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## Iowa 2008 Prediction for Stewart's Disease of Corn

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# Iowa 2008 Prediction for Stewart's Disease of Corn

## **Abstract**

Following an Iowa winter of ice, snow and cold temperatures, the predicted risk for Stewart's disease of corn in 2008 is negligible throughout most of Iowa, with only the southeastern-most counties having a low risk. Stewart's disease (also known as Stewart's wilt), is caused by the bacterium *Pantoea stewartii*. In addition to the pathogen, an insect vector, the corn flea beetle, plays a critical role in the spread of this microorganism from plant-to-plant.

## **Keywords**

Plant Pathology, Entomology

## **Disciplines**

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## Iowa 2008 Prediction for Stewart's Disease of Corn

ICM News

*April 17, 2008*

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Following an Iowa winter of ice, snow and cold temperatures, the predicted risk for Stewart's disease of corn in 2008 is negligible throughout most of Iowa, with only the southeastern-most counties having a low risk.

Stewart's disease (also known as Stewart's wilt), is caused by the bacterium *Pantoea stewartii*. In addition to the pathogen, an insect vector, the corn flea beetle, plays a critical role in the spread of this microorganism from plant-to-plant.

The corn flea beetle is important not only because it serves as a vector to acquire and transmit the causal bacterium, but because it also provides safe refuge for the bacterium

(within the gut of hibernating corn flea beetles) to survive the winter. Thus, if temperatures are mild enough for the corn flea beetle to survive the winter, the pathogen (*P. stewartii*) will also survive. In the spring, surviving beetles infested with the bacterium will emerge from grassy areas near neighboring corn fields and will begin to transmit the pathogen to corn seedlings.

Stewart's disease can occur at any stage of plant development, but symptoms are almost always associated with flea beetle feeding. At the seedling stage, infected plants wilt rapidly from systemic infection, and seedling death is common. However, plants that do survive will be stunted and will serve as a source for next year's overwintering, as well as future corn flea beetle generations to acquire and spread the pathogen.

Plant-to-plant spread by overwintering corn flea beetles will continue until late May, when corn flea beetles lay their eggs at the base of corn plants. The overwintering generation of adult corn flea beetles then dies. Beetle death begins a "beetle-free" period lasting 2 to 3 weeks (early to late June), which ends as the next generation of adult corn flea beetles begin to emerge. During this "beetle-free" period, foliar insecticide sprays are not effective.

The first summer generation of adult corn flea beetles emerges in late June, and feeds on diseased corn plants. They can acquire the bacterium, and facilitate the further spread of the bacterium to healthy corn plants. Later in the growing season, usually after pollination, the leaf blight stage may occur. Diseased plants at this phase exhibit long, wavy streaks (lesions) that are initially water soaked, and then turn yellow and die. Corn flea beetle feeding scars are usually visible within the lesions. If the disease is severe, whole leaves may wilt and die.

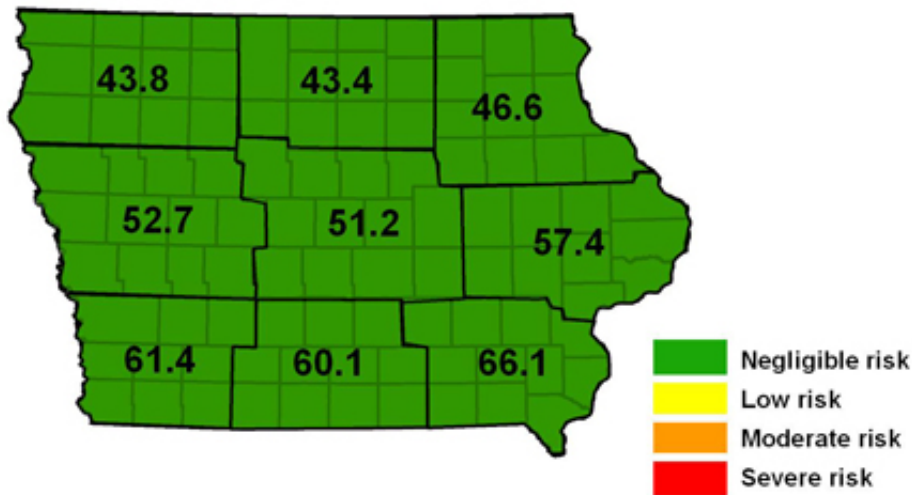
A second summer generation of corn flea beetles will emerge about mid-August, but late growing season foliar insecticide sprays are not recommended to control this generation.

