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## Severe risk for Stewart's disease

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### **Abstract**

Stewart's disease of corn, also known as Stewart's wilt, is caused by the bacterium *Pantoea stewartii*. The 2000 growing season is predicted to be a very severe year for this disease, largely because of six successive winters with above-average monthly temperatures that have favored the survival of the insect vector for this disease, the corn flea beetle (*Chaetocnema pulicaria*). There are commonly two stages to the disease. Initially, leaf lesions that are off-green to yellow extend along the leaf veins, followed by mild-to-severe early seedling "blight" symptoms.

### **Keywords**

Plant Pathology

### **Disciplines**

Agricultural Science | Agriculture | Plant Pathology

# INTEGRATED CROP MANAGEMENT

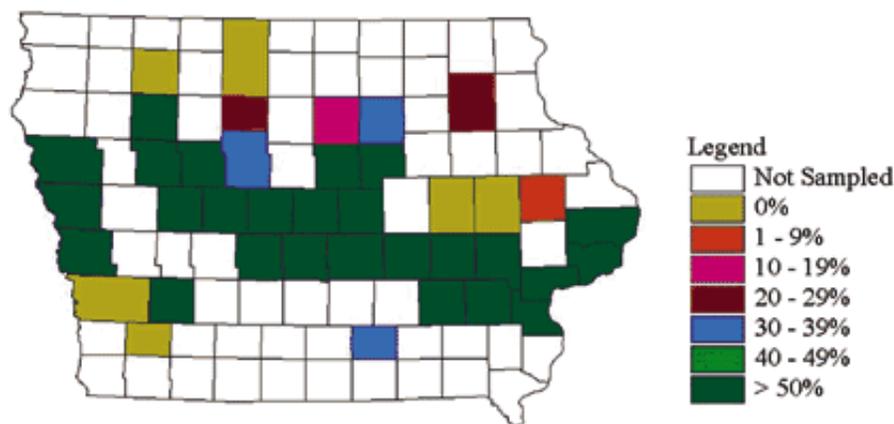
## Severe risk for Stewart's disease

Stewart's disease of corn, also known as Stewart's wilt, is caused by the bacterium *Pantoea stewartii*. The 2000 growing season is predicted to be a very severe year for this disease, largely because of six successive winters with above-average monthly temperatures that have favored the survival of the insect vector for this disease, the corn flea beetle (*Chaetocnema pulicaria*). There are commonly two stages to the disease. Initially, leaf lesions that are off-green to yellow extend along the leaf veins, followed by mild-to-severe early seedling "blight" symptoms. This phase is sometimes misdiagnosed as drought injury, nutritional deficiency, or insect injury. In epidemic years, such as 1999, plant death also may occur during this stage. Later in the season, the more common leaf blight phase of this disease may occur. Typical symptoms of this stage include corn flea beetle feeding scars that first turn dark, and as the bacteria reproduce in the leaf, a strawlike color develops. Leaves may completely senesce during this phase of the disease, making whole plants appear scorched. Hybrid corn varieties are generally more resistant than corn inbreds and sweet corn varieties. By combining the following four factors, a severe risk for Stewart's disease of corn is expected during the 2000 growing season throughout all of Iowa.

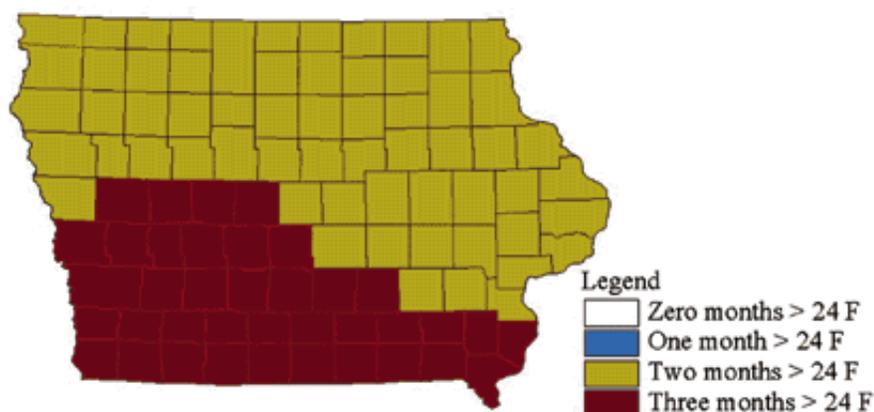
1. **Prevalence of Stewart's disease in corn inbreds has steadily increased each year between 1995 and 1999.** In 1999, 762 inbred fields of 1,317 fields inspected (58 percent) during the annual corn inspections showed evidence of Stewart's disease (Figure 1). The prevalence in 1999 was more than double that of 1998 when 25 percent of the 1,101 fields inspected had Stewart's disease (both years were record highs).
2. **Corn flea beetle populations in 1999 were extremely high in the lower two-thirds of Iowa.** In 1999, we observed an initial overwintering generation (late April into early May) of corn flea beetles followed by two additional corn flea beetle generations (early July and mid-August, respectively). In addition, corn flea beetles have already been detected this year approximately 2 weeks earlier compared with last year (corn flea beetles were first found in the lower one-third of the state at the end of April).
3. **In addition to the unusually large populations of corn flea beetles in 1999, we found that most of the corn flea beetles that we tested were infested with the Stewart's bacterium (50-80 percent).** This percentage range is based upon the results of a serological test (enzyme-linked immunosorbent assay) that was originally developed by Iowa State University (ISU) researchers to detect *P. stewartii* in seed but was modified by our laboratory to detect the presence of the pathogen in individual corn flea beetles.
4. **The most important risk factor that we used to make the prediction for Stewart's disease in 2000 concerns the effect of winter temperatures on corn flea beetle survival.** The beetles overwinter in Iowa as adults. The mean monthly temperatures for December 1999, January 2000, and February 2000 were greater than 24°F for

approximately 40 percent of the state (Figure 2). Such mild winter temperatures translate into a high risk for Stewart's disease because more of the corn flea beetles are expected to have survived the winter in soil covered with grass. The rest of the state had mean temperatures greater than 24°F for 2 of the 3 months. Based on a risk method developed at ISU, when temperatures for 2 months are greater than 24°F, a moderate-to-high risk for Stewart's disease is possible.

This project involves a team of ISU researchers, including John Obrycki (Department of Entomology), Elwynn Taylor (Department of Agronomy), Gary Munkvold (Department of Plant Pathology), and John Harri (Iowa Department of Agriculture and Land Stewardship). Forrest W. Nutter, Jr., leads the project. Paul Esker is a graduate research assistant (Department of Plant Pathology).



Prevalence of Stewart's disease of corn in Iowa in 1999.



Risk for Stewart's disease of corn in 2000 based solely on mean monthly air temperatures for December 1999, January 2000, and February 2000 (when considering all disease risk factors (see text), Stewart's disease is predicted to be "severe" throughout all of Iowa).

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