

## THREE DISEASES OF CORN (ZEA MAYS) NEW TO ONTARIO: CRAZY TOP, A PHYLLOSTICTA LEAF SPOT, AND EYESPOT

L. F. Gates and C.G. Mortimore<sup>1</sup>

CRAZY TOP (*Sclerophthora macrospora* (Sacc.)  
Thirum., Shaw and Narasimhan)

This downy mildew has been reported by Connors (1) to occur on wheat (*Triticum aestivum* L.) in Canada, but it has not been recorded on corn (*Zea mays* L.) in this country. The only previous occurrence of crazy top in Ontario known to the authors was in 1946, when it was seen in one field in Kent County by Mr. Earl Thompson of Pioneer Seed Company (personal communication). However, in 1968 the disease occurred unexpectedly in several areas of Essex and Kent Counties. In an August survey of 22 fields near Harrow known to have had flooded areas in the spring, 5 fields contained infected plants. In all, 10 cases were reported in 1968 in a 6-mile radius of Harrow, and 2 cases were reported in Kent County.

Infected plants were stunted, tillered, and often crooked, with disorganized vascular systems. Leaves were thickened, leathery, and corrugated, with a characteristic striping of light green lines, which were frequently longer near the midrib than at the edges of the leaf (Fig. 1A). The tassels, or parts of the tassels, developed leafy proliferations of the floral parts, and some plants developed multiple ears which were small and largely barren (Fig. 1B).

Invasion of the plant is reported to occur when the soil is flooded or waterlogged after seed germination and before the plants are about 6 inches high (6). In the Harrow area, where most corn is sown during the second and third weeks of May, 4.01 inches of rain were recorded on May 26-27, and many fields were flooded. The disease was clearly associated with the flooded areas: infected plants

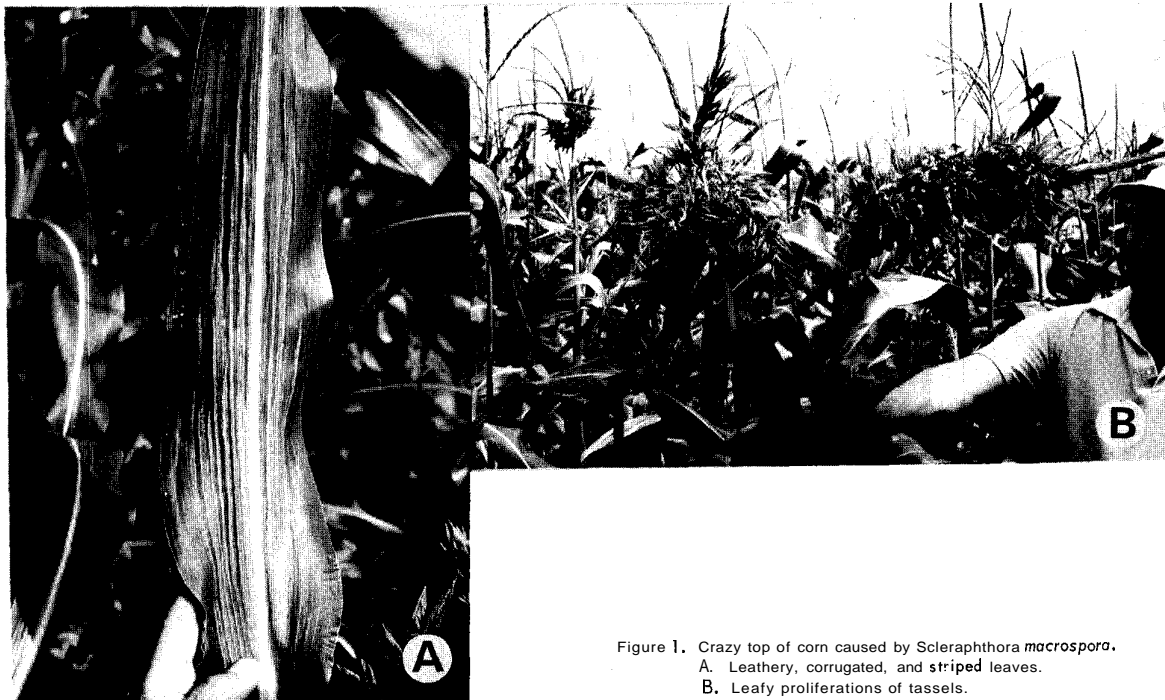


Figure 1. Crazy top of corn caused by *Sclerophthora macrospora*.  
A. Leathery, corrugated, and striped leaves.  
B. Leafy proliferations of tassels.

