CARIBBEAN FOOD CROPS SOCIETY

26

Twenty Sixth Annual Meeting 1990

Puerto Rico

Vol. XXVI
©1991
EXTENDING THE TOMATO SEASON IN PUERTO RICO: PROBLEMS OF SUMMER PRODUCTION

L. Wessel-Beaver, G. Fornaris, A. Armstrong, E. Caraballo, and L. Velázquez
University of Puerto Rico
Mayaguez, Puerto Rico 00708

ABSTRACT

Commercial varieties and breeding lines of tomato were evaluated over three planting dates (April, May, June) in 1988 and 1989 at Juana Díaz, Puerto Rico in order to study the effects of planting date, variety, and planting date by variety interaction of summer tomato production. In addition, the 1989 plantings included sprayed and nonsprayed plots at every planting date to evaluate the importance of insect pests particularly pinworm. While average yield over all varieties decreased markedly with later planting dates, heat tolerant varieties ‘Heatwave’ and ‘Capitan’ maintained excellent yields (up to 70,000 kg/ha) in the April and May planting dates and good yields (45,000 kg/ha) in the June planting. Tomato pinworm populations and damage were high at the beginning of the summer, decreased and then increased again. Use of a heat tolerant variety is essential for successful summer tomato production.

INTRODUCTION

Almost all commercial tomato production in Puerto Rico is found on the south coast during the relatively cool and dry winter months of November through April. Nevertheless, there is a strong interest on the part of tomato producers to extend their growing season into the summer months. A strong export market may not be available during the summer, but a local demand exists which is currently satisfied by imports because of little or no local summer production.

Almost all varieties currently planted on the south coast during the winter months exhibit low fruit set when planted during the summer. Average day/night temperatures above 32/21°C result in poor fruit set in most tomato genotypes (Abdalla and Verkerk, 1968; Went, 1944). Summer temperatures on the south coast of Puerto Rico regularly reach these limits. In addition to high temperatures, summer tomatoes are subjected to a high incidence of insect pests and diseases. High rainfall, humidity, and temperatures, as well as continuous tomato plantings over many months, contribute to the incidence of these problems.

This research was supported by the U.S. Department of Agriculture under CSRS Special Grant No. 88-34135-3609 managed by the Caribbean Basin Advisory Group (CBAG).

Similar problems are encountered in other areas of the Caribbean (Anais and Dali, 1985; Suah, 1986).

The objective of our study was to determine the effect of the following factors on tomato production, fruit quality, and incidence of diseases and pests (especially tomato pinworm): (1) planting date (April, May, June), (2) variety, (3) date by variety interaction, and (4) insecticide sprayed vs. non-sprayed treatments.

MATERIALS AND METHODS

A total of 22 genotypes were planted in the summer of 1988 and 1989. These included commercial varieties and advanced breeding lines from the University of Florida and University of Puerto Rico breeding programs. This paper deals chiefly with 12 commercial varieties planted in both years. Seed companies were requested to supply their most heat tolerant materials. Flora-Dade and Flora-Del were included as heat susceptible checks. Seed sources and variety codes used appear in Table 1. Month-old seedlings were transplanted into single 6.9 m rows. All plants were sprayed with a complete block design with replicates. In 1989 two trials were planted at each of three planting dates: one trial was sprayed with a rotation of various insecticides and the other was unsprayed. Cultural practices typical of the Puerto Rican south coast tomato production areas (drip irrigation, plastic mulch, fertigation, and staking) were used. Depending on the planting date, 2 to 4 harvests were made of mature green to red fruit. Total weight of each plot was measured and a random 50-fruit sample was taken to determine weight and number of culls, small/medium fruit and large/extra large fruit (small, medium, large, extra large as defined by US grading system).

