

fruit has followed the heavy leaching rains, however, these defects have been no more prevalent in nitrogen treated plots than in plots not receiving post-rain applications of nitrogen. In one trial a heavy application of nitrate of soda-potash resulted in a reduction in fruit cracking.

In relation to the expense of applying the major elements as foliar sprays, it should be stated that it is necessary to spray tomatoes immediately following heavy rains with fungi-

cides and insecticides in order to replace those washed off by the rains. In that sense, the application of the nutrients can be considered without cost.

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SOME FACTORS AFFECTING THE YIELD OF BROCCOLI ON SCRANTON FINE SAND IN FLORIDA

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Broccoli is becoming increasingly important as a cash crop in Florida, both for fresh market and processing. Only a few years ago broccoli was almost unknown to our farmers. Today it is shipped in increasing volume to Northern markets and is grown on contract for the freezing plants. Some farmers ship their large center heads to fresh market and sell the side shoots to the processors of frozen foods.

The fresh market wants the center heads and the side shoots fit the cartons in which frozen food is packed. A center head which weighs two or three pounds must be cut into small pieces to fit into a ten-ounce package. The processor likes side shoots weighing about one ounce each.

As late as 1947 it was customary for the farmers to grow broccoli only as a winter fill-in crop. They would grow a fall crop of tender vegetables. At the same time they would have a broccoli seed bed coming on.

SOUTHLAND EXPERIMENTAL FARM. SEASON OF 1951-52
BROCCOLI YIELDS, IN POUNDS PER ACRE, WITH, AND WITHOUT, MANURE. SANDY SOIL.

Kilgore cut 7" with manure	_____	9128
Kilgore cut 7" without manure	_____ 4681	
Kilgore cut 5" with manure	_____ 6428	
Kilgore cut 5" without manure	_____ 3251	
Woodruff cut 7" with manure	_____	12823
Woodruff cut 7" without manure	_____ 7375	
Woodruff cut 5" with manure	_____ 7916	
Woodruff cut 5" without manure	_____ 4820	
Ferry-Norse cut 7" with manure	_____	11132
Ferry-Norse cut 7" without manure	_____ 7733	
Ferry-Norse cut 5" with manure	_____ 7276	
Ferry-Norse cut 5" without manure	_____ 5054	
Cornell Early cut 7" with manure	_____	15333
Cornell Early cut 7" without manure	_____ 7896	
Cornell Early cut 5" with manure	_____ 8863	
Cornell Early cut 5" without manure	_____ 5094	
Dicicco cut 7" with manure	_____	10722
Dicicco cut 7" without manure	_____ 4218	
Dicicco cut 5" with manure	_____ 6701	
Dicicco cut 5" without manure	_____ 2950	

Scale: 1" equals 3000 pounds per acre.

As soon as frost killed the fall crop they would set broccoli in the field. They would harvest the center heads and cut the primary side shoots. In the meantime they had their spring tomato or pepper seed beds coming along and when the plants were ready, and danger of frost was not too great, they would plow up the broccoli and plant the more profitable spring crop.

WEIGHT OF SHOOTS
OUT FIVE INCHES.

Primary	—————	1.03 oz.
Secondary	—————	.48
Tertiary	—————	.23

Weight is given in ounces and decimal fractions.

A study of the yields of broccoli under this system of farming showed that the average of 96 crops was only 2,200 pounds, per acre. This was not enough to be attractive to the farmer, since the contract price, for freezing, was usually seven cents per pound. Often the farmer would plow up his broccoli while still cutting center heads, because he thought he could get more money out of pepper, tomatoes, squash or some other spring crop. The price to the farmer was fixed by the competition of California and Texas where, by use of cheap Mexican labor, broccoli could be grown more economically than in Florida.

The freezers wanted a great deal more broccoli than they were getting. They could not increase the price to the farmer because they must compete with low-cost labor in other states. They must either increase the yield or reduce the cost of production if they were to make it attractive to the Florida farmer to grow the broccoli that they wanted.

A major part of the cost of producing broccoli is the item of harvesting. The farmer usually makes money while cutting center heads and large side shoots but loses when he starts to cut small side shoots. Time studies showed that it cost just as much to harvest a side shoot weighing $\frac{1}{4}$ ounce as it did to cut one weighing one ounce. In other words, the cost of harvesting small side shoots was approximately four times as much, per pound, as was the cost of harvesting large ones. The obvious approach was to attempt to increase the size of the side shoots.

EXPERIMENTAL

*At The Experimental Farm of Southland
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Plots were laid out in double latin square pattern, giving 10 replications for each variable. Row positions were not randomized but were changed in regular order, from 1 to 5, in each set of plots. The soil was a good grade of Scranton fine sand and was practically level. A heavy cover crop of weeds was turned under the last week in September.

Broccoli does not like wet feet, either in the seed bed or in the field. Due to past trouble in growing plants during the hurricane season, the seed beds were not planted until November 17, when the danger from heavy rains is practically ended. Transplanting was done on December 20. First harvest was made February 22 and the last cutting was on June 10th. All plots were harvested three times each week, as is customary with commercial growers.

