UNIVERSITY OF ILLINOIS EXTENSION
College of Agricultural, Consumer and Environmental Sciences

report on
PLANT
DISEASE

RPD No. 212
June 1989

DEPARTMENT OF CROP SCIENCES
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

ILLINOIS CORN DISEASE MANAGEMENT PROGRAM

Approximately 30 different diseases are known to cause economic loss of yield and grain quality to corn in Illinois. To prevent loss from these diseases, it is necessary to follow a comprehensive integrated corn disease management program. Such a program should include the use of disease-resistant hybrids, crop rotations, various tillage practices, balanced fertility, fungicides, insect and weed control, and other cultural practices. These practices should relate to the risk potential of the various diseases and the life cycles of disease-causing organisms (pathogens).

Table 1 lists those diseases known to cause yield losses in Illinois and the relative effectiveness of various control measures.

Disease-Resistant Hybrids

The use of disease-resistant hybrids is the most economical and efficient method of disease control. Although no single hybrid is resistant to all diseases, hybrids with combined resistance to several major diseases are available. The maps in Figure 1 portray the areas of Illinois in which certain diseases are most likely to occur and the approximate expected yield loss on a regional basis if susceptible hybrids are grown. Yield losses may be higher in individual fields and losses will vary from year to year. Corn producers should select high-yielding hybrids with resistance or tolerance to major diseases in their area.

Crop Rotation

Crop rotation is a very powerful disease-control tool. Many common pathogens require the presence of a living host crop for growth and reproduction. Examples of such corn pathogens include the leaf diseases ("Helminthosporium" leaf diseases, Physoderma brown spot, Goss's bacterial wilt, gray leaf spot, yellow leaf blight, eyespot) and nematodes. Rotating to nonhost crops (e.g., soybeans, alfalfa, clovers, and canola) "starves out" these pathogens resulting in a reduction in inoculum levels and the severity of disease. Continuous corn, especially in combination with conservation tillage practices, which promote large amounts of surface residues, may result in severe outbreaks of disease. In such cases it is highly advisable to utilize all other disease-control measures.

Tillage

Tillage programs that encourage rapid residue decomposition, before the next corn crop is planted, will help reduce populations of pathogens which overwinter in or on crop debris. Although a clean plow-down is an important disease-control practice, the possibility of soil losses from erosion must be considered. Other control measures can provide effective disease control if conservation tillage is implemented.

For further information contact Dean K. Malvick, Extension Specialist and Field Crops Pathologist, Department of Crop Sciences, University of Illinois, Urbana-Champaign.

Examples of diseases partially controlled by tillage include stalk and root rots, "Helminthosporium" leaf diseases, Physoderma brown spot, Goss's bacterial wilt, gray leaf spot, anthracnose, ear and kernel rots, yellow leaf blight, eyespot, and nematodes.

Balanced Fertility

Adequate balanced fertility plays an important role in checking the development of such diseases as Stewart's bacterial wilt, seedling blights, leaf blights, smut, stalk rots, ear rots, and nematodes. Diseases are often most severe where there is an excess of nitrogen and/or a lack of potassium. Healthy, vigorous plants are more tolerant of diseases and better able to produce a near normal yield.

Seed Treatment

Essentially all commercial corn seed is treated with a fungicide, and sometimes with an insecticide, by the seed processor. This important practice helps to insure high yields of top-quality grain. Seed treatment is most valuable under adverse soil conditions (cold and wet or very dry) when seed germination is delayed, or when planting into heavy residues (no-till or certain conservation tillage practices). Proper fungicide seed treatment controls seed rots and seedling blights. Failure to control this disease complex results in spotty stands. The treated seed should be plump, injury-free, and planted in soils at 50°F or above. The seedbed should be well prepared with fertilzier, herbicide, insecticide, and seed properly placed.

The recommended seed treatment fungicides are given in Illinois Extension Service publication: Plant Disease Management Guide for Field Crops. This circular is revised annually and can be purchased from Ag Services, P345, 1917 S. Wright, Champaign, IL 61820.

Foliar Fungicides

One or more "Helminthosporium" leaf blights and rust diseases may occur every year regardless of the precautions taken. If extended periods of moist, overcast weather occur before or shortly after tasseling, these diseases may cause losses of 10 to 30 percent. If significant disease occurs earlier than 2 weeks after tasseling, the application of foliar fungicides may be justified, especially in seed production fields. The decision to apply fungicides should be based on the prevalence and severity of leaf diseases. Leaf blights generally are first seen on the lower leaves. Rusts first appear on the upper leaves.