<sup>1</sup> Plant Pathologist and Plant Breeder,  
Research Station, Canada Department of  
Agriculture, Harrow, Ontario.

occurred around patches of flood-damaged corn or along areas where surface-water had flowed. Usually only a few infected plants were found, but some fields had areas with many infected plants. Crazy top was unusually prevalent in Indiana and in some adjacent states in 1968 under similar weather conditions (8).

It is of interest that the disease should appear in so many fields in areas where it has not been recorded before. Possibly, long-dormant oospores were the source of inoculum, but since the flooded areas frequently adjoined grass edges spores may have floated in from perennial grass hosts.

Some plants were seen in which leaf symptoms were recognized but the tassels were not affected, and it is possible that under wet conditions corn plants are invaded to a limited extent more frequently than observations of typical symptoms would suggest.

#### LEAF SPOT CAUSED BY A PHYLLOSTICTA SP.

In 1967 this disease was noted on corn in southwestern Ontario between Brantford and Chatham. In 1968 it was observed in the same general area and also in Essex County, and in 1969 was seen from Essex County to Northumberland County. Usually scattered infections occur mainly on the lower and middle leaves in August and September, but on occasions the spots coalesce and severely damage the leaves. Most of 56 hybrids were affected in a performance trial near Brantford in 1969.

Lesions are narrow, about 4-6 times as long as wide, and many fall typically within the range 1-4 cm x 0.2-0.5 cm; they are fawn-colored, frequently with a dark border (Fig. 2A). Pycnidia 80-150  $\mu$  in diameter develop, often in rows between the veins (Fig. 2B). Spores produced on leaves or on agar culture media are unicellular, ellipsoid to cylindrical, contain two or more oil-