All plots received 1,200 pounds of 4-5-8 mixed fertilizer, per acre, in a band. The band was 5 inches from where the plants were set. After harvest started, all plots received 150 pounds, per acre, of 15-0-14 nitrate of soda-potash side dresser every two weeks. This was applied in a band 8 to 10 inches from the plants. Applications of side dressing were alternated on the east and west side of the rows.

Irrigation was used when needed and the sprinklers were timed to give all plots the same amount of water.

Variables were:

1. Varieties. It was known from previous work that some varieties have larger side shoots than others. Five varieties were used.

2. Fertilizer. Ten plots received an application of 15 tons per acre of a mixture the following composition:

Fresh dairy manure,	1,000 lbs
Acid muck,	1,000 lbs
Calcium Cyanamid,	300 lbs

This method of composting was used in order to kill grass seed, weed seed and nematodes in the manure. The compost should be wet at the start, or the heat of this exothermic reaction may be sufficient to set it on fire. Two weeks should be allowed for the cyanamid to change to urea and then cool down. The 10

plots used as controls did not get the manure compost.

3. Method of harvest. Is described below. It had been noted, during previous work, that the first side shoots that appear after the center head is cut are larger than those which come later. In looking for the reason for this it was found that the first side shoots come from the axial buds on the main stalk and are rather uniformly large. It is customary practice among growers to cut off the desired length of this side shoot and leave a stump of the side shoot attached to the main stalk. The next side shoot which appears does not come from the main stalk but comes from the stump of the side shoot that was cut. If a stump of this secondary side shoot is left, the tertiary shoot will come from this and not from either the main stalk or the primary side shoot.

More than 5,000 each of the primary, secondary and tertiary side shoots were weighed and studied.

The primary side shoots, coming directly from the main stalk, were tight and firm heads and graded U.S. FANCY.

The secondary side shoots, branching off of the primary side shoots, were more open and loose and graded U.S. CHOICE.

The tertiary side shoots, branching off of the secondary side shoots, were very loose and open from the time that they appeared and graded U.S. SUBSTANDARD.

In one block of 10 plots, no manure was added. The south tier of plots were harvested by grasping the primary side shoots near the base and pressing down. This separated the side shoot from the main stalk with a clean break and left no stump. The side shoot was cut 7 inches long and the excess length dropped for mulch. Adventitious buds appeared and new primary side shoots formed as fast as they were harvested. All of them had large, firm and tight heads. U.S. FANCY side shoots were produced until June 10th.

The north tier of plots, also replicated 10 times for each variable, were harvested by cutting the side shoots 7 inches long and leaving the stump of the side shoots attached to the main stalk. When the secondary side shoots appeared they were also cut 7 inches long and the stumps left. Tertiary side shoots were harvested in the same manner. Harvest of these plots was stopped when no more side shoots graded as good as U.S. CHOICE, which is the lowest grade that is processed for in-

stitutional use. Harvest of these plots stopped on April 12th. Yields, per acre, were as follows:

North tier: Primary, secondary and tertiary side shoots, 3,247 lbs. per acre

South tier: Primary side shoots only, 6,551 lbs. per acre

The most surprising feature of the whole experiment was the high quality maintained by the primary side shoots in the south tier until the summer rains started. When the rainy season came on the plants seemed to scald. They went out of production and died quickly. It is possible that the leaching of nitrate nitrogen was a major factor in this break in production.

DIFFERENCES

1. Average yield, per acre, with manure, cut 5", 7437 lbs.
Average yield, per acre, without manure, cut 5", 4234 lbs.
Difference due to manure 3202 lbs., or 43%
2. Average yield, per acre, with manure, cut 7", 11,828 lbs.
Average yield, per acre, without manure, cut 7", 6881 lbs.
Difference due to manure 5447 lbs., or 46%
3. Average yield, per acre, with manure, cut 7", 11,828 lbs.
Average yield, per acre, with manure, cut 5", 7,437 lbs.
Difference due to cutting for fresh market 4391 lbs., or 37%
4. Average yield, per acre, primary side shoots only, 6,551 lbs.
Average yield, per acre, primary, secondary and tertiary shoots, 3247 lbs.
Difference due to method of harvest 3304 lbs. per acre, or 50.4%

CONCLUSIONS

From the data presented here it appears that:

1. The yield of broccoli on Scranton fine sand at Plant City, Florida, was greatly increased by the use of dairy manure composted with acid muck and calcium cyanamid.

2. By harvesting the crop in such a manner that stumps of primary side shoots are not left attached to the main stalk, the yield and quality can be increased.

3. In selecting a variety of broccoli for processing the size and quality of the side shoots should be a major consideration.

4. If dairy manure is available, at a price which makes its use profitable, it will increase the yield and quality of broccoli grown on Scranton fine sand.

5. Cutting broccoli 7 inches long for fresh market increases the yield about 37% over cutting 5 inches for freezing.