Historically, bacterial spot of tomato incited by \textit{Xanthomonas campestris pv. vesicatoria} (Dodge) Dye (XCV) has been the most important bacterial foliar disease of tomato in the southeastern United States. Recently, bacterial speck caused by \textit{Pseudomonas syringae pv. tomato} (Okabe) Young et al (PST) and a leaf spot caused by \textit{P. syringae pv. syringae} van Hall (PSS) have occurred. Two strains each of PST and PSS from Florida were isolated consistently. In controlled-environment chambers, the disease developed only when plants were water-soaked by misting before and after inoculation or where wounds were inoculated. The bacterium appears to be an opportunistic parasite that attacks plants stressed by unfavorable environmental conditions.

A leaf spot disease of tomato was observed in several fields near Bradenton, FL, in the late winter and early spring of 1983. A fluorescent bacterium identified as \textit{Pseudomonas viridiflava} was isolated consistently. In controlled-environment chambers, the disease developed only when plants were water-soaked by misting before and after inoculation or where wounds were inoculated. The bacterium appears to be an opportunistic parasite that attacks plants stressed by unfavorable environmental conditions.

**ABSTRACT**


A leaf spot disease of tomato was observed in several fields near Bradenton, FL, in the late winter and early spring of 1983. A fluorescent bacterium identified as \textit{Pseudomonas viridiflava} was isolated consistently. In controlled-environment chambers, the disease developed only when plants were water-soaked by misting before and after inoculation or where wounds were inoculated. The bacterium appears to be an opportunistic parasite that attacks plants stressed by unfavorable environmental conditions.

**RESULTS**

Characterization of the pathogen. A fluorescent bacterium was isolated consistently from leaf and stem lesions. These isolates induced a hypersensitive reaction in tobacco. The bacterium was aerobic, gram-negative, and negative for oxidase and arginine dihydrolase activity. Results of key determinative tests made with 17 isolates agreed closely with those obtained with a known strain of \textit{P. viridiflava}, except the unknown tomato isolates degraded pectate gel at pH 5.0 (Table 1). These isolates were different from PSS and PST in their ability to rot potato and degrade pectate gel at pH 8.3 and in their inability to utilize sucrose. They also differed from PST in their ability to utilize erythritol. When two of the tomato strains and one each of PST and PSS were compared in a battery of tests, all were positive for citrate utilization, ascorbic acid, and catalase. All were negative for nitrate reduction and urease activity, starch hydrolysis, and lipolysis. The two unknown isolates from tomato were weakly positive or negative for motility, whereas the PST and PSS were positive. PST and PSS were negative and weakly positive, respectively, for ammonia production, but the two tomato isolates were positive. The two tomato isolates were positive for growth in 5% sodium chloride, casein hydrolysis, and peptonization of litmus milk, whereas PST and PSS were negative. All strains except PSS liquefied gelatin. PST
Table 1. Comparison of the tomato isolates with isolates of Pseudomonas viridiflava, P. syringae pv. syringae, and P. syringae pv. tomato in differential tests

<table>
<thead>
<tr>
<th>Tests</th>
<th>Tomato isolates (17)</th>
<th>P. viridiflava (1)</th>
<th>P. syringae pv. syringae (2)</th>
<th>P. syringae pv. tomato (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potato soft rot</td>
<td>17</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Levan</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Pectate degradation at pH 5.0</td>
<td>17</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pectate degradation at pH 8.3</td>
<td>17</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>D(-)-Lactate</td>
<td>17</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>d(-)-Tartrate</td>
<td>17</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Mannitol</td>
<td>17</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Mesotartrate</td>
<td>ND</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Sucrose</td>
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<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Sorbitol</td>
<td>13</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Erythritol</td>
<td>17</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

*Number in parentheses is number of isolates tested.

was the only strain negative for ice-nucleating ability.

Pathogenicity tests. Results of inoculation tests differed greatly, depending on the method used. Disease was least severe when inocula of the unidentified isolates were applied by spraying leaves or rubbing them with a cotton swab without a preinoculation mist treatment. One isolate produced some foliage blight when the spray or rub treatments were used, but most isolates produced either small, necrotic spots or no reaction. Plants inoculated similarly with PST developed numerous leaf spots with halos. Plants given preinoculation and postinoculation mist treatments to induce and maintain water-soaking secondary invader that follows entrance postinoculation mist treatments to the bacterium a weak parasite or a halos. Plants given preinoculation and investigator (1,21). Billing (1) considered disease diminished rapidly with the onset of more favorable growing conditions.

The role attributed to P. viridiflava as a plant pathogen has varied with the investigator (1,21). Billing (1) considered the bacterium a weak parasite or a secondary invader that follows entrance by another pathogen. Billing believed that PV is primarily an epiphyte that, under conditions conducive for lesion production, may have pathogenic capability. Wilkie et al (21), however, considered the bacterium to be a pathogen in its own right and listed several hosts. In their test, water-soaking leaves of young tomato plants with PV inoculum followed by a 48-hr mist period at 20 C (conditions somewhat similar to those in our experiments) resulted in disease. Most workers (1,6,11,18) have considered P. viridiflava to be an opportunistic pathogen that attacks plants that have been wounded or otherwise stressed. On the basis of our research, P. viridiflava should be considered an opportunistic pathogen that incites leaf spot on tomatoes. We believe that if the pathogen were not opportunistic, the disease would have continued to progress, although at a slower rate, once the weather conditions became less favorable (low precipitation).

LITERATURE CITED