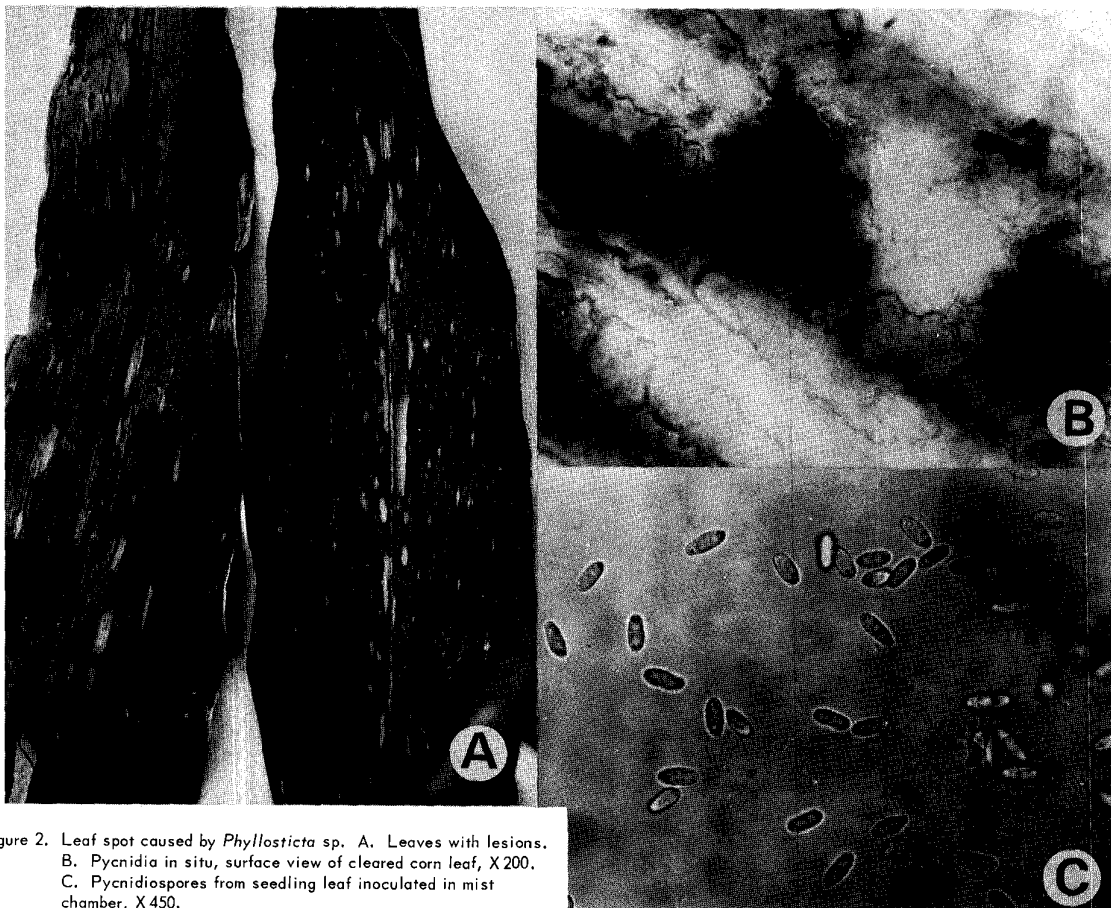


Figure 2. Leaf spot caused by *Phyllosticta* sp. A. Leaves with lesions. B. Pycnidia in situ, surface view of cleared corn leaf, X200. C. Pycnidiospores from seedling leaf inoculated in mist chamber, X450.

drops, and are generally  $9.6-14.0 \mu \times 3.2-5.3 \mu$  (Fig. 2C). These are larger than the spores described by Stout for *Phyllosticta zeae* (4), though they match in size the spores of *Ascochyta zeae*, which Stout describes as "obscurely uniseptate, the septum often apparently lacking". Cross-walls have only occasionally been seen in our material.

The wide distribution of this disease suggests that it is normally present at levels that are not noticed, but that conditions have favored its appearance in 1967, 1968, and 1969. The fungus behaves as a weak pathogen in that, after artificial inoculations of greenhouse corn plants, it infects leaves of young seedlings and older leaves of larger plants, but mature leaves in good condition are attacked only slowly. In the field the fungus attacks mainly older and senescing leaves. In the last 3 seasons, conditions in some areas of southwestern Ontario have been somewhat adverse for corn due to dry periods in the late summer, sometimes following heavy spring rains, which seem to have restricted root development. These conditions have resulted in shortages of moisture and nutrients in late summer, with a consequent early maturation and

senescence of leaves that would favor unusually widespread attack by the fungus. In 1968, leaf spots due to species of *Phyllosticta* were also widespread in several states of the U.S.A. (3,5). The use of large populations of plants places greater stress on individual plants, also favoring the disease. Corn monoculture, which is becoming common in southwestern Ontario, is likely to increase pathogen inoculum. Experiments at Harrow indicate that stalk rot resistance and yield depend largely on the integrity of the leaves above the ear, and so far in Ontario these leaves generally are only lightly affected by the disease.

EYESPOT (*Kabatiella zeae* Narita and Hiratsuka).

This disease was observed on corn in performance trials near St. Thomas and Brantford in 1967-69. Its incidence has been light, except on occasional leaves.

Spots are circular, brown, 1-2 mm in diameter, including a dark brown or reddish brown margin (Fig. 3A). Sometimes a translucent ring surrounds the spots. Conidiophores about  $30 \mu$  long emerge in