RESULTS AND DISCUSSION

In general we observed a very strong negative effect of later planting dates on yield (Figure 1). The average yield (over two years) of the April planting date was about 35 Mt/ha, fell to about 23 Mt/ha in the May plantings and finally dropped to about 14 Mt/ha at the June planting date. Nevertheless there were certain varieties that produced very well in the April and May planting dates, particularly Heatwave (PSR) and Capitan (AP). In the April planting many varieties did well, including including Sunny, Duke, Flora-Dade and Flora-Del which are not considered heat tolerant (Figure 2). Heatwave (PSR) and Whirlaway (WHL) had excellent yields of large and extra large fruit. In the May planting overall yields were reduced by about a third compared to April but again Heatwave and Capitan maintained good yields (although Capitan had smaller fruit).
In summary, we found that tomato production was highest in the April planting date and decreased by one third at each later planting date. All varieties had severely reduced fruit set and produced minimal yields in Puerto Rico, but Capitan was the least affected. High humidity and rainfall are particularly common in the months of August and September, and particularly in Puerto Rico due to high disease incidence. Red spider mite was also difficult to control, and a late-impacted variety is used to control this pest. Populations of this insect can increase dramatically especially during summer tomato production, although we found poor fruit set to be the most limiting problem. However, if a heat tolerant variety is used, then insects, particularly tomato spotted wilt virus, are not a critical pest to compete these yields since plants will also be severely affected by radial cracking.

In general, diseases were a minor problem compared to poor fruit set and insects. Particularly in the April and May plantings, high humidity and rainfall were particularly common, and in the June plantings, humidity and rainfall were particularly common during the months of August and September. In general, we observed a decrease in limited by high disease incidence. Reduced fruit set due high temperatures limits summer tomato production, although it did control most other insect pests. Spayed plantings yielded better than unsprayed although they had smaller fruit (general medium) than other heat tolerant varieties. Other good varieties (Heatwave, Capitan, Whirlaway, and Bingo) were not replicated (Figure 6). Along with tomato pinworm, red spider mite was also difficult to control, and a late-impacted variety is used to control this pest. Populations of this insect can increase dramatically especially during summer tomato production, although we found poor fruit set to be the most limiting problem. However, if a heat tolerant variety is used, then insects, particularly tomato spotted wilt virus, are not a critical pest to compete these yields since plants will also be severely affected by radial cracking.

CONCLUSIONS

Figure 3. Tomato yields* averaged over 1988 and 1989 late May plantings at Juanita Diaz, Puerto Rico

Figure 4. Tomato yields* averaged over 1988 and 1989 late June plantings at Juanita Diaz, Puerto Rico

Figure 5. Tomato yields* at Juanita Diaz, Puerto Rico averaged over April, May and June planting dates in 1988 and 1989.

Figure 6. 1989 tomato yields* over three summer planting dates at Juanita Diaz, PR with and without insecticides.

*not including fruit damaged or/and sized less than 2 1/2" (U.S. No. 1)
Table 1. Variety code names used in figures 1-6 and seed source:

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Seed Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHL</td>
<td>Whirlaway</td>
<td>Ferry-Morse</td>
</tr>
<tr>
<td>BIN</td>
<td>Bingo</td>
<td>Ferry-Morse</td>
</tr>
<tr>
<td>MAR</td>
<td>Marquis</td>
<td>Harris-Moran</td>
</tr>
<tr>
<td>PSR</td>
<td>PSR-39686</td>
<td>Petoseed</td>
</tr>
<tr>
<td></td>
<td>(released in 1989 as 'Heatwave')</td>
<td></td>
</tr>
<tr>
<td>CAP</td>
<td>Capitan</td>
<td>Petoseed</td>
</tr>
<tr>
<td>SAN</td>
<td>San Quintan</td>
<td>Asgrow</td>
</tr>
<tr>
<td>GAT</td>
<td>Gator</td>
<td>Asgrow</td>
</tr>
<tr>
<td>FLA</td>
<td>Flash</td>
<td>Asgrow</td>
</tr>
<tr>
<td>SUN</td>
<td>Sunny</td>
<td>Asgrow</td>
</tr>
<tr>
<td>DUK</td>
<td>Duke</td>
<td>Petoseed</td>
</tr>
<tr>
<td>FDA</td>
<td>Flora-Dade</td>
<td>Asgrow</td>
</tr>
<tr>
<td>FDE</td>
<td>Flora-Del</td>
<td>Asgrow</td>
</tr>
</tbody>
</table>

Figure 1. Planting date effect on average tomato yields and yields of variety 'Capitan' and 'Heatwave (PSR).'

Figure 2. Tomato yields averaged over 1988 and 1989 late April plantings at Juana Diaz, Puerto Rico

REFERENCES