In general, fungicide applications are economically feasible only in seed-production fields. Weekly scouting for "Helminthosporium" leaf blights and rusts should begin in the tillering stage. If diseases are present, and weather conditions favor continued disease development (rainy and overcast), fungicide applications should be considered. Two to four protectant sprays are suggested, starting when disease appears. Add a label-recommended spreader-sticker (surfactant) to the spray tank to insure more uniform coverage. Follow the manufacturer's recommendations regarding rates, timing of applications, and the time interval between the last application and harvest. The best method for applying fungicides is by air (fixed-wing or helicopter), using a minimum of 5 gallons of water per acre. Fungicides must be applied uniformly. Do not feed fungicide-treated fodder or forage to livestock.

Integrated Control

The aim of control measures is to disrupt the combination of factors necessary for disease development,

including a favorable environment, susceptible plants, sufficient quantities of a virulent pathogen, and adequate time for disease development. Disease control programs are based on an understanding of host and pathogen biology and the factors involved in infection and disease development.

Short-term control may be achieved by a single practice. However, long-term reduction of disease losses requires the implementation of an integrated control program, including the use of disease-resistant hybrids, crop rotation, tillage, balanced fertility, insect and weed control, and, if necessary, the timely application of disease-control chemicals.

Disease-control practices should be based on knowledge of which diseases are likely to occur and when they are likely to cause economic loss. The maps in Figure 1 indicate approximate disease risk areas. Field surveys can be helpful in identifying diseases and developing appropriate disease-control measures. For example, fall surveys for stalk and ear rots will help reduce losses from these diseases and determine drying and storage strategies.

Table 1. Corn Diseases that Reduce Yields in Illinois and the Relative Effectiveness of Various Control Measures

Disease	Resistant or tolerant hybrids	Crop rotation	Clean plow-down	Balanced fertility	Fungi-cides	Other controls and comments
Stewart's bacterial wilt	1			3		Early control of corn flea beetles may be helpful on susceptible hybrids
Seed rots and seedling blight	2			3	1	Sow injury-free, plump seed. Plant seed in soils 50° to 55°F or above. Prepare seedbed properly and place fertilizer, herbicides, and insecticides correctly.
"Helminthosporium" leaf blights; Northern leaf blight, Northern leaf spot, "Helminthosporium" leaf spot, southern leaf blight	1	2	2	3	2	Fungicide applications are generally only justified in seed production fields and only if the lower three leaves up to 2 weeks after tasseling are infected.
Physoderma brown spot	1	3	2			
Yellow leaf blight and Eyespot	1	2	1		3	See comments for "Helminthosporium" leaf blights
Gray leaf spot	2	2	2		3	See comments for "Helminthosporium" leaf blights
Anthracnose	1	2	1	3		
Crazy top and sorghum downy mildew	1	3	3			Avoid low wet areas and plant only downy mildew-resistant sorghums in sorgum-corn rotations. Control of shattercane (an alternate host) is very important.
Goss's bacterial wilt	1	1	2			Rotations of 2 or more years will provide excellent control.
Smut	2	3	3	3		Avoid mechanical injuries to plants. Control insects.
Common and southern rusts	1				3	Fungicides may be justified in seed-production fields.
Stalk rots: Diplodia Charcoal Gibberella Fusarium Anthracnose Nigrospora	2	2	2	2		Plant adapted, full-season hybrids at recommended populations and fertility. Control insects and leaf diseases. Survey at 30 to 40% moisture to determine potential losses.

Ear and kernel rots: Diplodia Fusarium Gibberella Physalospora Penicillium[a] Aspergillus[a] Others	2	2	3	3	Control stalk rots and leaf blights. Hybrids that mature in a downward position with well-covered ears usually have the least ear rot. Ear and kernel rots are increased by bird, insect, and severe drought damage.
Storage molds: Penicillium Asperigillus, etc.					Store undamaged corn for short periods at 15 to 15.5 percent moisture. Dry damaged corn to 13 to 13.5 percent moisture prior to storage. Low-temperature-dried corn has fewer stress cracks and storage mold problem s if an appropriate storage fungicide is sued. See your nearest Extension adviser for details. Corn stored for 90 days or more should be dried to 13 to 13.5 percent moisture. Inspect weekly for heating, crusting, or other signs of storage molds.
Maize dwarf mosaic	1				Control Johnsongrass and other perennial grasses (alternative hosts) in and around fields.
Wheat streak mosaic	1				Plant winter wheat (an alternative virus host) after the fly-free date and control volunteer wheat. Separate corn and wheat fields.
Nematodes: Lesion Needle Dagger Sting Stubby-root		2	2	3	Clean plow-down helps reduce winter survival of nematodes. Nematicides may be justified in some situations. See your Extension adviser for information on chemical control.

