GROWING CUCUMBERS FOR PICKLES

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GROWING CUCUMBERS FOR PICKLES

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While the production of cucumbers for pickles is not an extensive agricultural enterprise in Oregon, nevertheless the climatic conditions that prevail in various portions of the state are such as to produce pickles of high quality and good yield, which fact is realized by manufacturers who appreciate the possibility of being able to obtain pickles of superior value.

According to reports of the United States Department of Agriculture the State of Oregon was credited with 1,100 acres of cucumbers for pickles in 1941, 950 acres in 1942, and a ten-year average from 1931 to 1940 of 820 acres. According to figures from the same source, the production of pickles during those periods varied from 108,000 to 242,000 bushels, the yield per acre varying from 105 to 220 bushels per acre.

The total national acreage of cucumbers for pickles was approximately 112,800 in 1941, 108,000 in 1942, and between 78,000 and 80,000 acres over a ten-year average from 1931 to 1940, with a total production of between 5 and 8 million bushels of cucumbers.

In view of the fact that fixed contract prices are paid to the grower for the grade of pickles delivered, it is important that the grower operate so as to be able to deliver to the factory as high a quality and as large a quantity of pickles as possible per acre. This publication considers important factors which affect the yield and quality of cucumbers in the field.

The cucumber plant is tender to frost and is naturally a warm season crop. It grows best during periods of moderately warm days and nights. The plant is a member of the Cucurbit family, which includes, in addition to cucumbers, melons, squash, pumpkin, etc. All evidence points to the fact that there is no hybridization or mixing of these plants with cucumbers. However, varieties of cucumbers will readily cross, one with another.

The cucumber plant bears male and female flowers separately on the plant. They can be readily distinguished from each other in that the female flower bears the miniature pickle at the base of the flower. The male flower has a straight, thin stem connecting the base of the flower with the plant. The male flowers far outnumber the females and the first ones appear on the plants several days before the female blossoms.

In view of the fact that the plant produces flowers continuously through the season and that the yield of pickles depends on this continuous blossoming, it is important that the vegetative growth of the plant be maintained as long as the season permits. This is done by providing the plant with plenty of moisture and plant food and by careful harvesting of fruits so that none remain uncult to get large and restrict the production of fruits on the plant.
Soils. While cucumbers will grow in a variety of soils, yet the yield and quality of pickles which are obtained will be dependent very largely upon the character of the soil which is used. The better the soil type the more and better cucumbers that will be grown. The two most important characters of land are the amount of organic matter contained in the soil and the relation of the soil to moisture either as the soil may naturally hold moisture well or be adapted to irrigation. In either case an ample supply of soil moisture is necessary in order to produce high yields. Land that is inclined to be sandy and light is usually deficient in humus and dries out quickly during the summer months with a resulting short yield. Similarly, a clay loam soil may become somewhat packed and hard from heavy late spring rains and it may be difficult to put such a soil into a good condition for a seedbed.

In view of the usefulness of supplementary irrigation in growing a crop it is desirable to have a soil type that is adapted to irrigation. Sandy and silt loam soils warm quickly, work down well into a smooth seedbed and are adapted to irrigation. Soils that are high in organic matter produce large quantities of pickles per acre and the moisture supply of these soils can usually be maintained to good advantage during the dry months of the year. Some of these soils are naturally subirrigated. Whether or not irrigation water can be applied is one of the important factors that determines how productive the crop will be during the dry months. Strong-growing vines are necessary for good yields and continuous production. Irrigated cucumber fields, therefore, are capable of producing continuously and heavily. It is likewise true that some fertile unirrigated lands have produced good yields of pickles.

Lands that have been previously well farmed or new land of good texture, particularly that with a high organic matter content, are types of soil capable of producing good yields. Cucumbers are fairly heavy feeders and the largest yields come from the better types of soil where plants are vigorous.

