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ON-FARM EVALUATION OF CUCUMBER CULTIVARS FOR SUMMER PRODUCTION IN THE U.S. VIRGIN ISLANDS

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ABSTRACT: An on-farm cultivar evaluation trial for cucumber (*Cucumis sativus* L.) was conducted to compare differences in plant growth parameters related to fruit characteristics and marketable yield during the summer season. Eight cultivars (Calypso, Cobra, Eureka, Dasher II, SMR 58, Marketmore 76, Olympian F₁ and Poinsett 76) were transplanted on June 12, 2003 into rows 1.52 m apart and spaced 0.41 m within rows. The trial was established using a randomized complete block design with three replications. Cultivars were harvested on five dates from July 23 to August 10, 2003. Data collected at each harvest included total number of fruits, fresh weight, number of marketable fruits, fruit length, vine length to first flower and fruit. Except for fruit length, differences among cultivars in all measured parameters were significant. New cultivars Cobra and Olympian F₁ produced yields that were not significantly ($P>0.05$) different with common cultivars Calypso and Dasher 2. Cultivar Eureka produced the smallest (202 g) fruit while largest fruits (414 g) were produced by cultivar Olympian F₁. Vine length to formation of first fruit was shortest (8.7 cm) with cultivar Olympian F₁ and longest (20.9 cm) with cultivar Calypso. In all cultivars, formation of first flower in the vine did not develop into fruit. The study indicates that new and improved cultivars are available to farmers who want to replace old and common cultivars. Best cultivars are Cobra and Olympian F₁.

INTRODUCTION

Cucumber (*Cucumis sativus* L.) is a very popular fresh market vegetable crop in the Virgin Islands. It ranks second after lettuce in terms of total volume produced in 1998 (U.S. Department of Commerce, 2000). The 1998 Census of Agriculture reported a total production of 45,450 lbs (20.7 metric tons) from 16 acres (6.48 ha) the highest among other vegetables (U.S. Department of Commerce, 2000). This production level is however, not sufficient enough to meet demands such that the Virgin Islands have to import most of the cucumbers from other islands or from the U.S. mainland (Pearrow, 1992). There is potential for increasing cucumber production in the Virgin Islands since its tropical climate is suitable for year-round cultivation. Furthermore, excellent local markets exist and growers have been taking advantage of this market.

Variety selection, often made several months before planting, is one of the most important management decisions made by the vegetable farmer (Maynard et al., 2002). Proper choice of varieties is important for successful cucumber production and marketing. Failure to select the most suitable variety or varieties may lead to loss of yield or market acceptability. Important characteristics that are considered in choosing cucumber varieties include market acceptance, yield, fruit quality, diseases, and pest resistance. Most common cucumber varieties grown in the Virgin Islands are the slicing and semi-pickling types. Cultivar evaluation trials for cucumber were conducted at the UVI Agricultural Experiment Station more than ten years ago in 1991 (Palada et al., 1993). Five variety trials were conducted from 1988 to 1991 evaluating yield

performance of eight varieties. Results of these trials indicated that cultivars Victory, Dasher II, and Tropicuke maintained high yields ranging from 23 to 41 t ha⁻¹ (Palada et al., 1993). Marketable yields varied with growing season and high yields were obtained during the winter-spring season. Virgin Islands vegetable farmers are constantly looking for cultivars superior to common cultivars that have been cultivated and grown for decades. This study was conducted to: 1) identify and select alternative/suitable cucumber cultivars for local market in the Virgin Islands and 2) compare differences in plant growth parameters related to fruit characteristics and marketable yield of cucumber cultivars during the summer production season.

