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## GROWING CANNERY BEETS

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Importance of Crop. Beets have ranked third or fourth in commercially canned vegetables in Oregon in volume of cases packed. In 1919, 360 cases were packed, and five years later, 39,098 cases. In 1927, beets were third in volume with a pack of 74,544. In 1928, the pack amounted to 70,581 cases; in 1929, 111,199 cases; in 1930, 120,148 cases; and in 1931, 50,776 cases. In Washington state in 1928, the pack amounted to 22,897 cases or ranking seventh place in volume packed. In 1930, the Washington state pack was 62,880 cases. In the U. S., the leading states packing beets are Wisconsin, New York, Michigan, New Jersey, and Oregon, the U. S. pack for 1928 being 1,293,667 cases; for 1929, 2,604,104 cases; for 1930, 2,923,063 cases, and for 1931, 1,613,766 cases.

The pack of canned beets has increased considerably in the last 10 to 14 years. In one important cannery in Oregon, 185,000 pounds were canned in 1918 and as many as over 3,000,000 canned in 1927. During the year 1931 there was a general decrease in the amount canned, not only in Oregon but nationally.

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. Checks in growth in the early spring may cause premature seeding; that is, the 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 also contribute very markedly to the development of drouth spots or canker rot, sometimes known as beet girdle. Most of the beets for canning are grown in Oregon to be 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 summer and into the fall.

It is considered by some that beets canned in the fall have a better color and quality. In Wisconsin the crop is canned largely in the fall, the seed being sown during the middle of the summer.

Soils for Beets. 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 Station seems to indicate that the lighter sandy soils are productive of lighter colored roots than the silt or clay loam 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. The peat or organic soils are capable of making a high tonnage, followed by silt or sandy loam soils which are irrigable. The smallest yields come from unirrigated uplands. It is usually easier to get a good stand of plants on a free, friable soil of a sandy or silt loam nature or a peat soil than it is on one of

heavier structure. An important factor in the soil type is that it be comparatively free from weeds, for the crop is intensively cultivated with the rows close together, hence the desirability of a clean soil.

Fertilizers. Soils for beets should be well balanced in fertility for a growth of leaf and root. 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, producing a possible scabby condition of the roots. Commercial fertilizers may be unnecessary on lands of reasonable fertility, but in case the plants need stimulation, a complete fertilizer of a 4-7-6 analysis, using 500 pounds upward per acre may result in an increased yield. 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 on the particular piece of land to which is applied.

The beet plant is sensitive to acidity, and if grown on a soil that is more acid than pH 6, liming may be advisable. However, an alkaline soil would not be desirable because of inducing scab, which is the same as that causing the scab of potatoes.

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 insofar as possible a high class strain of the variety be grown. The desirable characters of a beet for canning include a comparatively small, erect top with the roots having a small collar, not wide, globe shaped, symmetrical, with a small tap root and a uniform interior color which is not too dark, and zones so inconspicuous that the flesh seems to be a solid ball of a deep blood red color.

As has been mentioned, strains of the Detroit Dark Red vary largely in color. Colors in beets vary from an almost white to a pink, carmine, raw meat color, light purplish red, a light blood color, a dark blood color, reddish black, and almost black, and many gradations between these various colors. The Oregon Experiment Station has for a number of years grown strains of beets from various sources, indicating the variations in these strains. Some strains have produced roots that are as high as 99% of uniformly good color, while others run to 50% and less. Twenty-seven strains were tested in 1930, twelve of them from one seed company. These strains varied all the way from practically 100% desirable roots to 26 up to 35% undesirable roots. In some strains there are too many light roots. Other strains which are good have comparatively few roots of light color. Some strains are moderate in performance with no extreme colors, either very light or very dark. 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.

Seeding. The time of seeding varies according to when the beets are wanted for harvesting. In most cases, seeding is done during late April through the first of May for delivery in July and early August. A crop will grow to a desirable size in from 60 to 70 days. In areas where the summers are hot and dry, it is desirable to have crops ready for harvesting before hot weather. In other places where the crop is harvested continually, there may be more than one seeding. The rows are usually 16 to 18 inches apart and about 10 pounds of seed used per acre. The number of pounds sown per acre varies from 6 to 10, depending upon the distance between the rows. For rows 24 inches apart, about 6 pounds of seed is necessary per acre, for 16-inch rows, 10 pounds of seed per acre. On good land, about 8 to 10 plants per foot make a desirable size of root.

Cultivation. Weed control is the main object of cultivation 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 is capable of handling quite a good deal of soil area per day. In some cases where the rows are far enough apart they may be horse cultivated.

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 good stand and rapid growth of plants, greater uniformity of plants 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.

Beets are irrigated by both the gravity and the overhead systems. Some growers irrigate their beets by distributing the water with a 5 to 6 inch canvas hose, thereby giving the soil a thorough wetting and obtaining a high yield per acre.

Crop Pests. There are comparatively few insects that do damage to beets. Flea beetles attack the young plants soon after they are through the ground, but these may be controlled by dusting or spraying with Bordeaux. Later on when the plants are growing rapidly, the flea beetles cannot injure them.

