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Using Seed and Foliar Insecticides to Control Corn Flea Beetles and Stewart's Disease of Corn

Abstract
Stewart's disease of corn, caused by Pantoea (Erwinia) stewartii has significant economic implications for sweet and seed corn producers. These problems stem from phytosanitary regulations put in place by many countries to prevent the introduction of this pathogen into their countries. Growers or seed producers have to perform costly tests on seeds from fields where P. stewartii was found to occur in order to export the seed. Foliar insecticides have been used to reduce corn flea beetle populations during the growing season as a means to reduce the risk of Stewart’s disease of corn. This management practice, however, has not been adequately tested in field trials. The purpose of this study was to determine the efficacy of using both seed (Gaucho, Gustafson, Inc., Dallas, TX; Cruiser (formerly Adage), Greensboro, NC) and foliar (Warrior, ZENECA Ag Products, Wilmington, DE) insecticides to reduce corn flea beetle populations and Stewart’s disease of corn and to quantify the impact of these management practices on yield.

Keywords
Plant Pathology

Disciplines
Agricultural Science | Agriculture | Plant Pathology

This southeast research and demonstration farm is available at Iowa State University Digital Repository: http://lib.dr.iastate.edu/farms_reports/1540
Using Seed and Foliar Insecticides to Control Corn Flea Beetles and Stewart's Disease of Corn

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Department of Plant Pathology

Introduction
Stewart's disease of corn, caused by *Pantoea (Erwinia) stewartii* has significant economic implications for sweet and seed corn producers. These problems stem from phytosanitary regulations put in place by many countries to prevent the introduction of this pathogen into their countries. Growers or seed producers have to perform costly tests on seeds from fields where *P. stewartii* was found to occur in order to export the seed. Foliar insecticides have been used to reduce corn flea beetle populations during the growing season as a means to reduce the risk of Stewart's disease of corn. This management practice, however, has not been adequately tested in field trials. The purpose of this study was to determine the efficacy of using both seed (Gaucho, Gustafson, Inc., Dallas, TX; Cruiser (formerly Adage), Greensboro, NC) and foliar (Warrior, ZENECA Ag Products, Wilmington, DE) insecticides to reduce corn flea beetle populations and Stewart's disease of corn and to quantify the impact of these management practices on yield.

Materials and Methods
This experiment was conducted at the ISU Southeast Research Farm, Crawfordsville, Iowa. The experimental design was a randomized complete block with four replications and 12 treatments. The inbred line A632 Ht Block (Holdens Foundation Seeds, Inc., Williamsburg, IA) was used and the seeding rate was 70,000 plants/hectare. Disease incidence (number of plants showing *P. stewartii* symptoms/total number of plants assessed \( \times 100 \)) and disease severity (percentage of diseased area of the top two leaves/total area of leaves \( \times 100 \)) were assessed six times during the growing season. The field was harvested mechanically and yield was quantified.

Results and Discussion
Overall, either Gaucho or Adage combined with two or three foliar insecticide applications resulted in the most effective control of both corn flea beetles and Stewart's disease compared with the untreated control (no seed or foliar insecticides) (Figure 1, Table 1). Gaucho or Adage using the beetle threshold or degree-day model reduced disease incidence by 23–24% compared with the control (Table 1). Due to storm damage causing lodging and plant losses in certain treated plots, there were no significant differences in yields among treatments (Table 1). This project will provide growers with new decision-making tools to more effectively manage corn flea beetles and Stewart's disease of corn.

Acknowledgments
We wish to extend our gratitude to Kevin Van Dee and Matt Hunt for their help during field preparations, planting, growing, and harvesting. We would also like to thank Pioneer, Monsanto, Syngenta, and Gustafson for providing financial support for this project.
Table 1. The effects of seed and foliar insecticide applications on the incidence of Stewart’s disease and seed corn yield for corn inbred (A632 Ht Block) at Crawfordsville, Iowa, 2002.

<table>
<thead>
<tr>
<th>Treatment number/treatment</th>
<th>Final incidence (%)</th>
<th>Yield (bu/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Control (no insecticide)</td>
<td>36.0 a(^1)</td>
<td>42.65 a</td>
</tr>
<tr>
<td>2- Gaucho Seed treatment</td>
<td>18.0 bcd</td>
<td>36.67 a</td>
</tr>
<tr>
<td>3- Adage Seed treatment</td>
<td>15.0 bcd</td>
<td>40.76 a</td>
</tr>
<tr>
<td>4- Warrior 1X at V5(^2)</td>
<td>23.0 b</td>
<td>43.95 a</td>
</tr>
<tr>
<td>5- Warrior 1X using threshold(^3)</td>
<td>16.0 bcd</td>
<td>34.91 a</td>
</tr>
<tr>
<td>6- Warrior 1X using DD-model(^4)</td>
<td>22.0 bc</td>
<td>36.60 a</td>
</tr>
<tr>
<td>7- Gaucho + Warrior 1X (V5, VT, R3)</td>
<td>19.0 bcd</td>
<td>34.84 a</td>
</tr>
<tr>
<td>8- Gaucho + Warrior 1X using threshold</td>
<td>13.0 cd</td>
<td>37.64 a</td>
</tr>
<tr>
<td>9- Gaucho + Warrior 1X using DD-model</td>
<td>12.0 d</td>
<td>33.09 a</td>
</tr>
<tr>
<td>10- Adage + Warrior 1X (V5, VT, R3)</td>
<td>12.0 d</td>
<td>36.15 a</td>
</tr>
<tr>
<td>11- Adage + Warrior 1X using threshold</td>
<td>13.0 cd</td>
<td>32.31 a</td>
</tr>
<tr>
<td>12- Adage + Warrior 1X using DD-model</td>
<td>15.0 bcd</td>
<td>37.06 a</td>
</tr>
</tbody>
</table>

\(^1\)Means with the same letters within columns are not significantly different (\(P \leq 0.05\)) based on the Waller Duncan K-ratio test.
\(^2\)V5 is the stage of growth when corn plants had five leaves with visible collar.
\(^3\)The action threshold was reached when an average of one beetle/trap/week from twelve traps was reached.
\(^4\)Sprays were applied according to the accumulation of degree days using a developmental threshold of 16\(^\circ\)C. The first spray was applied after 350 degree-days had accumulated, and the second spray was applied after 650 degree-days had accumulated.