MATERIALS AND METHODS

The trial was located on a farmer's field in Estate Glynn, St. Croix, Virgin Islands (Lat. 17°42'N, Long. 64°48'W). The soil is a Glynn gravelly loam (clayey, skeletal, mixed, superactive, isohyperthermic, typic argiustoll) as described by Lugo-Lopez et al., (1998). Average rainfall is 1015 mm per year. The trial was planted on June 12, 2003 and harvested from July 23 to August 10, 2003. Eight cultivars were evaluated including three commonly grown varieties as local or standard checks. The new cultivars were Cobra, Eureka, Olympian F₁, Poinsett 76, and SMR 58. The commonly grown cultivars were Calypso, Dasher II, and Marketmore 76. Cobra, Eureka and Calypso are semi-pickling types while Olympian F₁, Poinsett 76, and SMR 58 are slicing types comparable to Dasher II and Marketmore 76.

The cultivars were planted in plots consisting of three rows 5 m long and spaced 1.5 m apart. Each plot measured 4.5 m x 5 m or 22.5 m². Plants were spaced 0.41 m within rows with plant population density equivalent to 16,260 ha⁻¹. All plots were drip irrigated to maintain soil moisture tension at -30 kPa. The experiment was established using a randomized complete block design with three replications. Dehydrated and composted cow manure (2-1-2) was incorporated in the soil prior to planting at the rate of 4.0 t ha⁻¹ as basal fertilizer application. This was followed by weekly fertigation of 20-20-20 kg ha⁻¹ N-P₂O₅-K₂O. The total fertilizer applied was 200-80-200 kg ha⁻¹ N-P₂O₅-K₂O. Insect pests and diseases were controlled with regular spraying of Dipel, M-Pede, Admire, and Trigard.

The crop was harvested five times on July 23, 25, 29, August 6 and 10, 2003. Five plants in the middle row were sampled for measurement of total number of fruits, fresh weight of fruits, number of marketable fruits, fruit length, and vine length to first blossom (flower) and fruit. Data were analyzed for statistical significance using the SAS program.

RESULTS AND DISCUSSION

Vine length to first flower and fruit

The first flowers in cucurbits are normally male flowers and therefore will not develop into fruit. Cultivars vary in vine length to formation of first flower or fruits. Data on Table 1 show that cultivars differ significantly ($P < 0.05$) in vine length to the formation of first flower and fruit. Vine length to first flower was shortest (5.5 cm) in Marketmore 76, and longest (17.9 cm) in Calypso (Table 1). Marketmore 76, Olympian F₁, Poinsett 76 and SMR 58 have vine length to first flower shorter than 10 cm whereas cultivars Eureka, Dasher II, Cobra, and Calypso had vine length to first flower above 10 cm. Cultivars also differed significantly ($P < 0.05$) in vine length to formation of fruit (Table 1). It was shortest (9.7 cm) for Olympian F₁ and longest

(20.9 cm) for Calypso. Cultivars with shorter vine length to first fruit may indicate earliness compared to those with longer vine length. These cultivars can be harvested early in the season and may benefit farmers in terms of high market price. Cultivar Olympian F₁ seems to fit this characteristic and may be ideal for early harvest.

Number of fruits, fruit size, and fruit length

The number of marketable fruits varied significantly ($P < 0.05$) among cultivars (Table 2). Cultivars Cobra and Dasher II produced the greatest number of marketable fruits that were significantly higher than cultivars Marketmore 76 and SMR 58. Cobra, which is a new slicing type cucumber, produced almost similar number of marketable fruits with Dasher II, a commonly grown cultivar in the Virgin Islands. This indicates that Cobra is a good alternative cultivar to local varieties grown by farmers. The number of marketable fruits produced by cultivar Eureka, a new semi-pickling type cucumber was lower but not significantly ($P > 0.05$) different from marketable fruits produced by cultivar Calypso, a common variety grown in the Virgin Islands (Table 2). Eureka therefore is an alternative cultivar for semi-pickling cucumbers. Most consumers in the Virgin Islands prefer the pickling type of cucumber since the fruit size is relatively smaller than the slicing types.

