

Sprouting Broccoli Spacing

five varieties studied to determine closest spacing to yield heads of freezing and fresh market standards

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Spacing of slightly more than 8" between sprouting broccoli plants is most satisfactory.

When thinned to a 12" spacing, total yield is reduced significantly, even though head and stem diameters are greater than at 8" spacings.

Closer spacing may result in too many stalks without sufficiently large head or stem diameters to meet fresh market and freezing specifications.

Standards

Fresh market and freezing standards call for heads with a compact bud cluster at least 2¼" in diameter. Freezing standards require that the stem—at a point 6" below the top of the cluster—be not less than ¾" in diameter.

Sprouting broccoli production in California increased from 7,800 acres in 1940 to 19,000 acres in 1950. If production is concentrated on center heads—neglecting side shoots which are more expensive to harvest—it is important to know the effect of spacing on head size and yield for the fresh and frozen product.

Experiments at Davis and the Imperial Valley were undertaken to study the effect of spacing on the growth of sprouting broccoli.

Davis Experiments

The Medium strain of broccoli was planted at Davis on August 6, and the Late strain on August 31. The beds were on 40" centers running north and south. Two rows 13" apart were seeded on each bed. When the plants were developed sufficiently they were thinned to a stand of 4", 6", 8", or 12" in the row. The soil showed no evidence of nitrogen deficiency, but the plants might have been benefited by an application of nitrogen.

The harvesting of the Medium strain began on October 20 and November 1, and ended December 13.

At the 4" and 6" spacings the inherently more vigorous plants tended to shade the weaker ones, and many poor heads were formed.

When the plants were spaced closer than 12", a high percentage of heads were below the 2¼" diameter standard. At the 12" spacing, 91% of the stems—6" below top of cluster—were ¾" or

more in diameter. At the closer spacings, 74% or less stems reached that diameter size.

Total yield per acre increased significantly only when space between plants was doubled, as from 4" to 8", or from 6" to 12". However, the yield of heads 2¼" or over was about equal on all spacings.

Harvesting of the Late strain began February 26 and ended March 13. Maturity was delayed somewhat by the 4" spacing.

Except at the 4" spacing a good percentage of the stalks had cluster diameters of 2¼" or more, and stem diameters—6" below top of cluster—of at least ¾".

Highest yield was achieved at the 6" spacing. Total yield at the 8" spacing decreased significantly below those at 4" and 6", and yield at the 12" spacing below those at the other three spacings of the test.

From this experiment it appears that the Late strain could be spaced at 6" between plants, giving a high yield of stalks of satisfactory size, although an 8" spacing gives a greater percentage of properly sized heads.

Imperial Valley Tests

The Early, Midway, and Medium strains were planted at the Imperial Valley Field Station on October 8. The seed was drilled in rows 13" apart on beds at 42" centers running north and south. One shoe of the planter tended to toe in so that the rows were actually nearer 12" than 13" apart.

All plots received 60 pounds of nitrogen per acre as ammonium nitrate, and 90 pounds of phosphoric acid per acre in the form of treble superphosphate. These were drilled into the shoulders of the beds before planting. A side-dressing of ammonium nitrate at a rate to supply 40 pounds of nitrogen per acre was given after thinning, which took place when the plants were 3" high. Plants were thinned to 8", 12", 16", or 20" in the row. The heads were harvested, trimmed of excess leaves, the stems cut to an 8" length, the stalks weighed, and the diameters measured.

The Early strain was harvested December 23 to January 6; Midway January 8 to 23; and Medium January 14 to 28. A

slight delay in maturity was apparent at the 8" and 12" spacings.

Spacing had more effect on stem diameter and stalk weight than on the diameter of the bud cluster.

The average diameter of the bud clusters at all spacings for the three varieties exceeded the minimum—2¼"—of the frozen food raw product standards. It ranged from 2.89"—Early strain spaced 8"—to 4.33"—Medium strain at 20".

The average stem diameter—taken 8" below top of cluster—was of sufficient size—¾"—in all strains at all spacings except at the 8" spacing of the Early and Midway strains.

The average stem diameter, the average head diameter, and the average weight per stalk increased as the spacing between plants increased. The difference resulting from the 4" change in spacing was not always significant.

The general conformation of the plants changed with the spacing, especially with the Early strain. At a 20" spacing the plants were stocky and about 15" high; at the 8" and 12" spacings they were 20" to 30" high.

The calculated total yields per acre showed a similar trend as those in the Davis experiment. Highest yields resulted from the 8" spacing. A 4" increase in spacing decreased total yield significantly except between 16" and 20" with Early and Medium strains, and between the 12" and 16" spacings in the Midway.

Hollow Stem Condition

Data were collected on the occurrence of a hollow stem condition which is found in plants developing during the warm fall months.

The percentage of hollow stems usually increased as the spacing increased. Larger stems showed more of the internal cracking. These two factors, and the somewhat earlier maturity at the wider spacings suggest that too rapid growth may be the cause of the hollowness.

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