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CORN LEAF DISEASES AND THEIR CONTROL

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The 1993 growing season was another unusual year for leaf diseases of corn. Some diseases went rampant and other diseases, which were expected because of the wet weather, did not develop on corn leaves. The various diseases will be discussed.

The source of the pathogen is important when considering control measures for leaf diseases. The leaf diseases of corn can be categorized into seed borne, debris borne, insect borne, and continental. The seed borne characteristic of some diseases is important for introduction of the pathogen into a new area or field, but the development of epidemics requires favorable weather. Luckily none of the serious pathogens of commercial field corn are seed borne, or the seed borne nature of the pathogen is rare or unimportant for control of the disease in Iowa fields.

The corn flea beetle is the overwintering source and primary vector of the bacterium *Erwinia stewartii*, which is the causal agent for Stewarts disease of corn. The bacteria survive the winter in the body of the insect and are transmitted to the plants by the same insect. Other leaf feeding insects can also cause secondary spread of the bacterium. Survival of the corn flea beetle will occur when the average temperatures for December, January, and February total 90 degrees or more, which usually means that the flea beetle (and bacterium) do not survive most Iowa winters and the "flea beetle survival line" is usually about mid Missouri. In 1992, the mild winter allowed for widespread survival of the corn flea beetle, but in 1993 an insignificant number of beetles survived the Iowa winter and Stewarts disease was rarely seen in Iowa in 1993. The bacteria may be systemic in the vascular system of many corn varieties, yet the leaf lesions are the most obvious symptoms of the disease. The disease is often misdiagnosed as Northern leaf blight. Stewarts disease is a problem for seed producers because it is on the quarantine list for most countries buying US produced corn seed.

A prevalent disease every year is common rust, caused by the fungus *Puccinia sorghi*, which is a continental pathogen. The cool, wet weather in 1993 was ideal for rust to develop and it became epidemic. The rust was so severe by early July, that we sought a Section 18 Emergency exemption for seed producers to apply propiconazole (Tilt®). This obligately parasitic fungus supposedly does not survive the winters in Iowa and the spores of the organism must be blown in from the Southern states, thereby making it a continental pathogen. Lesions were observed in Iowa by early June. Normally common rust development is inhibited by the hot summer temperatures and the disease does not increase greatly until the cooler nights of late August and September. Sweet corns and some inbred lines of dent corn are normally very susceptible to rust

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and most dent hybrids are resistant, but in 1993 all corn was affected by rust. We could see differences in the relative susceptibility of hybrids.

Northern leaf blight, Northern leaf spot, gray leaf spot and eyespot and anthracnose are the more common foliar diseases where the pathogen overwinters in the debris from the prior corn crop. These diseases are caused by fungi and are more severe with conservation tillage and continuous corn cropping. The corn debris on the soil surface is a ready source of spore inoculum. In 1993, the early season rains allowed all of these diseases to develop, especially on corn planted in late April. The later planted corn appeared to escape most of these diseases, except for anthracnose (Colletotrichum graminicola), which became the dominant disease caused by a debris-borne pathogen. Anthracnose produces small football shaped lesions on the leaves. Late in the season, the pathogen can be seen affecting stalk and crown tissues; the shiny black symptoms on the surface of corn stalks is diagnostic. It is present every year as a stalk rot pathogen. Northern leaf blight, which is characterized by elongated, lens shaped lesions about 2 to 6 inches long, is observed every year over the entire state. Some years, like 1990, it reached epidemic proportions. This disease is caused by the fungus Exserohilum (Helminthosporium) turcicum, which exists as several races. Resistance is the common measure for control of this disease

Northern leaf spot appears every year and can be a severe problem in a few hybrids and in many of the seed production fields in Central and Eastern Iowa. The fungal pathogen, Bipolaris zeicola (= Helminthosporium carbonum), exists as 3 or 4 races. In 1989, 1990, 1991, and 1992 Northern leaf spot was a problem in some seed production fields north of Interstate 80 from Central Iowa, through Wisconsin, Illinois, Indiana, and Michigan. In 1993, this was not a common disease. The disease apparently is most severe on some germplasm of B73 heritage, moderately severe on Mo17 types, and lightest on other families like A632 and Oh43 derivatives.

The remaining two leaf diseases of any importance in Iowa are gray leaf spot (Cercospora zeae-maydis), and eyespot (Kabatiella zeae). Gray leaf spot did not develop until late in the growing season in 1993, but was more prevalent throughout Iowa in 1992. There is little resistance to gray leaf spot in corn belt hybrids. Eyespot prevalence has diminished in recent years because of resistance in most current hybrids. For economic losses due to eyespot, continuous corn cropping is almost a prerequisite and then the early season must provide for prolonged moist periods for inoculum production and leaf infection.

Control of these diseases can be accomplished by several procedures. Resistance is available for most of the diseases, but incorporation of the resistance into suitable hybrids can be a tedious procedure. Crop rotation is beneficial for control of the debris-borne pathogens, but the inoculum can become wind-borne and spread into rotated fields. Fungicides can be applied, but we are limited greatly by the few that are registered for use on corn, and then the harvest interval (time between last application and harvest). Mancozeb can be applied to corn for control of leaf diseases, but there is a 40 day harvest interval. Copper tallate is registered, though
usually it is less effective than mancozeb. Chlorothalonil is registered for use on seed corn, but the fodder can not be fed to livestock. Propiconazole was available for use on seed corn for a 15 day window in 1993. It can not be applied after silking begins. The clue to successful control with fungicides, is to make the applications timely. This requires scouting for the diseases and starting fungicide applications when only a few lesions are present on the leaves. Multiple applications are needed to prolong the control. New leaf tissue will need to be protected and prior deposits of a fungicide are easily eroded by rain. Usually the interval between sprays is a week to two weeks. The cost of the fungicide and application can be prohibitive for use of fungicides on field corn.