Fruit size and weight also differed significantly ($P < 0.05$) among cultivars (Table 2). The largest average fruit size (414 g) was produced by Olympian F₁, while the smallest fruit size (202 g) was obtained from cultivar Eureka. Dasher II and Marketmore 76 produced fruit size which was greater than 300 g, while the rest of the cultivars except Olympian F₁ had fruit size in the range of 202-278 g (Table 2).

There were no significant differences in fruit length among cultivars (Table 2). Fruit length ranged from 11.9 cm for Eureka and 17.0 cm for Marketmore 76. Generally, the slicing type cucumbers such as cultivars Marketmore 76, Olympian F₁, Dasher II and Poinsett 76 have fruits longer than the semi-pickling type of cucumbers such Calypso, Cobra and Eureka.

Marketable yield

Early in the growing season the crop was severely infested by thrips and mites causing stunted growth. Most of the affected leaves turned whitish in color and eventually changed to brown. Visual observations indicated that some cultivars were more susceptible than others. For example, cultivar SMR 58, Marketmore 76, and Eureka were seriously infested compared to other varieties and resulted in lower yields (Figure 1). Because of insect infestation, the crop was only harvested five times. Except for Calypso, all other cultivars were harvested four times. Most cultivars produced the highest yield during the fourth and fifth harvests, however; in general yields were below 15 t ha⁻¹.

As shown in Figure 1, total cumulative marketable yield was highest for Dasher II and Olympian F₁ followed by cultivars Cobra, Poinsett 76, and Calypso in descending order. Cultivars Eureka, Marketmore 76 and SMR 58 produced the lowest yields that were below 6 t ha⁻¹ (Figure 1).

Differences in total marketable yield were significant ($P < 0.05$) among cultivars (Figure 1). In terms of marketable yield, Dasher II and Olympian F₁ were highly superior to Eureka, Marketmore 76, and SMR 58. The yield difference between Dasher II and Olympian F₁ was not significant, thus, Olympian F₁ is an alternative cultivar to Dasher II, an old variety. Marketable

yield of semi-pickling cucumber Cobra was higher but not statistically different from Calypso. Therefore, Cobra is a better alternative to Calypso compared to Eureka in this category.

In general, yield levels obtained from this summer trial were lower than those obtained in previous trials at the experiment station. For example, marketable yield of 18 t ha⁻¹ was recorded for Dasher II during the spring-summer season trial (Palada et al., 1993). High yields were obtained during the winter-spring and summer-fall growing seasons.

SUMMARY AND CONCLUSIONS

This study has shown that there are new alternative cultivars for cucumber production in the Virgin Islands. Cultivars differed in vine length to formation of first flower and fruit, number of marketable fruits, fruit size, fruit length, pest tolerance, and marketable yield. For slicing cucumber, cultivar Olympian F₁ is a good alternative to commonly grown cultivar Dasher II. For semi-pickling cucumber, cultivar Cobra is a better alternative to commonly grown cultivar Calypso. These new cultivars are available to farmers in the Virgin Islands who may want to replace old and common cultivars.

ACKNOWLEDGEMENTS

This research was supported by a Hatch grant from the U.S. Department of Agriculture. The authors are grateful to Paulino Perez, Research Assistant, Nelson Benitez, Agricultural Aide, Kwasi Henry, student assistant, and to both Emilie Cramet and Lucie Dromer, summer interns from Quimper's Institut Universitaire Professionnalise (IUP). Universite de Bretagne Occidentale, Pole Universitaire P.J. Helias, 29000 Quimper, FRANCE for their assistance in establishing the field trial, maintaining the trial plots and collecting samples and other data. Special appreciation is extended to Sekou George, vegetable grower who provided a portion of his farm for conducting the cultivar evaluation trial.

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Table 1. Vine length to first flower and fruit of cucumber cultivars, St. Croix, USVI, Summer2003.

