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Asian soybean rust and weather

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Asian soybean rust and weather

Abstract

We know that all diseases are sensitive to the environment to one extent or another, but there are a lot of gaps in what I know about the interaction of weather with the Asian soybean rust. The rust did become established in places where the winter did not kill the green vegetation that can serve as a host to this pathogen (it appears that reported temperatures of 25 °F or less kill the green leaves). We must assume that the rust will be active this spring in the southern United States.

Disciplines

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Weather

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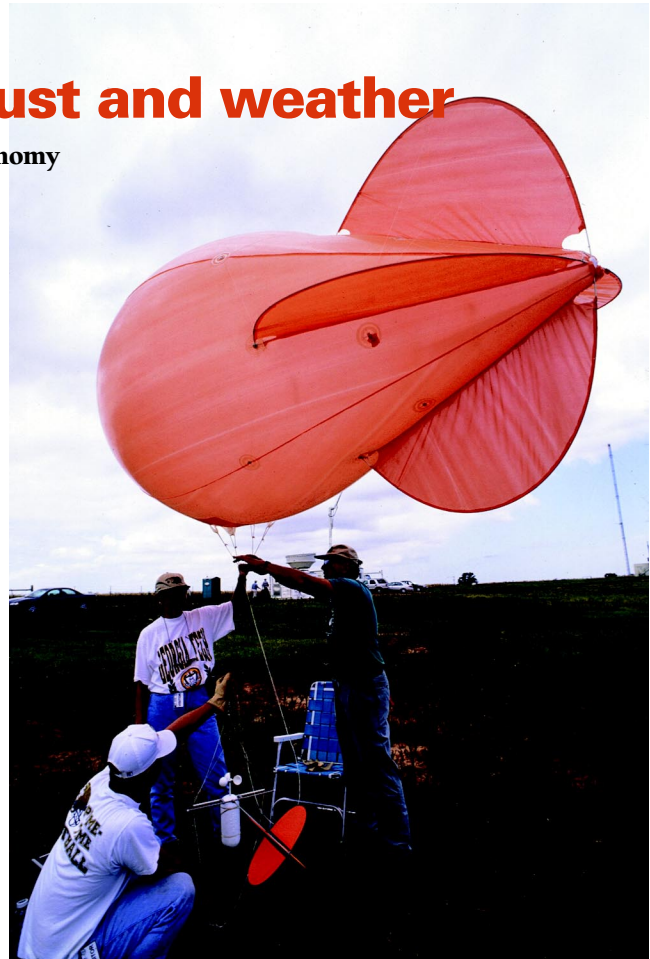
by Elwynn Taylor, Department of Agronomy

We know that all diseases are sensitive to the environment to one extent or another, but there are a lot of gaps in what I know about the interaction of weather with the Asian soybean rust. The rust did become established in places where the winter did not kill the green vegetation that can serve as a host to this pathogen (it appears that reported temperatures of 25 °F or less kill the green leaves). We must assume that the rust will be active this spring in the southern United States.

We do know that windblown rust spores can spread the disease. We do know that the prevailing winds in the Midwest shift from northwest to winds from the southeast or south as we move from April to June. We would expect a dispersion of the spores with the wind in areas that have dew most nights. We have several reports of sudden long-distance movements of this disease in South America. Some of these may be caused by people, but many appear to be associated with the Low Level Jet that often develops in Brazil and Argentina. This jet develops mainly at night and carries materials from near the equator toward the pole. We have a similar air event in the Midwest.

The hot-air balloon folks discovered our Low Level Jet some years ago. We have noted that it plays a large role in the weather and in movement of insects and disease in the Midwest (also in movement of some birds). At this time several of us are working to put together a program that will let everyone know the areas with rust and winds that can disperse it, and to where, and when, and what the risk is that the disease will establish should the spores arrive. You can take note of nighttime thunderstorms. These often mark the area where a Low Level Jet is depositing the materials the wind has been keeping aloft. If your area receives overnight thunderstorms, be alert to the possibility that rust spores may have been carried with it and keep a close eye on your soybean crop.

The seasonal outlook as of now is not abnormal, although spring may be on the moist side. Temperatures are not expected to be overly warm in spring and early summer at this time. Overall in Iowa, if the spores do



A tethered weather balloon carries instruments to measure humidity, temperature, and wind speed, factors that can disperse Asian soybean rust spores. (USDA Agricultural Research Service)

arrive, there is about a 65 percent chance the disease will establish; the percentage is higher if heavy dew occurs most nights (according to the information we have to date). I do not have proper information on temperature, moisture, and thermal radiation conditions that are conducive to disease development (reports received so far from Africa, Asia, and South America do not have sufficient environmental and development data), but as these observations become available, we will replace a lot of uncertainty about this disease with functional risk assessments that apply to effective management.

Elwynn Taylor is a professor and climatologist with extension and research responsibilities in agronomy.