CARIBBEAN FOOD CROPS SOCIETY

# PROCEEDINGS

## ELEVENTH ANNUAL MEETING

# INVESTIGATION ON THE EFFECT OF DIFFERENT FREQUENCIES OF HARVEST ON THE YIELD OF STRING BEANS

by

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## INTRODUCTION

The String Bean (Snap Bean Cultivar Bountiful, Herbs Brothers Seed Company, U.S.A.) is a commonly used fresh vegetable in Barbados. There is a constant demand for this vegetable throughout the year. The Vegetable Research Unit of the Ministry of Agriculture has tested machinery for harvesting this crop. The harvester used was a 'once over harvester' which destroys the vines as it harvests the fruits. Bean harvesting by hand is probably the highest single cost factor of bean production in Barbados.

This experiment was carried out to determine the influence of various frequencies of harvest on the yield of the crop. It was hoped that the experiment would provide information as to whether there was any stage at which beans could be harvested once, and which would not result in considerable loss in the potential yield.

## METHOD

The experiment was carried out at the Central Agronomic Research Station. The soil at the station is a vertisol (Vernon & Carrol 30 series). The area was one in which other vegetables were grown and on which 200 lbs/acre of mixed fertilizer was applied before the field was rotavated.

The seeds were planted with a 'Stanhay Vegetable Planter'. The planting consisted of six rows 8 inches apart. in a bed 55 inches wide as is common for this crop under commercial production in Barbados. A pre-emergence weedicide was used and no further weed control was necessary during the period of the experiment.

The field was divided into 48 plots. Each plot consisted of one (1) bed 30 ft. long. There were two (2) ft. spaces between the plots, the beds were separated by a space of approximately the same two (2) ft width. The 8 Treatments were randomly allocated among the plots. All 6 replicates were irrigated soon after planting, and irrigation water was supplied as necessary during growth. The plants were harvested at intervals of between 1 - 3 days depending on the appearance of the crop and convenience for marketing. After the 8th picking, the plants were all harvested and counted so that the yield on a plant basis could be determined.

## RESULTS

The plots all started to flower uniformly and the first harvest was started about 14 days after flowering had begun. Table I shows the influence of the number of harvest on the fruit yield per plant. The yield decreased from 1.54 ounces per plant when the crop was picked 8 times between the 7th and 29th April, to a value of 0.44 ounces per plant when the crop was harvested once, at the end of the harvest period.

Fruits which were left for 21 days (harvested 16.4.71) were more than 50% hard and unmarketable. After the 25th day after flowering more than 95% of the fruits were hard and unsuitable for marketing.

The data in Table I shows that the full yield potential of the plant was realized by increasing the frequency of harvest.

The data in Table 2 shows the average quantity of beans harvested and the percentage of the final total at various stages of development.

The first harvest of beans occurred fourteen days after flowering; at that time only 10% of the total crop was harvested. Delaying the harvest three days resulted in a crop which was 39% of the total crop. The longest possible date for which the first harvest could be delayed was 21 days after flowering; at that time 59% of the crop was harvested.

It should be noted that frequent harvest between the second and third week after flowering yielded about the same percentage of the total crop.

Delaying the harvest longer than 21 days after flowering resulted in a decrease in the marketable weight and total yield of the bean crop. If the harvest was delayed between the 21st and 27th day, 50 to 80% of the crop was "seedy" and unsuitable for market; delay into the 4th week resulted in the yellowing of the pods. At that time also, the plants began to show severe signs of senescence.

## TABLE I

THE INFLUENCE OF THE NUMBER OF HARVEST ON THE BEAN PLANT (SNAP BEAN YIELD)

| Period | 7.4.71 29.4.71 | 10.4.71 29.4.71 | 14.4.71 29.4.71 | 16.4.71 29.4.71 | 20.4.71 29.4.71 | 22.4.71 29.4.71 | 26.4.71 29.4.71 | 29.4.71 29.4.71 |
|---|---|---|---|---|---|---|---|---|
| No Harvest | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Yield Ounces/plant | 1.54 | 1.52 | 1.20 | 1.12 | 0.89 | 0.65 | 0.70 | 0.41 |

NOTE: 1 ounce = 28.35 gms; 1 pound = 0.45 Kg; 1 Acre = 4046.8 $m^2$; 1 hectare = 2.47 acres.