Fertilizers. Stable manure, which is valuable in supplying organic matter and plant food, is one of the best materials with which to fertilize cucumber land. If it is plentiful it may be spread broadcast and plowed under, or if the manure is scarce and fine it may be put into a furrow before planting. If manure is not available it will be necessary to provide the organic matter and plant food by growing a cover crop and turning it under early enough to have it rotted before planting time.

Complete commercial fertilizers may often be used to advantage either by applying the material broadcast previous to planting or by applying a portion of the fertilizer in that manner and later making side-dressings a few inches from the rows of plants. Another method is to apply a band of fertilizer alongside the seed at the time of planting, placing the fertilizer at a distance of approximately two to three inches from the seed row and at a depth of an inch or so below the seed level. If manure is put into the furrow before planting it is oftentimes advisable to broadcast a few hundred pounds of superphosphate or a complete commercial fertilizer in the furrow with the manure as it is being covered.
A five ton yield of cucumbers is said to remove from the soil 30 pounds of nitrogen, 14 pounds of phosphoric acid and 80 pounds of potash, which would indicate that a complete fertilizer would be desirable for this crop and particularly one which has a relatively high number of units of potash in the analysis.

Food Production Order No. 5 states that in the case of certain A and B crops, the rate of fertilizer applications shall not exceed the rate of application per acre recommended by the State Agricultural Experiment Station. For cucumbers for processing the recommended maximum amount of fertilizer per acre is 75 pounds of nitrogen, 150 pounds of phosphoric acid and 150 pounds of potash. In terms of materials supplying this amount of plant food this would be equivalent to 375 pounds of sulfate of ammonia, 825 pounds of 18% superphosphate and 300 pounds of sulfate of potash. Remember that this is the maximum amount of fertilizer and not necessarily the amount of material recommended to be applied on a specific area.

Cucumbers in general are tolerant of mild acidity of a soil and grow satisfactorily in soils having reactions varying from 5.5 to 6.5.

Fitting the Soil. Soil for cucumber growing should be plowed in the spring when in good condition, early enough so that manure or a cover crop may be rotted by planting time. Thereafter a light mulch would be maintained in order to kill weeds and keep the soil loose and to prevent it from packing. A fine seedbed is desired and thus the land should be worked down to a fine texture which will assist in inducing good seed germination and in holding moisture better during the dry months. Killing of weeds in the spring previous to planting will be an important factor in reducing weeding operations after the plants are growing.

Varieties and Seeding. Snow's Perfection is widely used in growing pickles. Other varieties include Boston Pickling, Chicago Pickling and National Pickling. Seed strains of varieties differ considerably and it is important to plant the best obtainable. About 2½ to 3 pounds of seed are generally used per acre, depending on the method of seeding. In areas where pickles are grown extensively, it is advantageous to treat the seed before planting, using yellow copper oxide 2/5 ounce or 1 1/2 level teaspoon to 10 pounds of seed, or Semesan, a mercury compound, at the rate of 1/2 ounce to 10 pounds seed. Arasan, a sulfur compound, has also been shown to be a good protectant for cucumber seed.

There are two ways of seeding; first, drilling the seed in rows, dropping seeds every six inches or so and later thinning the plants; second, planting the seed in hills, dropping several seeds to a hill and later thinning the plants to two per hill.

In the matter of distances between rows, plants and hills, there is considerable variation. Where the row system is used, a common distance capable of producing good yields is 5 feet. Soil types will sometimes determine the distance between rows, plants and hills. Land that tends to produce a heavy vine growth requires wider spacing between rows and hills.
Excellent yields have been obtained in unirrigated fields with the distance between rows varying from 4 to 5½ feet, where the row system was used. Good yields have been taken from unirrigated fields where hills were 3 x 4, 2 x 5½, and 2 x 4 feet respectively. In general, a good spacing for the hill method is 3 x 5 feet; and 5 feet between rows where the row system is used. In some other growing areas, further planting distances are in use with resulting good yields. Experimental data obtainable from field trials of varying planting distances would be of value in helping to determine most efficient planting methods. There are some advantages in the drill method on account of less labor in seeding, better distribution of plants, more plants to the acre, a greater chance for a better and more even stand of plants, more moisture available for the individual plants during the dry season, particularly if they are unirrigated, and more room for hoeing and weeding around individual plants in a row. On the other hand, the hill method permits of cross cultivation.

