Yields and Gross Returns from New Slicing Cucumber Varieties

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Introduction

Slicing cucumbers have become a profitable "new" crop for a number of Kentucky growers. Growers planted over 50 acres of slicing cucumbers this year for fresh market sales through new marketing cooperatives in central and western Kentucky. Slicing cucumber trials had not been conducted in Kentucky since 1989 and many new disease-resistant hybrids have come on the market since then. Some Kentucky growers have tried trellising cucumbers to achieve higher yields of more uniformly dark green fruit. Anecdotal evidence suggests that trellising improves color and lowers the incidence of 'yellow bellies'; however, this has not been tested and it is not known if an increase in yields of higher quality cucumbers would pay for the labor and material costs of trellising. While the primary purpose of this trial was to compare new varieties, we also wished to observe differences between trellised and non-trellised cucumbers.

Methods and Materials

Sixteen slicing cucumber varieties were compared for yield, potential returns, and overall appearance in the spring of 2002 at the Horticultural Research Farm at Lexington. Dasher II and Marketmore 76 were included as standard (check) varieties. Marketmore 76 is an old standard for disease resistance while Dasher II is one of the most popular hybrids in the region. With the exception of open-pollinated Marketmore 76, all varieties tested were gynoecious F1 hybrids with approximately 12% pollinators. All varieties are reported to have disease resistance (Table 1) although our trial was nearly disease-free and resistance was not evaluated in this trial.

Cucumbers were seeded in 72-cell flats in the greenhouse on 16 May 2002 and transplanted to the field after 12 days on 29 May. Most cultural practices were according to our current commercial recommendations for Kentucky. A total of 50 lb N/acre was applied prior to transplanting; an additional 70 lb N/acre from ammonium nitrate was fertigated in 7 weekly doses of 10 lb N/acre. All P and K was applied preplant according to recommendations based on soil tests. The fungicide Ridomil Gold was applied on 28 May and was followed by alternating weekly applications of Bravo or Quadris for disease control. The systemic insecticide Admire was applied as a post-transplant drench one day after transplanting for cucumber beetle/bacterial wilt control. A single application of Pounce and two applications of Sevin were made after 27 June for cucumber beetle control.

Plots consisted of raised beds 8 ft long with black plastic mulch and drip irrigation; bed centers were 6 ft apart. Single plants were spaced 12 in. apart within double rows (two rows/bed) with approximately 15 in. between double rows (16 plants/plot). Plots were replicated four times in a randomized complete block design. Cucumbers were harvested every three to four days from 1-29 July for a total of nine harvests. After grading into either marketable fruit or culls, fruits were counted and weighed. Marketable fruits were sorted according to USDA grades US Fancy, US No. 1, US No. 1 Large, US No. 1 Small, and US No. 2.

Yields, gross and early returns. Average yields of each USDA grade were compared using Waller-Duncan's LSD (*k*-ratio *t*-tests, $P = 0.05$) following an analysis of variance. Although yields for these grades are important, we believe that the large tables of data usually reported are confusing and often difficult to interpret. Although reporting only total marketable yields simplifies matters, this variable is of limited practical use to commercial growers and can mask more important economic considerations. It is possible that some varieties with high total marketable yields might have been later maturing with a larger proportion of their marketable yield achieving only marginal prices later in the season. Making planting decisions based on total marketable yield data alone could lead to disastrous results.

Because we believe comparing the potential income or gross returns per acre is a more useful way of evaluating yield data from several different grades, raw data were converted by multiplying the yield of each grade by that grade's actual price for that harvest date. Yields in lbs/acre were first converted to boxes/acre by dividing yield by the average weight of one 1 1/9 bushel box of slicing cucumbers (55 lb). Box yields were multiplied by actual average weekly wholesale prices received by a Kentucky cooperative less box costs, packing charges and commissions. The resulting single variable 'gross return' provides a better indicator of a variety's overall performance, taking into account yields of the different grades and their price differentials. 'Early returns' were calculated in the same way using data from only the first three harvests on 1 July, 5 July, and 8 July.

Trellising. In order to make preliminary observations on the possible benefits from trellising, each of the four blocks (replications) in this trial were treated as follows (all plots on raised beds with black plastic and drip irrigation):

Block 1: no trellis.