Mild winters during the past decade have resulted in an increased occurrence of Stewart's disease in Iowa. Two disease prediction models are available to predict the seasonal and county-level risk of Stewart's disease. These models are: the Stevens-Boewe Index Model, and the recently-developed Iowa State Mean Monthly Temperature Model. Both models use the monthly mean winter temperatures that occur during in December, January and February to predict the degree to which the corn flea beetle population survived the winter.

The Stevens-Boewe Index predicts the severity (how much of the corn leaf tissue is infected) of the leaf blight stage of Stewart's disease in the late summer. The risk is calculated by summing the average monthly temperatures for December, January and February. A sum below 80 indicates a negligible risk, 80 to 95 is considered low, 85 to 90 indicates moderate risk, and greater than 90 is considered a severe risk. Stewart's disease predictions based upon the Stevens-Boewe Index, for the late leaf blight phase of

Stewart's disease throughout Iowa in 2008 (Figure 1).

## Stevens-Boewe Index

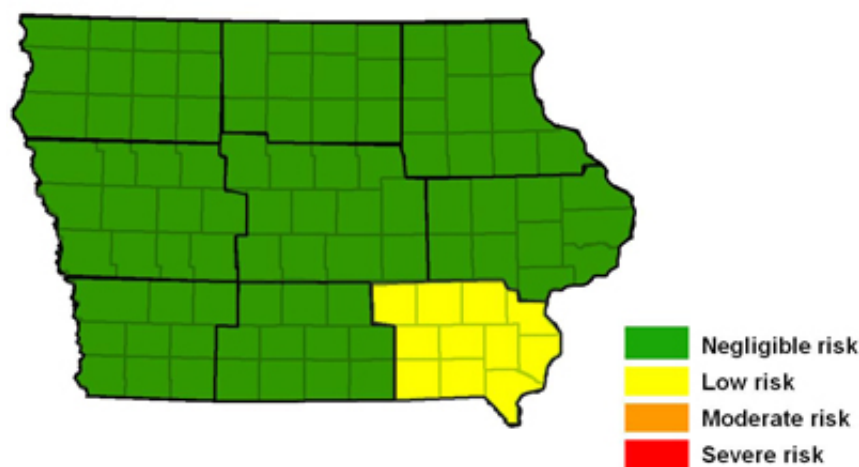


**Figure 1**

The Iowa State Model predicts the prevalence (presence or absence) for Stewart's disease at the county-level. A high prevalence of Stewart's disease is predicted if the mean monthly air temperatures for December, January and February are each above 24 degrees F. For December 2007, the mean temperature was greater than 24 degrees F only in crop reporting district #9 (southeast Iowa). The mean monthly temperatures for January and February were all well below 24 degrees F, which strongly suggests that temperatures were not favorable for corn flea beetles to survive the 2008 winter.

However, continuous snow cover on the ground over most of central and northern Iowa from early December to early March functioned as an insulation blanket to protect beetles from subfreezing temperatures. What this means is that although the models predict a negligible risk for Stewart's disease to occur throughout most Iowa in 2008, and only a low disease risk for southeast Iowa (Figure 2), the incidence may be slightly higher than we expect because of better than anticipated beetle survival from the snow cover.

## Iowa State Model



**Figure 2**

### **Insect Economic Thresholds**

Stewart's disease can be controlled on susceptible corn by controlling the corn flea beetle with a foliar-applied insecticide, but timing of the application is critical. Seed treatments also may provide a better approach to control. A 2000 study at the University of Illinois demonstrated that two insecticides, imidacloprid (Gaucho®) and thiamethoxam (Cruiser®), applied to sweet corn seed reduced the incidence of Stewart's wilt by 50 to 85 percent under field conditions with naturally occurring populations of corn flea beetles. These seed treatment insecticides controlled Stewart's wilt during the very early growth of corn plants when applications of conventional, foliar insecticides were ineffective, according to the researchers. The full article may be found at

<http://www.apsnet.org/pd/pdfs/2000/0726-01R.pdf>

Use the following thresholds for rescue treatments in corn:

- **Field corn**--prior to stage V5, 50 percent of plants with severe feeding injury and five or more beetles per plant.
- **Seed corn**--on susceptible inbreds, 10 percent of the plants with severe feeding injury and two or more beetles per plant.

Labeled insecticides include, but are not limited to, Asana XL, Capture 2 EC, Lorsban 4 E, Pounce 3.2 EC, and Warrior. See manufacturer's labels for use rates and restrictions.

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