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

Forrest W. Nutter Jr.
Iowa State University, fwn@iastate.edu

Blucher Menelas
Iowa State University

Paul Esker
Iowa State University

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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.

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Forrest W. Nutter, Jr., professor
Blucher Menelas, graduate research assistant
Paul D. Esker, graduate research assistant
Department of Plant Pathology

Introduction

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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 × 100) and disease severity (percentage of diseased area of the top two leaves/total area of leaves × 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.

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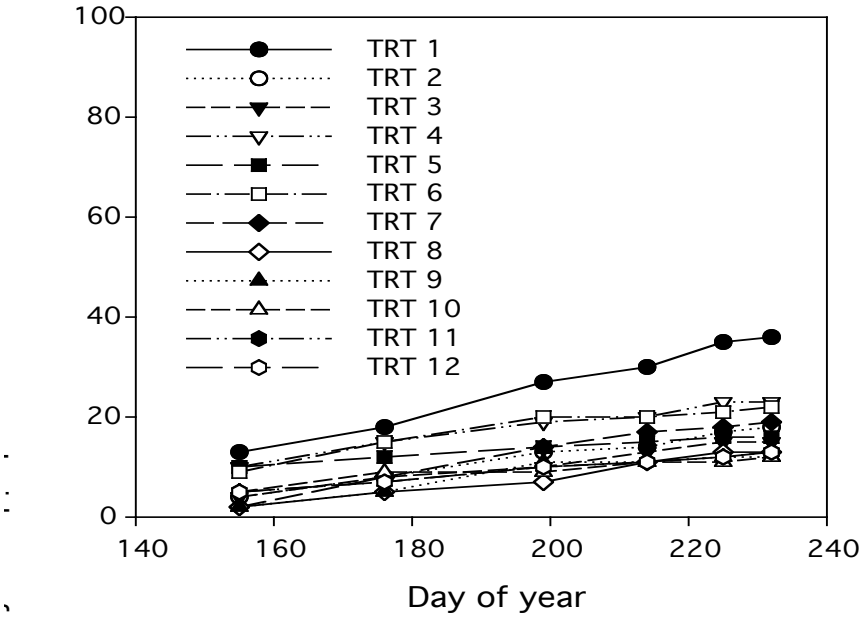

Figure 1. Disease incidence progress curves of Stewart's disease of corn for corn inbred (A632 Ht Block) plots at Crawfordsville, IA.

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.

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

[1]Means with the same letters within columns are not significantly different (P 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°C. The first spray was applied after 350 degree-days had accumulated, and the second spray was applied after 650 degree-days had accumulated.