Cultivar	Vine length first flower (cm)	Vine length to first fruit (cm)
Calypso	17.9 a	20.8 a
Cobra	10.2 bc	13.5 ab
Dasher II	12.1 bc	13.1 ab
Eureka	11.4 bc	12.0 bc
Marketmore 76	5.5 d	11.7 c
Olympian F ₁	9.2 c	9.7 c
Poinsett 76	7.9 b	13.4 ab
SMR 58	7.9 b	15.6 ab

Mean separation in columns by Duncan's Multiple Range Test, $P=0.05$.

Table 2. Number of marketable fruits, fruit size and length of cucumber cultivars, St. Croix, USVI, Summer 2003.

Cultivar	Marketable fruits (number/ha)	Fruit size (g)	Fruit length (cm)
Calypso	30106 abc	262 bc	12.2
Cobra	38710 a	278 bc	14.1
Dasher II	41935 a	323 ab	16.9
Eureka	25806 abc	202 c	11.9
Marketmore 76	13977 c	354 ab	17.0
Olympian F ₁	30106 abc	414 a	15.7
Poinsett 76	35484 ab	276 bc	15.6
SMR 58	19355 bc	248 bc	12.3

Mean separation in columns by Duncan's Multiple Range Test, $P=0.05$.

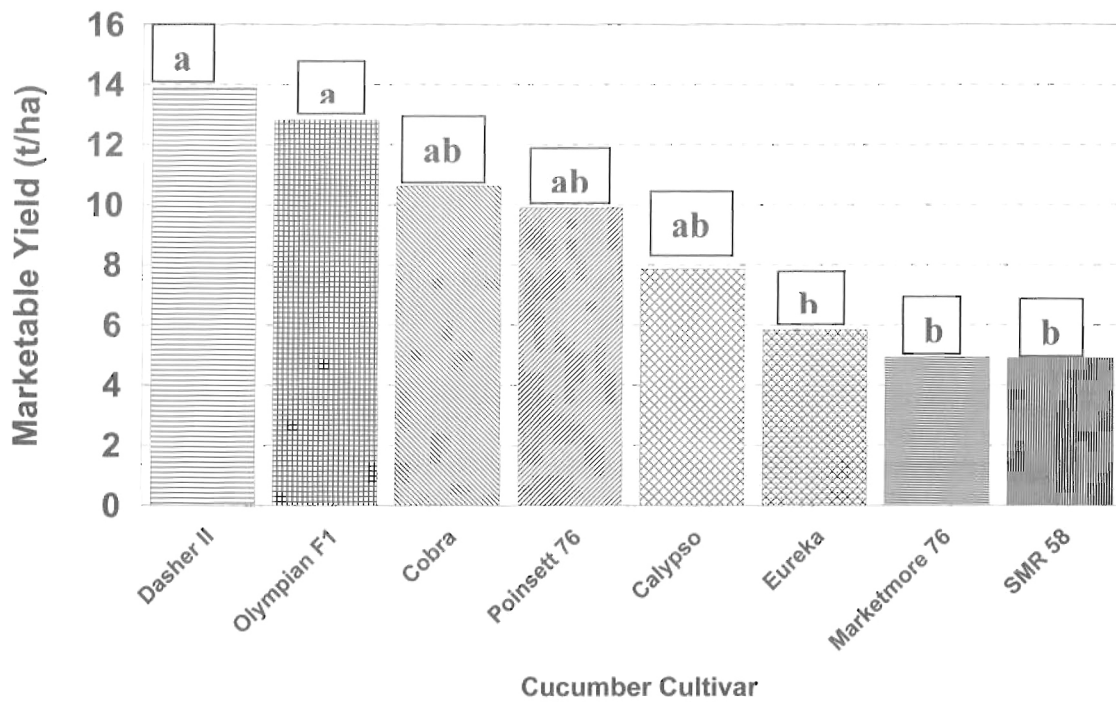


Figure 1. Marketable yield of cucumber cultivars, Estate Glynn, St. Croix, Summer 2003.
 (Bars with common letters are not significantly different by Duncan's Multiple Range Test, $P=0.05$)