The most serious damage to beets during the last few years has been caused by the so-called beet girdle. Injury consists of a circular dark spot on the root that later may be sunken and extends in the form of a girdle part way or completely around the entire root. The skin over the sunken area finally cracks and leaves the darkened tissue below exposed. In some of the old dead areas various diseases are found, but it is rather certain that they are not the origin of the trouble. There is considerable evidence at hand that this trouble is caused by drouth. It is known that beet roots are very susceptible to drouth injury, and that injury may form as a girdle just below the surface of the ground is true in the present cases. Irrigated beets or those which are growing on land having sufficient moisture in the summertime do not seem to suffer from this trouble. Especially where the beets have a good start in growing and then are suddenly checked is the injury more serious. Also, it is noticed that the injury is generally more severe in the drier parts of the field than in the lowlands, also that the injury was worse on late planted beets than on those which were planted early and received a considerable amount of their growth before the dry weather began.

The control for this trouble seems to be only in being able to control soil moisture by means of irrigation. Based on the evidence of the last few years, it is hardly possible to grow a crop of <sup>unirrigated</sup> beets that is sufficiently free from the girdle to make it profitable the grower. Beets on peat land, however, which is seldom irrigated but often naturally sub-irrigated, do not show evidence of much drought spot or girdle.

Harvesting. Beets must be watched closely when approaching the development of the best size of root for delivery to the cannery. The beets are pulled, topped and then put into sacks. With four people working on this operation, beets can be pulled, tops cut and roots sacked at the rate of about \$4.00 per ton, with two cutting off the tops, one putting in the sacks and one sewing.

Beets are usually graded into three grades or more; that is, before the roots are canned. The largest per cent of beets in a crop runs in grade 2 up to  $2\frac{1}{2}$  inches in diameter, the next largest percentage of grade 1 up to  $1\frac{1}{2}$  inches, and the lowest percentage of the crop in grade 3 up to  $3\frac{1}{2}$  inches. In an area of

approximately 100 acres of beets in 1928 of 882,000 pounds of beets bought, 39% were No. 1's, 50% were No. 2's, and 11% were No. 3's. In 1929 out of 103 acres of beets with 1,150,000 pounds bought, 36% of the beets were No. 1's, 50% No. 2's, and 14% No. 3's. In 1930 from 109 acres and a crop of 1,463,000 pounds of beets bought, 40% of the roots were No. 1 grade, 45% No. 2, and 15% No. 3. In a crop of over 9 tons per acre grown on peat land in Oregon, 37% of the crop was a No. 1 grade, 52% No. 2, and 9% No. 3.

The cannery beet grades are as follows:

Beet Grades

Grade No.	Name	Screen Mesh Inch	Count	
			No. 2 Can	No. 10 Can
1st	Petites	1	50 and over	
2nd	Midget	1-1/8	35 - 50	200 - 300
3rd	Tiny	1-1/4	25 - 35	130 - 200
4th	Baby	1-7/16	15 - 25	100 - 130
5th	Ruby	1-5/8	10 - 15	70 - 100
6th	Whole	1-13/16	7 - 10	50 - 70

Beets should be of uniform blood red color. Whole beets should be globular and free from scab, girdle rot, black blotches and internal discolorations. Beets 2" and larger should not be canned whole. Sliced beets must be uniform in size, slices to be cut from 1/4 to 3/8" thick.

Count	Per Can	No. 2 Can	No. 2-1/2 Can	No. 10 Can
Midget	1-1/8 and less	35 and over	55 and over	200 and over
Tiny	1-1/4 " "	25 " "	35 " "	130 " "
Baby	1-7/16	15 " "	22 " "	100 " "
Ruby	1-5/8	10 " "	15 " "	70 " "
Whole	1-13/16	7 " "	11 " "	50 " "

Yields. Tonnage of beets per acre varies according to the type of soil and the moisture available. On inferior land, usually upland without irrigation, the yield may be as low as a ton and a half per acre up to five and six tons per acre on soil of better types. As previously mentioned, one small acreage of beets on peat land yielded as high as 9.47 tons.

The average of a 100-acre area in 1929 was over  $5\frac{1}{2}$  tons per acre, while the yield in 1930 for over 100 acres was over 6 tons per acre. In some extreme cases the 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.

These are fields where there has been a poor selection of soil, a poor stand of plants, choked out by weeds, little care of the crop, and in general very undesirable conditions.

Eight tons of beets on irrigated alluvial bottom soil is not unusual in western Oregon.

Cost of Production and Harvesting. Costs which have been kept by some growers indicate that growing and harvesting items amount to between \$125 and \$150

per acre. Of this total, some \$10 to \$15 is expended in soil preparation, possibly \$20 for fertilizer, \$5 for seed, \$2 for planting, weeding and cultivation varying from \$25 to \$50, and harvesting costs varying from \$50 to \$75.

Gross returns per acre vary from \$200 to \$270, depending upon the tonnage and the current market price.

Circulars on other vegetables for canning including cabbage, carrots, cauliflower, cucumbers, onions, peas, spinach, pumpkin and squash, tomatoes, etc., may be obtained from the Clerical Exchange, Corvallis, Oregon.