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Update: Outbreak prediction for Asian soybean rust in Iowa

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Update: Outbreak prediction for Asian soybean rust in Iowa

Abstract

Last year, Asian soybean rust moved slowly and did not show up in Iowa. Because of the dry weather conditions that prevailed during the 2005 growing season, one cannot draw a meaningful conclusion. Therefore, soybean rust remains a major concern for soybean producers in the northern regions. A common question asked this winter has been: what is the risk of a soybean rust outbreak in the upcoming season?

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Update: Outbreak prediction for Asian soybean rust in Iowa

by E. M. Del Ponte and X. B. Yang, Department of Plant Pathology

Last year, Asian soybean rust moved slowly and did not show up in Iowa. Because of the dry weather conditions that prevailed during the 2005 growing season, one cannot draw a meaningful conclusion. Therefore, soybean rust remains a major concern for soybean producers in the northern regions. A common question asked this winter has been: what is the risk of a soybean rust outbreak in the upcoming season?

To better assess the risk, one needs to know that outbreaks of soybean rust in Iowa would have to follow several connected, timely events. The key events or factors are the production of spores early in the season in the South, the spread of large numbers of those spores from there to Iowa, and then weather conditions conducive for disease establishment and development. Each event is equally important because an outbreak will not occur if one of those events is missing. By assessing the likelihood of each event, one could determine the risk in the coming season.

Spore movement

In a previous *ICM Newsletter* article, we discussed the major findings of our assessment on potential spore dispersal and deposition on Iowa's soybean fields originating from sources in southern states and how to read spore prediction maps based on results of spore models using historical weather data. A network, led by the University of Minnesota, detected the presence of spores throughout the growing season in most of the North Central Region, which suggests spores moved as models predicted. However, the viability of spores after traveling a long distance is unknown. Spore viability can be reduced by ultraviolet radiation, particularly when spores are exposed high in the sky for several days. Once spores land and infect soybean leaves, it may take about a month for the disease to develop to a detectable level.

Rainfall and rust outbreaks

Precipitation has been highly associated with rust outbreaks in South America and Asia. Rainfall models were developed at Iowa State University using the relationship between final severity of a disease outbreak and the amount of rainfall in the month after disease detection. The model was developed with a dataset from three years of disease occurrence in Brazil and had a predictive ability up to 93 percent. We used the model to assess the rainfall favorability for the likelihood of soybean rust outbreaks in Iowa using 50-year historical rain

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data for the month of August.

Study results show that if a significant number of viable spores is available, rainfall in August is suitable for soybean rust to occur in general, with most years having light disease. In wet years, as occurred in northeastern Iowa in 1998 and northwestern Iowa in 1996, predicted disease severity may reach high levels. Keep in mind that disease severity is different from yield loss. There is no firm relationship between disease severity and yield; it varies according to the time the disease is detected and other factors. With late-season soybean rust detections, the likelihood of yield losses is lower. In the coming season, we should assess the risk of soybean rust according to the three key events: (1) overwintering status of soybean rust in the Gulf Coast region, (2) soybean rust development in these regions before June, which suggests the availability of spores from the South, and (3) precipitation conditions during the summer. If one of these events is missing or is unfavorable to rust, we may be in a good position, as was the case last year.



Asian soybean rust. (X.B. Yang)

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