



PEST ASSESSMENT: *Peronsclerospora maydis*, (Corn Downy Mildew),

USDA-APHIS-PPQ-CPHST-PERAL/ NCSU

Scientific name: *Peronsclerospora maydis*

Order: Sclerosporales

Family: Sclerosporaceae

Common Name: Corn downy mildew

Source: CABI, 2002

Figure 1. *Peronsclerospora maydis* (Figure not available)

Description: (based on Smith and Renfro, 1999)

White to yellow streaking, followed by necrosis and browning of the streaks are characteristic leaf symptoms. The fungus may develop systematically causing severe chlorosis in the upper leaves. Infected plants may be stunted, sterile and often lodge. Plants older than four weeks are highly resistant to infection.

Life History: (based on Smith and Renfro, 1999)

Infected maize plants grown during the dry season are the primary source of inoculum in Indonesia. The fungus may survive as mycelium in Kernal, but this is a minor source. Infection by conidia occurs through stomata of young plants and local lesions elongate towards the meristem, inducing systemic infection. Conidia are produced superficially on wet leaves in the dark. The primary economic host of *Peronosclerospora maydis* is *Zea mays* (maize) (CPC, 2002).

Projected distribution in the United States if Introduced:

Prediction Model:

Corn downy mildew is modeled using the Generic Infection Template. *P. maydis* usually, caused high levels of systemic infection from 8 to 36°C. Results from other species of *Peronosclerospora* suggest that 4-6 hours of wetness is required for infection (Bonde and Melching, 1979; Bonde et al., 1978,1992). The incubation period for *P. maydis* has not yet been identified but *P. sorghi* is approximately 7 days under laboratory conditions.

Other factors that are influenced by weather include sporulation and germination. *Peronoscleraspora maydis* produces large numbers of conidia from 18 to 23° (the opt. temp. for sporulation) in presence of dew for 5-6 h (Bonde et al., 1992). Note sporulation requires darkness. *P. maydis* has a broad optimum temperature range for germination (at least 10-30°C) and germ tube growth (18-30°C) (Bonde et al., 1992). It is unclear if conditions for primary infection exceed that identified for secondary infection.

In creating the downy mildew model, we assumed that the distribution of the organism can be related to the frequency of infection periods. The influence of weather on other biological factors such as overwintering, sporulation and dispersal were ignored. However, the conditions for sporulation are similar to that for infection and weather conditions are not thought to limit overwintering in areas where corn is grown. .

The recommendations for infection model parameters for *P. maydis* are T_{\min} 8 C, T_{\max} 36 C, T_{opt} = 21 C, W_{\min} 5 h.