Block 2: simple trellis; tomato stakes were placed on each side of the beds every 4 ft of row (every 4 plants). Tomato twine was wrapped around each stake to create a 'fence' on both sides of the bed. Cucumber plants were simply laid up upon this 'fence' by hand and were not otherwise trained to the trellis (Figure 1). Four stringings were used to make trellises in all trellised blocks.

Blocks 3 & 4: more complex trellis; stakes placed as in Block 2 but with strings that crossed over from one side of the bed to a stake on the opposite side, creating an 'X' pattern. It was thought that this method might be better for training vines to the trellis (Figure 2).

Although this arrangement of trellising or not trellising blocks does not allow for statistical comparisons, it was intended to give us some indication of the possible benefits from trellising. In addition to this trial, several farmers' field demonstrations of trellising for slicing cucumbers were conducted in 2002, the results of which can be found elsewhere in this volume.

Fruit appearance ratings. All fruits of each trial entry harvested from all four replications were graded and laid out on the ground for careful examination and appearance ratings on 12 July. Fruits were visually assessed for shape, extent of yellow color, and overall appearance. Appearance ratings took into account, in order of importance, overall attractiveness, shape, shape uniformity, and color.

Results and Discussion

Yields and returns. Varieties are ranked from highest to lowest yield of a combination grade of US Fancy plus US No. 1 fruits in Table 1. This combination corresponds to the trade designation 'Superselect'. The US No. 2 grade corresponds to the 'Select' category while fruits of the US No. 1 Large grade are usually packed as '24 count' (24 fruits/box). The group of highest yielding varieties included SRQ 2389, Dasher II, Daytona, Panther, Indy, and Thunder; these were not statistically different from SRQ 2983 which was the highest yielding entry (Table 1). All varieties in this group had 65% or more fruit graded as 'Superselect' except for SRQ 2389 (59%). Other varieties with high average percentages of 'Superselect' fruit included Stonewall, General Lee, Greensleeves, Intimidator, and Turbo.

Sunseed's SRQ 2983 and SRQ 2389 had significantly higher gross returns than the other varieties tested (Table 1). Other varieties with very high returns included Daytona, SRQ 2387, and Dasher II. Early returns were highest for Thunder, Speedway, SRQ 2983, and Daytona. While there were no statistically significant differences among the qualitative assessments shown in Table 2, average overall appearance scores tended to be higher for Panther, Indy, Stonewall, Speedway, and Turbo. Appearance scores tended to be lower for Intimidator, Daytona, SRQ 2387, and Thunder. SRQ 2389, SRQ 2387, SRQ 2983, Stonewall, Dasher II, Turbo, and Thunder, tended to have less fruit yellowing while Marketmore 76, and Speedway appeared to have more fruit yellowing than the other varieties (Table 2). Intimidator tended to have more misshapen or curved fruits than the other varieties tested.

Trellising. Since each trellising method was applied uniformly to all varieties in a separate block or replication in the trial, it was impossible to make any conclusive statements regarding benefits of trellising based on these results. As we were well aware when planning the trial, the effects of trellising were confused ('confounded' is the proper statistical term) with the effects of field position (the location of a block and its trellising method in the trial field). Having said that, however, it is still useful to call attention to our observations, especially for characteristics like fruit color and appearance that are likely less affected by field position than by trellising. There was a highly significant difference among blocks/trellising methods for the extent of yellowing on fruits with the untrellised block showing the most yellowing (rating of 2.3 on a scale of 1-5 where 1 = best (no yellow color on most fruits) and 5 = worst (large percentage of fruit surface is yellow on most fruits)). Fruits from the simple trellis block showed the least yellowing (1.2 rating). While there were no other statistical differences among blocks/trellising methods for fruit quality ratings, the trend was for slightly better fruit appearance ratings with trellising than without trellising (data not shown). We also found no indication of improvement of fruit color or appearance with the more complex trellis vs. the simpler trellis. We also noticed that cucumber beetle damage to fruits tended to be more serious in the trellised blocks where it was more difficult to achieve complete spray coverage. The question for further research is whether a small improvement in fruit appearance is worth the considerable added expense of trellising.

Table 1. Marketable yields and gross returns of slicing cucumber varieties and advanced breeding lines; data are averages from four replications at Lexington, KY, 2002. Entries ranked from highest to lowest yield of US Fancy plus US No. 1 grade fruits.

