Performance of Genetically Modified Squash Cultivars, Plateau Experiment Station, 2000

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Interpretative Summary

‘Dixie’ was as productive as any cultivar evaluated in the trials. Diseases were not a problem in the trial.

Procedure

Cucurbit crops with disease resistance have become widely used by commercial growers. Plant breeders have continued to develop new cultivars with resistance to several diseases. Genetic engineering has become a useful tool to induce certain disease resistant characteristics in squash and other cucurbit crop cultivars. These cultivars, identified as transgenic cultivars, have performed well in trials, but under conditions of no disease pressure, have not been any more productive than standard cultivars. Transgenic cultivars have become an issue, and society has expressed concern about use of these cultivars. Several commercial companies have developed a policy of not using produce from transgenic cultivars. Many grain companies pay a bonus for grain cultivars that are not transgenic, and may not purchase grain of transgenic cultivars.

Several squash cultivar trials have been conducted by University of Tennessee researchers in recent years, and transgenic cultivars have been included in these trials. A demonstration trial was conducted at the Plateau Experiment Station at Crossville, TN in 2000 to evaluate performance of two newly released transgenic compared to a standard cultivar and an older mildew tolerant cultivar.

Materials and Methods

The site was prepared for planting using conventional tillage in late April. Fertilizer was broadcast at 300 lb/A of 15-15-15 before final disking on June 13. Plot size was one row, 90 ft long and contained 60 plants spaced 18 in. apart in the row. Rows were spaced 38 inches apart. Plots were cultivated on June 23 and June 30. Esfenvalerate (Asana) was applied at 0.05 lb ai/A for insect control on July 18. Eight harvests were made between July 19 and August 7. Harvested squash fruit were graded into marketable, cull, and oversize. Counts and weights of squash in each grade were recorded. Oversize squash were over 2.25 inches in diameter.

Results and Discussion

‘Dixie’, a non disease resistant hybrid yellow crookneck cultivar which has been grown for fresh market usage for many years. ‘Dixie’ was the most productive cultivar in yield
of marketable fruit and in total yield (Table 1). ‘Dixie’ also produced more oversized fruit than the other cultivars. ‘Dixie’ appeared to be slightly earlier than the other cultivars and a relatively high percentage of the oversized fruit of ‘Dixie’ was at the first harvest. ‘Prelude II’ is a transgenic yellow crookneck cultivar with virus resistance to WMV and one or more strains of ZYMV, and powdery mildew. ‘Prelude II’ was the least productive cultivar by number and by weight of fruit. ‘Liberator III’ is a new transgenic straightneck cultivar with resistance to three viruses. Marketable yields was similar to those of ‘Dixie’. ‘Liberator III’ produced few oversized fruit, and marketable fruit were heavier than fruit of any other cultivar in the trial. ‘Destiny III’ is a new crookneck cultivar with resistance to three viruses. ‘Destiny III’ produced well, but not as well as ‘Dixie’ and ‘Liberator III’. Fruit were slightly lower in weight than fruit of the other cultivars. Few cull squash were produced in the trial. All cultivars had nice smooth fruit that were very attractive.

The transgenic cultivars did not produce higher yields than ‘Dixie’, the standard cultivar, in this trial where diseases were no problem. Only a small incidence of powdery mildew was observed on plants of ‘Dixie’ at the conclusion of the trial. The transgenic cultivars have the most promise for production under conditions when diseases are a problem.

Table 1. Yield and average weight of summer squash cultivars evaluated at The University of Tennessee Plateau Experiment Station at Crossville, 2000.

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Marketable yield tons/acre</th>
<th>Cull yield tons/acre</th>
<th>Oversize yield tons/acre</th>
<th>Average weight marketable fruit - lb</th>
<th>Marketable no./acre</th>
<th>Total no./acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dixie</td>
<td>7.9</td>
<td>0.1</td>
<td>3.0</td>
<td>0.23</td>
<td>68,373</td>
<td>77,766</td>
</tr>
<tr>
<td>Prelude II</td>
<td>5.2</td>
<td>0.1</td>
<td>1.7</td>
<td>0.24</td>
<td>42,982</td>
<td>48,701</td>
</tr>
<tr>
<td>Liberator III</td>
<td>7.6</td>
<td>0.1</td>
<td>0.2</td>
<td>0.31</td>
<td>48,148</td>
<td>49206</td>
</tr>
<tr>
<td>Destiny III</td>
<td>6.6</td>
<td>0.1</td>
<td>1.0</td>
<td>0.21</td>
<td>61,895</td>
<td>66,799</td>
</tr>
</tbody>
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This research represents one season’s data and does not constitute recommendations.
After sufficient data is collected over the appropriate number of seasons, final recommendations will be made through research and extension publications.