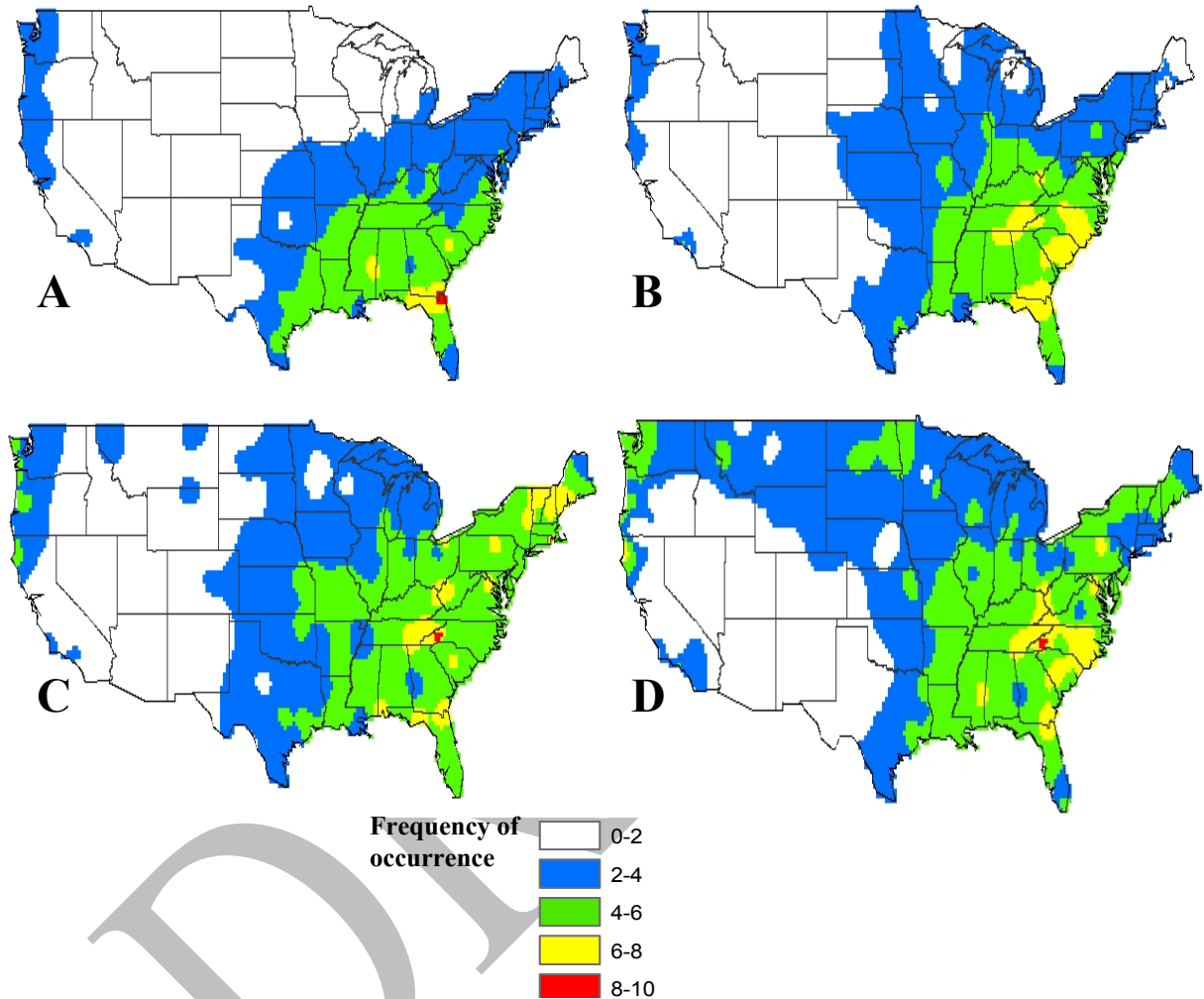


Figure 2. Probability maps of *P. maydis* infection during the periods of May 1, May 15, June 1 and June 15 (A-D), respectively, represented by frequency of occurrence in ten years. Maps based upon 30-year climatic averages.

Results

The maps are above are selected to represent periods of the growing season when maize is susceptible to infection. Since planting dates and crop phenologies are variable, these periods of susceptibility may differ by location. The climatic maps show that the southeast is highly favorable for disease for most of the period during June and July.

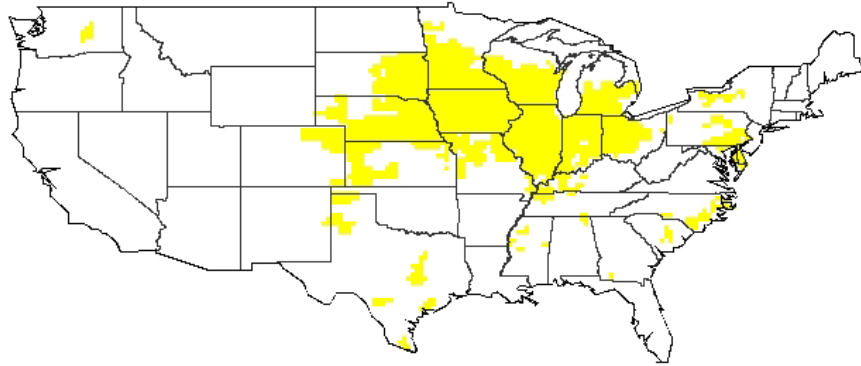


Figure 3. Counties in the United States where greater than 20,000 acres of corn are grown. (Census of Agriculture 1997)

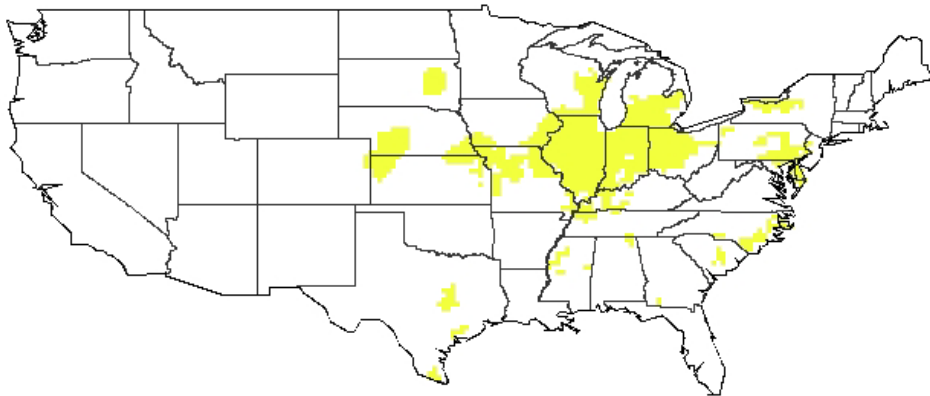


Figure 4. Areas of the continental United States where greater than 20,000 acres of corn are grown and infection risk > 3 years out of 10 on June 1. Maps based upon 30-year climatic averages.

The overlay map is to demonstrate the potential of the system to create risk maps based upon both climate and crop data. The overlay map with corn density shows that a substantial portion of the US corn production would be climatically favorable for infection by *P. maydis* on the selected date.

Acknowledgements:

Authors: Roger Magarey and Dan Borchert

References Cited:

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