for canning include Ohio Canner and Asgrow Canner.

Seeding

The time of seeding varies according to the time when the beets are wanted for harvesting. In most cases seeding is done during April through the first part of May for delivery in July and early August. A crop will grow to a desirable size in from 70 to 80 days. In areas where the summers are hot and dry it is desirable to have crops ready for harvesting before hot weather. In growing a fall crop, the fore part of the growing season may be warm but the crop will mature in cool temperatures.

The distance between rows is usually from 18 to 24 inches. For rows 24 inches apart about six to seven pounds of seed are planted per acre, and for rows closer together, 10 pounds of seed per acre. The size of beet desired to be canned will also have an effect on the thickness of seeding.

Beet plants are susceptible to "damping off," a fungus disease that may do damage to the young plants even before they appear above ground. Skips of plants in the rows may often be due to the failure of plants to develop because of damping off. Seed treatment is of value in improving the germination. Red copper oxide and Semesan are useful in this respect. Three-fifths of an ounce of Red copper oxide for one pound of seed or one ounce of Semesan for five pounds of seed are recommended.

Cultivation

The main object of cultivation is weed control, as well as putting the soil in a proper state of tilth following rains. Rapid soil stirring and weed eradication can be done when the plants are small by using a shove or push hoe. Later on as the plants are larger a wheel hoe is useful or a small gasoline power cultivator.

Irrigation

This is a part of the beet grower's program where the soil is of such a nature as to hold insufficient moisture for the entire season of the crop. Irrigation insures a rapid growth of the plants, greater uniformity of growth in the field, a better grade and quality of roots and a higher tonnage per acre. It is possible, too, that the color of the roots may be improved by having a sufficient amount of moisture for their best growth. It is also probable that with uniform moisture in the soil there is less danger of beet canker.

Beets are irrigated by both the furrow and the overhead systems. The majority of growers use rotary sprinklers or permanent or portable mist-spray lines. Applications of water may cover a period of two months, namely late May to the end of July, during which time the equivalent of ten inches of rainfall may have been applied.

Crop Pests

Serious damage to beets during the last few years has been caused by beet canker, which is fully discussed in O. S. C. Experiment Station Circular of Information 195. This malady of the roots can be readily controlled by the application of 20 to 40 pounds of borax per acre, which may be applied in various ways as suggested in the circular named.

There are comparatively few insects that do damage to beets, although flea beetles may attack the young plants soon after they are through the ground. They may be controlled by dusting with Rotenone. Later, when the plants are growing rapidly the flea beetles will do little if any damage. (See Extension Bulletin 523--Vegetable Insect Pest Control).

In certain parts of the state where beets are grown for canning the plants are seriously affected with curly top, caused by the presence on the plants of the beet leaf hopper. Investigations are being made at the present time looking to the control of this pest, probably by breeding varieties of table beets resistant to the hoppers.

A serious disease of the beet is downy mildew, the presence of which in beet fields during the past few years has assumed considerable proportions. The disease manifests itself on the older leaves of the plants by isolated spots of irregular shape ranging in size from a quarter-inch to an inch and half in diameter. These spots are differentiated from the healthy tissue by the lighter green color of the upper surface of the leaves and by the heavy coating of mildew on the lower surface. During periods of extremely low humidity these spots on the beet leaves are sometimes surrounded by a narrow ring of pale red pigment. In the fall after a period of heavy rainfall, all affected new leaves are small, thick, and often curled downward at the edges, having in most cases a light green color.

From investigations made by research workers at the California Agricultural Experiment Station, it is evident that this disease is carried in the roots which are "pitted" or left in the field in the original rows to be saved for seed production the following year. There is also considerable evidence indicating that downy mildew is transmitted with the seed.

Some strains of beets are highly resistant to downy mildew and, therefore, if these strains are suitable for canning purposes they should be grown in preference to others.

Premature Seeding

Beets will sometimes produce a seed stalk the first year instead of a root if the plants grow continuously under a temperature as low as 50° to 60° F. In warmer temperatures very few, if any, of the plants will shoot a seed-stalk.

Harvesting

When the roots have reached the best size for delivery to the cannery they are pulled, topped and sacked. In some cases machinery is used for pulling and topping. When done by hand, beets can be pulled, topped and sacked at the rate of about \$4.00 per ton.

Beets for canning are usually graded into three sizes, viz: grade 1, up to 1-1/2"; grade 2, 1-1/2" to 3"; grade 3, over 3". In areas producing beets extensively, from 36% to 40% of the beets usually grade out No. 1, from 45% to 50%, No. 2, and from 11% to 15%, No. 3. In a crop of over nine tons per acre grown on peat land, 37% of the crop was of No. 1 grade, 52% of No. 2, and 9% of No. 3. On the other hand, where beets are definitely permitted to grow larger, the mean of percentages may be 8 - 12% No. 1, 65 - 68% No. 2, and 12 - 30% No. 3.

Yields

Tonnage of beets per acre varies considerably according to the type of soil, fertility, and moisture available. On inferior land, usually upland without irrigation, the yield may be as low as a ton and a half per acre, but on good land, up to 12 and 15 tons per acre. A ten year average yields for the United States as a whole in beet growing areas is 5.15 tons per acre, but the record for Oregon over this ten year period is 8.4 tons.

The mean of a 100 acre area was over 5-1/2 tons per acre, while in another area of similar extent the yield was over 6 tons per acre. In extreme cases yields may be as high as 15 tons, but this is unusual. Also some fields are so poor as to make it unprofitable to harvest the crop, but this is unusual due to precautions taken in selecting growers to produce the crop. In fields where the yields are low, this has been usually due to a poor selection of soil, inferior stand of plants, too many weeds, comparatively little care of the crop, and lack of irrigation. Some fields have been low in production of good roots due to canker, but this can now be prevented.

Eight to ten tons of beets on irrigated alluvial bottom soils is not an unusual yield in western Oregon. The yield per acre for the State as a whole in 1939 was estimated* at six tons. The price of beets per ton for 1939 was estimated at \$14 per ton. For the ten year period of 1928-1937 the average price was \$20.90. The gross weight of roots required per packed case of 24 cans averages about 38 pounds, or at the rate of 52 cases per ton.

* U. S. D. A. release.