The average date of seeding is from the third week in May to the first week in June, with a date approximating the last week of May as the most desirable time for obtaining maximum yields. Plantings after June 1 are more productive than late June seedings but seldom as productive as those during late May. Important factors in time of seeding are that the weather and soil be warm and that there be ample moisture in the surface of the soil.

Dusting Young Plants for Insect Control. The striped cucumber beetle and the twelve-spotted cucumber beetle may be active on the young plants following seed germination, It is important that early damage to these young plants be prevented by dusting with a mixture of calcium arsenate powder, one pound, and landplaster, 20 pounds, repeating applications in such a way as to keep the young plants protected from the beetles. Early control of beetles will help to prevent injury to the young cucumbers later on.

Cultivation. The early control of small weeds in the cucumber area is important and should be continued at intervals as necessary before the plants spread out in such a way as to prevent cultivation close to the rows. Later on if there are no weeds and the soil has a natural dry mulch of a few inches there will be no gain, but sometimes a possible loss of moisture, if the soil is stirred. Following a rain it is advisable to wait until the moisture has had time to pass into the lower few inches of the surface soil, below the cultivating depth, before soil stirring.

Pollination. As stated in a previous paragraph, cucumber plants have separate male and female flowers, and pollen transfer from one to the other must be done by bees.

The flowers open in the early part of the day, soon after sunrise, and close in the afternoon, weather conditions determining to quite an extent when and how long flowers are open and the female flowers are receptive to fertilization. Seaton found that opening of flowers occurred between 5.0° and 6.0° F. and that opening of pollen sacs and nectar secretion began at 62° to 63° F. with an optimum of 65° to 70°. On cool days with the temperature at 55° F. or so, flowers may remain closed all day.

* Canner, 92 (1941), No. 15, p. 22.
In addition Seaton found that under good conditions four days were required for pollen grains to germinate and send down the pollen tubes to the ovules or seeds of the embryo pickle, and from seven to ten days elapsed from blossoming until the pickle reached harvesting stage. Pollen germination, according to Seaton, did not occur below 70° F. and the optimum conditions for pollen germination are between 80° and 85° F.

Adequate pollination of female blossoms is essential for the production of pickles of good shape, as discussed under the paragraph on fruit shapes. In view of the short time flowers are open, it can be readily appreciated how important it is that bee colonies be near the field where cucumbers are being grown. Increased production can be expected if hives of bees are in or near cucumber fields, and not more than a quarter of a mile away. More good pickles and less nubbins are usually found to develop where hives are located in or near fields. If clover fields or those of other legumes are near cucumber fields they may attract bees from the latter, and therefore it is usually necessary that added supplies of bees be available in the cucumber fields.

Irrigation. In order that the plants may continue to yield well during the dry portions of the year, it is desirable in many cases that cucumbers be irrigated, particularly through July, August and early September. The mid-summer drouth is responsible for considerable decline in the yield of pickles unless the soil is capable of holding moisture well. If the plants are growing vigorously there is also less danger of red spider affecting the leaves and reducing the vigor of the plants. Should water be applied by the furrow system the land in which the cucumbers are grown must have been previously smoothed with a slight slope from one end of the field to the other in order that the water may run gradually down the furrows, thus requiring as little attention of labor as possible. Otherwise, the overhead system of water application may be used, which will not necessitate any special soil smoothing. Times of applying water will vary each year according to rainfall but an irrigation previous to the beginning of picking would generally be advisable with succeeding applications following at such intervals to keep a uniform degree of soil moisture. There may be a tendency to over-irrigate cucumbers, resulting in unfavorable soil conditions and an increased production of ill-shaped fruits.