## TABLE 2

THE INFLUENCE OF THE NUMBER OF HARVEST ON THE YIELD OF BEANS HARVESTED AT VARIOUS PERIODS BETWEEN THE SECOND AND FOURTH WEEK AFTER FLOWERING.

| Date | 7.4.71 | 10.4.71 | 14.4.71 | 16.4.71 | 20.4.71 | 22.4.71 | 26.4.71 | 29.4.71 | Total Weight |
|---|---|---|---|---|---|---|---|---|---|
| Average yield lb/Acre | 284.0 | 380.8 | 361.6 | 274.8 | 495.2 | 292.4 | 98.0 | 106.0 | 2292.8 |
| Accumulated % | 10.5 | 24.9 | 53.1 | 633 | 81.6 | 92.4 | 960 | 100 | |
| Average yield lb/Acre | | 1098.0 | 862.0 | 296.0 | 468.0 | 116.0 | 116.0 | 106.0 | 3058.0 |
| Accumulated % | | 39.0 | 60.5 | 711 | 87.9 | 92.4 | 96.5 | 100 | |
| Average yield lb/Acre | | | 1246.0 | 206.0 | 301.0 | 144.0 | 96.8 | 114.0 | 2107.8 |
| Accumulated % | | | 59.1 | 68.7 | 83.1 | 89.9 | 94.5 | 100 | |
| Average yield lb/Acre | | | | *1230.0 | 284.0 | 118.0 | 42.0 | 116.8 | 1790.8 |
| Accumulated % | | | | 68.6 | 84.5 | 91.1 | 93.4 | 100 | |
| Average yield lb/Acre | | | | | **1096.0 | 254.8 | 160.0 | 111.2 | 1622.0 |
| Accumulated % | | | | | 67.5 | 83.2 | 93.1 | 100 | |

* Beans unpicked after one week were 30% hard and unmarketable;

** Beans unpicked after two weeks were 50% hard.

## TABLE 2 *Cont'd.*

THE INFLUENCE OF THE NUMBER OF HARVEST ON THE YIELD OF BEANS HARVESTED AT VARIOUS PERIODS BETWEEN THE SECOND AND FOURTH WEEK AFTER FLOWERING.

| Date | 7.4.71 | 10.4.71 | 14.4.71 | 16.4.71 | 20.4.71 | 22.4.71 | 26.4.71 | 29.4.71 | Total Weight |
|---|---|---|---|---|---|---|---|---|---|
| Average yield lb/Acre | | | | | | **880.0 | 118.8 | 73.2 | 1072.0 |
| Accumulated % | | | | | | 82.0 | 93.1 | 100 | |
| Average yield lb/Acre | | | | | | | ***955.0 | 103.2 | 1058.2 |
| Accumulated % | | | | | | | 90.2 | 100 | |
| Average yield lb/Acre | | | | | | | | ***816.0 | 816 |
| Accumulated % | | | | | | | | 100 | |

***After 4th week beans were 100% hard.

## DISCUSSION

The bean plants showed an increase in the yield per plant and total yield, if the crop was harvested frequently. This was in keeping with the observations of several crop physiologists who have noted that removal of early flowers and fruits will induce further flowering and fruiting of plants. This inducement of the crop to further flower and fruit formation results in higher yields of the plant and as a result a greater crop harvest.

It would seem possible to delay for a few days (5) the first harvest of the bean crop without affecting the total yield of the crop. Longer delays in harvesting would likely result in reduced crop yields.

## CONCLUSION

The bean crop can be harvested between two to three weeks after the flowers are opened, delaying the crop harvest results in reduced crop yields.

The more frequent harvest, allows the plant to realize its optimum yields. There is no period at which the use of the bean harvester in the crop is likely to recover more than 60% of the potential marketable crop.

The bean harvester would have to reduce the cost of harvesting by more than 60% of the hand labour method before its use could be justified.