		Marketable yields[z]						
Entry	Seed source	US Fancy+ US No. 1 (tons/acre)	% Fancy+ No. 1 (%)	US No.2 ----tons/acre----	US No. 1 large	Gross returns[y] --------$/acre--------	Early returns	Overall appear.
SRQ 2983	SS	35.1	71	8.4	6.0	11555	4495	4.5
SRQ 2389	SS	33.8	59	13.7	9.6	12311	4153	4.5
Dasher II	SM	31.1	75	5.4	5.1	9951	4086	5.0
Daytona	SM	30.4	70	7.8	5.3	10392	4314	4.0
Panther	SS	30.4	65	6.1	10.1	9879	3737	5.7
Indy	SM	30.1	71	5.9	6.7	9589	3855	5.7
Thunder	SM	29.9	74	6.2	4.5	9922	4802	4.2
SRQ 2387	SS	28.6	62	10.2	7.6	10314	4053	4.0
Greensleeves	HM	28.6	70	7.7	4.5	9627	4012	5.0
Stonewall	HM	27.4	75	5.9	3.1	8699	3594	5.7
General Lee	HM	27.2	72	6.7	4.1	9079	3274	4.0
Speedway	SM	26.8	63	7.7	8.6	9586	4641	5.5
Intimidator	SM	26.1	67	8.3	4.4	9237	4126	3.7
Turbo	SM	24.5	66	7.9	4.7	8162	2087	5.5
SliceMore	SK/SW	23.0	60	8.3	7.4	8447	3426	4.5
Marketmore 76	SW	20.0	64	5.4	5.8	6657	1470	5.0
Waller-Duncan LSD (P=0.05)		*5.8*	*6.3*	*2.5*	*3.7*	*1593*	*772*	*ns*

[z] The combined yields of USDA grades Fancy and US No. 1 are equivalent to the Superselect marketing category while US No. 2 grade is equivalent to Select; yields of US No. 1 Large are equivalent to yields of cucumbers used in 24 count packs.

[y] Gross returns are calculated for each entry by multiplying yields of each marketing category (Superselect, Select, and 24-count) by its appropriate price for a given harvest date (9 harvests). Prices used were actual average weekly prices received by a Kentucky cooperative from July 1-30, 2002 less $1.40/box packing/box charge and less 16% commissions. Higher returns may reflect earlier yields and/or higher yields of Superselect cucumbers.

We recommend the following varieties for further on-station trials and for small test plantings in growers' fields: SRQ 2983, SRQ 2389, Panther, Greensleeves, and Stonewall. Dasher II, Daytona, Indy, and Speedway will remain in the list of suggested slicing cucumber varieties for Kentucky growers.

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Table 2. Fruit shape, color, and overall appearance assessments for slicing cucumber varieties; scores are averages for all fruits of each variety from four replications harvested on 12 July, 2002; varieties are listed from highest to lowest US Fancy + US No. 1 yields.

Entry	Shape[z]	Fruit yellowing[y]	Appear. rating[x]
SRQ 2983	2.5	1.7	4.5
SRQ 2389	2.0	1.2	4.5
Dasher II	3.5	1.5	5.0
Daytona	2.7	2.0	4.0
Panther	3.0	2.2	5.7
Indy	3.5	2.2	5.7
Thunder	2.7	1.5	4.2
SRQ 2387	2.2	1.2	4.0
Greensleeves	3.0	1.7	5.0
Stonewall	3.0	1.2	5.7
General Lee	2.7	2.0	4.0
Speedway	3.2	2.7	5.5
Intimidator	2.7	2.0	3.7
Turbo	3.0	1.5	5.5
Slice More	2.7	2.0	4.5
Marketmore 76	3.5	3.0	5.0
statistical significance (P=0.05)	ns	ns	ns

[z]Shape ratings: 1 = worst (large percentage of misshapen fruits) to 5 = best (most fruits uniform, long, straight, cylindrical).
[y]Extent of yellowing: 1 = best (no yellow color on most fruits) to 5 = worst (large percentage of fruit surface yellow on most fruits).
[X]Appearance ratings: 1 = worst; 9 = best taking into account, in order of importance, shape, shape uniformity, and color.