NOTE: Description of these diseases can be found in the Corn Disease Compendium, published by the American Phytopathological Society, 3340 Pilot Knob Road, St. Paul, MN 55121.

1 = highly effective control measure; 2 = moderately effective control; and 3 = slightly effective control.
A blank indicates no effect.

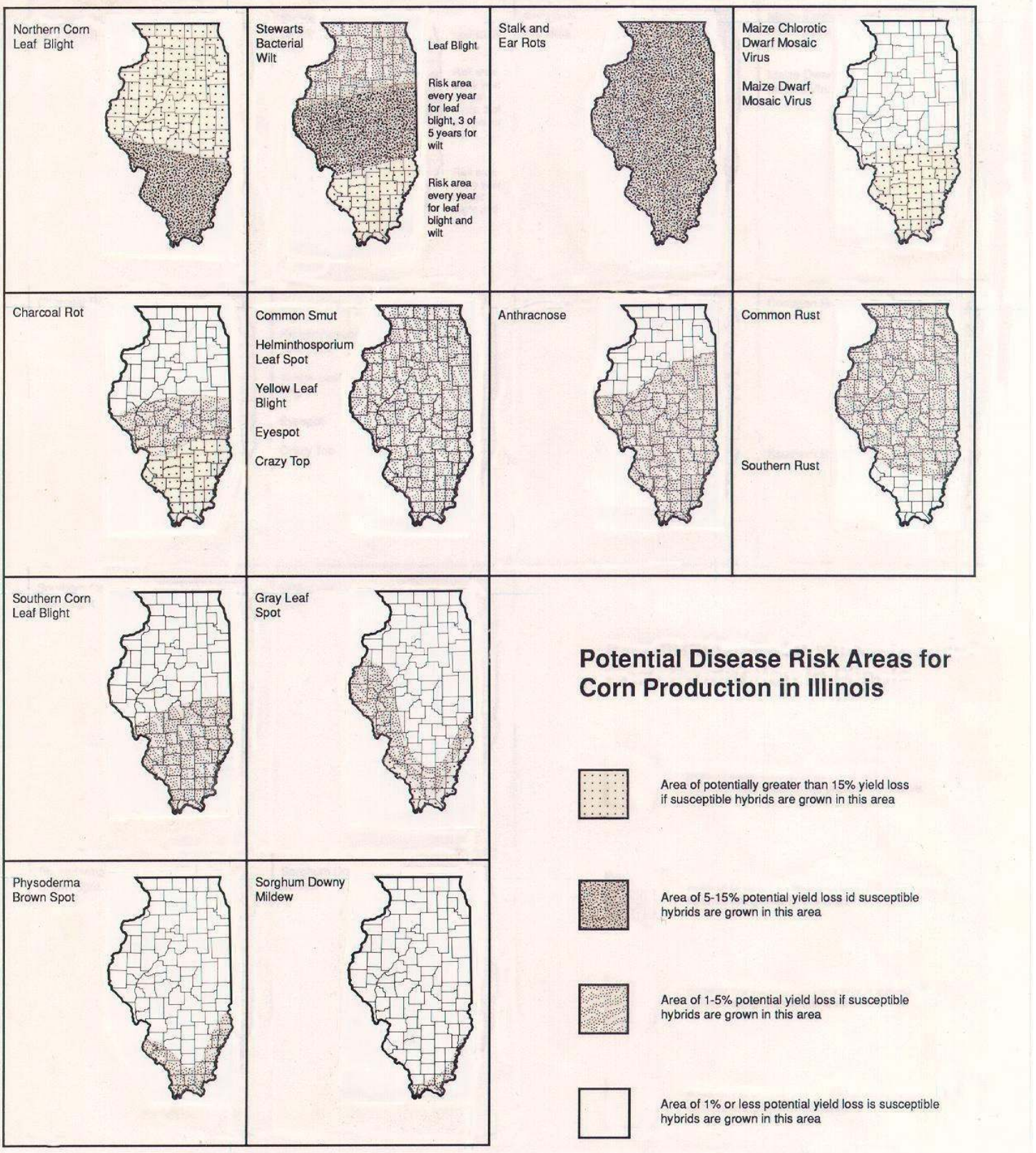

Fig. 1. Potential disease risk areas for corn production and approximate expected yield loss if susceptible hybrids are grown.