Fruit Shapes. Cucumber plants produce fruits of varying shapes, including (1) straight pickles, (2) "nubbins" or those having a constriction of the blossom end, (3) "wasps" or those with a stem end constriction, and (4) fruits having the center of the pickle constricted, otherwise known as "crooks." Tiedjens* accounted for these ill-shaped fruits by stating that growth was retarded by delayed pollination and starvation of the embryo fruits. He defined the "nubbin" as a fertilized ovary or fruit gradually starved after the embryo fruit developed to a certain stage without absolute inhibition of growth. In the nubbin, growth is retarded so that the ovules or seeds in the base of the fruit develop at the expense of the ovules in the tip portion. "Wasps," says Tiedjens, are caused by delayed pollination, an absolute inhibition of growth by prevention of fertilization or by the maturing of the ovules or seeds before the embryo fruit has reached a certain stage. These

observations were made with greenhouse cucumbers and Tiedjens found that there was no correlation between the number of seeds produced and the shape of the fruit. Fruit with two seeds in it was as well shaped as one with 200 seeds, provided the fruit was growing on a vigorous vine.

Seaton, however, found that there were highly significant differences in the weight and length of fruit, the length of the seed cavity, the number of seeds, and the number of small fully developed seeds in the constricted portions between the normal fruits and the constricted fruits. In other words, there was found to be high correlation between the weight of fruit and seed number and the length of the non-constricted seed cavity and the number of seeds, showing that the number of seeds in the fruit and the extent of the tissue development are closely associated.

Seaton found in straight fruits, designated as "A", 339 seeds. In fruits with a stem end constriction, designated as "B", 194 seeds, and in fruits having a blossom and constriction, designated as "C", 198 seeds. Furthermore, the weight of the seeds in fruits "A" was twice that of the seeds in "B" and "C" respectively. This investigator emphasizes the necessity for adequate pollination of female blossoms as being essential for the production of pickles of good shape. Such pollination is dependent, as already stated, to a very marked extent on day and night temperatures, nectar secretion, bee activity and other factors such as sufficient soil moisture and fertility.

Another cause observed for malformed fruits is the work of the cucumber beetle in feeding on the small pickles. This may be reduced in all probability by arsenical dusting in the earlier growth of the plants prior to the formation of pickles.

Harvesting. Picking of the cucumbers is the chief item of expense and one of the most important in the handling of the crop. Weather conditions influence the rapidity of development of the pickles and the number of harvestings necessary per week. At each harvesting it is essential that all cucumbers which are developed far enough to be picked should be harvested in order to prevent the formation of large, unmarketable cucumbers which would reduce the productivity and value of the plant. The highest price is paid for the smallest cucumbers so that constant regular picking is necessary.

Yields. These will naturally vary considerably according to individual farms and different soils and also whether irrigation is possible or not. A general average yield of growers producing pickles is about 5 tons to the acre. A yield of 16.2 tons was recorded in 1943 from one acre of ground, of which almost 12 tons were No. 1 and No. 2 grade pickling cucumbers. This crop was grown on Willamette silt loam which was fertilized with barnyard manure. The crop was not irrigated. The completion of harvestings took place about the middle of October.

In general, yields vary from "lows" of 3.5 tons to "highs" of 12 to 14 tons but the average of a number of growers is nearer 5 to 6 tons per acre. Some growers consistently obtain 6 to 8 tons yearly.
Insects and Diseases. Two insects, namely, the striped and spotted cucumber beetles, have already been mentioned and control discussed in a previous paragraph.

Aphids are sometimes present but may be controlled effectively by using a nicotine dust.

The seed corn maggot may be injurious, particularly during seasons when there is considerable rain in the spring. At the present time there is no known satisfactory control for this pest.

Wireworms also cause considerable damage to seed during wet, cold springs.

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