Effect of Roguing on Erwinia Soft Rot in Commercial Production with Two Phalaenopsis Plants per Pot

ROBERT T. MCMILLAN, JR.1*, AARON PALMATEER2, AND WAGNER VENDRAME2

1Kerry’s Bromeliad Nursery, Inc., S.W. 258th Street, Homestead, FL 33031
2University of Florida, IFAS, Tropical Research and Education Center, 18905 S. W. 280th Street, Homestead, FL 33031

ADDITIONAL INDEX WORDS. orchid, biological control, bacteria

The major bacterial disease of Phalaenopsis orchids in Florida is the bacterium Erwinia carotovora (L.R. Jones) Bergey et al. subsp. carotovora (L.R. Jones) Bergey et al. Major economic damage occurs during environmental conditions that favor E. carotovora soft rot disease, such as warm to hot temperatures combined with high moisture. This bacterium spreads through rain or overhead irrigation splash, which allows plant-to-plant movement. Phalaenopsis are generally planted with two plants per 6-inch pot. When plants infected with Erwinia are found in the nursery, the diseased plant is rogued out. A study was initiated in Homestead, FL in 2006 to determine if roguing of diseased plants was effective in reducing plant losses. The study was repeated 5 times and in all cases roguing of a single diseased plant from the pot was not effective.

Commercially, Florida’s orchids represent a large portion of the agricultural industry with $47,000,000 in potted orchids produced in 2005 (US Department of Agriculture, 2006a). The most popular orchid produced in Florida is the Phalaenopsis hybrid. There are several diseases that affect Phalaenopsis hybrids, but none are more serious and cause more economic damage than Erwinia carotovora (L.R. Jones) Bergey et al. subsp. carotovora (L.R. Jones) Bergey et al. (Alfi eri et al., 1991) (Fig. 1). It is the most significant disease of Phalaenopsis hybrids because most of the economically important cultivars are highly susceptible. Southern Florida’s summertime environmental conditions, with warm to hot temperatures combined with high moisture, favor Erwinia soft rot disease. At present there are no effective bactericides for the control of Erwinia.

At one time, roguing (or removal) was commonly practiced in an effort to control plant diseases (Broadbent et al., 1950; McGrath and Miller, 1958; Pirone et al., 1960). History has shown that roguing is of little value and not an economically feasible method to control plant diseases (McGrath and Miller, 1958; Pirone et al., 1960). The application of roguing is usually limited to such crops in seed production or to individual plants of high economic value. Some cultivated crops infected with systemic diseases either do not bloom or the flowers and fruits normally fail to mature. In local infections, as is the case of some wilts, blights, and root and stem rots, there may be partial recovery and some development of blossoms, but these plants should be discarded because of the potential for spreading the pathogen to adjacent plants (Pirone et al., 1960). Plants infected with viral and bacterial diseases should be rogued as early as possible because insects can carry the bacteria and virus from infected to healthy plants (Broadbent et al., 1950; Pirone et al., 1960). In general roguing is a specialized technique that is not widely used in the control of epidemic diseases.

Nurseries have practiced roguing of Erwinia diseased orchid plants for years without every knowing if it was successful. A study was initiated in Homestead, FL in 2006 designed to determine if roguing is of economic value to control or save inventory in Phalaenopsis production.

Materials and Methods

One hundred 6-inch pots of Phalaenopsis with one plant showing typical Erwinia bacterial soft rot were selected. Fifty of the pots were selected at random and the diseased plant was removed leaving the remaining symptom-free plant. Roguing was accomplished by pulling out the young disease plants and by cutting off the older diseased plants at the soil surface (Fig. 2). The remaining 50 pots with one plant showing soft rot were
left as the control. In addition 50 pots of Phalaenopsis with no Erwinia symptoms were selected as a second control.

The trial was evaluated for the development of disease with the progress as shown in Figures 3 and 4 and data taken each day for a total of 120 d.

Results and Discussion

The trial was repeated four times in Spring 2005 with similar results. The trials conducted during the dry spring months of 2006 had a higher percent of survivors in the rogued treatments (Table 1). However, in all cases the controls with the single diseased plant in the pot, the disease spread to the adjacent plant and all came down with soft rot (Table 1) (Fig. 3). Careful roguing of the infected Phalaenopsis as soon as the first symptoms appear is essential to prevent the gradual spread of Erwinia soft rot throughout the planting. Throughout the year, a total of 35,452 (3.5%) single-potted and 92,588 (9.3%) double-potted Erwinia soft rot-infected Phalaenopsis plants were rogued (Table 2.)

When pulling out the young plants, where 100% of the plant and roots are removed, one would expect a higher survival rate of the healthy adjacent plant. As was pointed out by Stevens in 1960, it is doubtful that roguing would ever achieve a degree of control that would be highly satisfactory. The results of these studies support his observations that by the time disease symptoms are so conspicuous as to indicate removal of the plant, inoculum

Table 1. Number of *Phalaenopsis* Erwinia soft rot infected plants rogued as compared to the nonrogued controls in the 2006 trials.

<table>
<thead>
<tr>
<th>Source</th>
<th>Cumulative no. of diseased plants from 5 replicates of 50</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trial 1</td>
</tr>
<tr>
<td>Control with 1 initially diseased and 1 Symptomless <em>Phalaenopsis</em> in a 6-inch pot</td>
<td>200</td>
</tr>
<tr>
<td>Rogued treatment resulting in 1 <em>Phalaenopsis</em> plant per 6-inch pot</td>
<td>195</td>
</tr>
</tbody>
</table>
Table 2. Total number of *Phalaenopsis Erwinia* soft rot-infected *Phalaenopsis* from 1,000,000 plants that were dumped in the year.

<table>
<thead>
<tr>
<th>Source</th>
<th>Plants dumped (no.)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Phalaenopsis</em>, 1 plant/6-inch pot</td>
<td>35,452</td>
<td>3.5</td>
</tr>
<tr>
<td><em>Phalaenopsis</em>, 2 plants/6-inch pot</td>
<td>92,588</td>
<td>9.3</td>
</tr>
</tbody>
</table>

will have spread to nearby healthy individuals (Fig. 3).

However, Garrett (1944) felt that the greater value of the crop grown under glass would permit closer attention to individual plants, where plants are grown in pots on raised benches, and the practice of roguing, with appropriate disposal of infected soil and plant residues, is likely to be more effective.

Thus, based on the data derived from these studies and the results of other researchers (Broadbent et al., 1950), it was found that roguing is not cost effective and the removal of the infected potted plants would be a financial savings.

**Literature Cited**