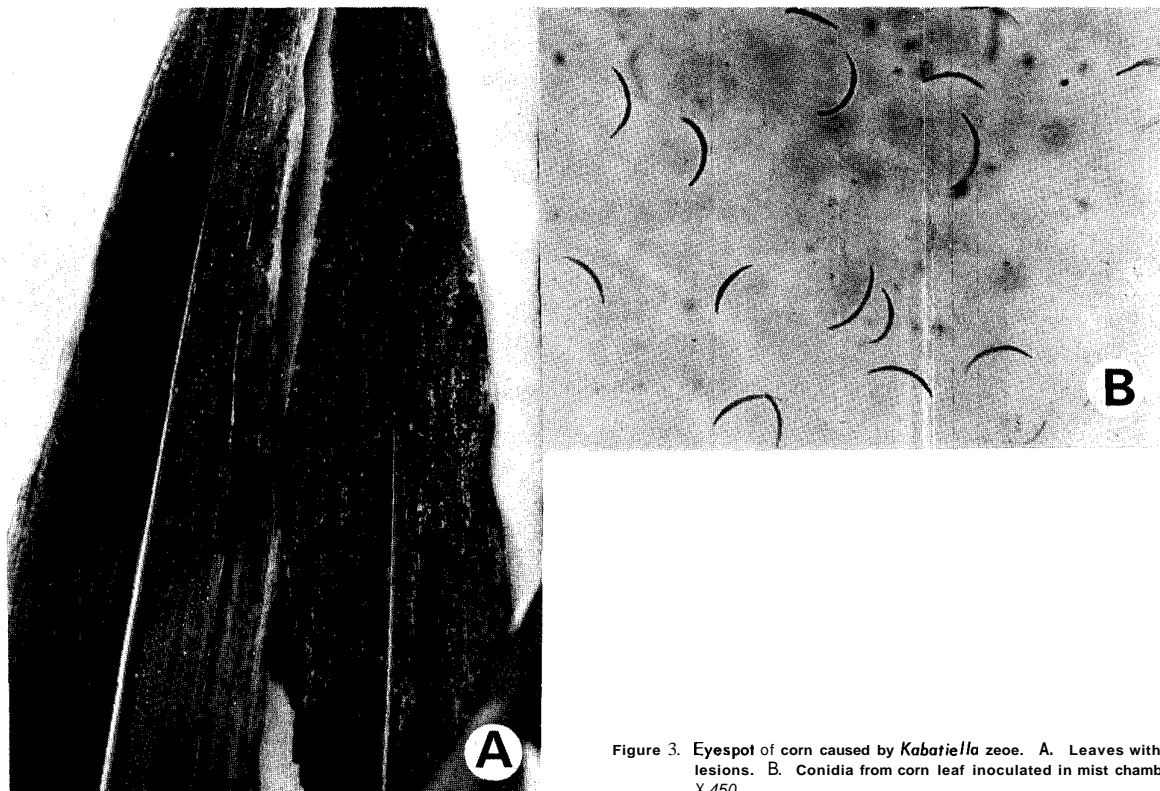


Figure 3. Eyespot of corn caused by *Kabatiella zeae*. A. Leaves with lesions. B. Conidia from corn leaf inoculated in mist chamber, X 450.

groups through the stomata and produce distinctive sickle- or crescent-shaped spores which measure  $16-29\mu \times 2.2-3.2\mu$  (Fig. 3B). The original description of this disease and pathogen was made in Japan (2), and it was recorded over a wide area of north-central U.S.A. in 1968 (5,7).

The fungus appears to be a weak pathogen, only slowly attacking corn leaves after artificial inoculation in a mist chamber, and attacking only older leaves in the field. Lesions sometimes occur along folds in the leaves along which spores have evidently been washed by rain or dew.

### Literature cited

1. Connors, I.L. 1967. An annotated index of plant diseases in Canada. Can. Dep. Agr. Pub. 1251. 381 p.
2. Narita, T., and Y. Hiratsuka. 1959. Studies on *Kabatiella zeae*, n. sp., the causal fungus of a new leaf spot disease of corn. Ann. Phytopathol. Soc. Japan 24:147-153; Rev. Appl. Mycol. 39:304. 1960.
3. Scheifele, G.L., and R.R. Nelson. 1969. The occurrence of *Phyllosticta* leaf spot of corn in Pennsylvania. Plant Dis. Repr. 53:186-187.
4. Stout, G.L. 1930. New fungi found on the Indian corn plant in Illinois. Mycologia 22:271-287.
5. Worf, G.L., and R.W. Ahrens. 1968. Two new corn diseases in Wisconsin. Cooperative extension programs bulletin, Control Plant Diseases, No. 32, Department of Plant Pathology, Univ. of Wisconsin.
6. Ullstrup, A.J. 1952. Observations on crazy top of corn. Phytopathology 42:675-680.
7. Ullstrup, A.J., E.B. Smalley, G.L. Worf, and R.W. Ahrens. 1969. Eyespot: A serious new disease of corn in the U.S.A. Phytopathology 59:1054.
8. Ullstrup, A.J., and M.H. Sun. 1968. The prevalence of crazy top of corn in 1968. Plant Dis. Repr. 53:246-250.