

BIPOLARIS SOROKINIANA ON SNAP BEANS IN NOVA SCOTIA¹

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Abstract

A severe infection of leaves, pods and stems caused by *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoemaker was found in 10 acres of snap beans (*Phaseolus vulgaris*) in Nova Scotia. The symptoms of the disease differ from those previously described for *B. sorokiniana* on beans in New Brunswick. Lesions on leaves, petioles, and stems were similar to those described for *Bipolaris victoriae* on beans in North Carolina, but pod lesions were distinctive in the Nova Scotia material. The fungus failed to sporulate on diseased beans in the field. An adjacent field of infected oats (*Avena sativa*) was considered to have been the source of inoculum.

Introduction

In August, 1967, 'Tendercrop' snap bean (*Phaseolus vulgaris* L.) plants in a 10-acre field in Kings County, Nova Scotia, were severely infected with what was at first considered to be bacterial blight. However, a species of the fungus *Bipolaris* was the dominant organism isolated from the leaves, petioles, pods, and stems of infected bean plants. The fungus was identified by Dr. R. A. Shoemaker as *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoemaker and the specimen was filed as DAOM 117217.

Bipolaris victoriae (Meehan and Murphy) Shoemaker was reported by Winstead and Hebert (under the name *Helminthosporium victoriae* Meehan and Murphy) to be the causal agent of a similar disease of beans in North Carolina (2). Graham et al. (1) reported *B. sorokiniana* on the green-podded snap bean varieties 'Tendercrop' and 'Bush Blue Lake' in New Brunswick and stated that the symptoms of this disease were distinct from those reported for *B. victoriae*. In Nova Scotia bean leaves infected with *B. sorokiniana* showed interveinal symptoms similar to those reported from New Brunswick, but the symptoms on the leaf veins, petioles and stems were more characteristic of those caused by *B. victoriae* (2). The symptoms of *B. sorokiniana* infections on pods were distinctive from those caused by the same species in New Brunswick (1) and from symptoms of *B. victoriae* on pods in North Carolina (2).

A brief account of the symptoms of the disease found in Nova Scotia, the isolation of the fungus, and the source of inoculum is given in this paper.

Symptoms

More than 90% of the pods over 3 inches long were infected with *B. sorokiniana* and as many as 275 lesions were counted on a single pod (Fig. 1). Pod lesions consisted of a small, black, crusty, central spot surrounded by a narrow band of water-soaked tissue, around which was a broader reddish-colored area (Fig. 2). The circular lesions on the pods were slightly depressed and as large as 5 mm in diameter, and they often coalesced to form extended areas of infection. Lesions were not found on pods less than 3 inches long.

Numerous lesions were found on even the youngest expanded leaves, and the oldest leaves were almost completely necrotic. Lesions between the veins were different from those on the veins. Interveinal spots appeared first as small, chlorotic areas, the centers of which soon became brown and necrotic (Fig. 3). The necrotic areas enlarged as the lesions developed and became darker around the outer edge than in the center but did not exceed 1.5 mm in diameter. Infections on the leaf veins were similar to those found on the petioles and stems (Fig. 4). They were linear, black, not more than 3 to 5 mm long, and usually less than 1 mm wide. Lesions on the ridges of petioles and stems often developed a light-colored center and frequently coalesced to form linear areas of infection (Fig. 4 - B, C).

Isolation of the causal fungus

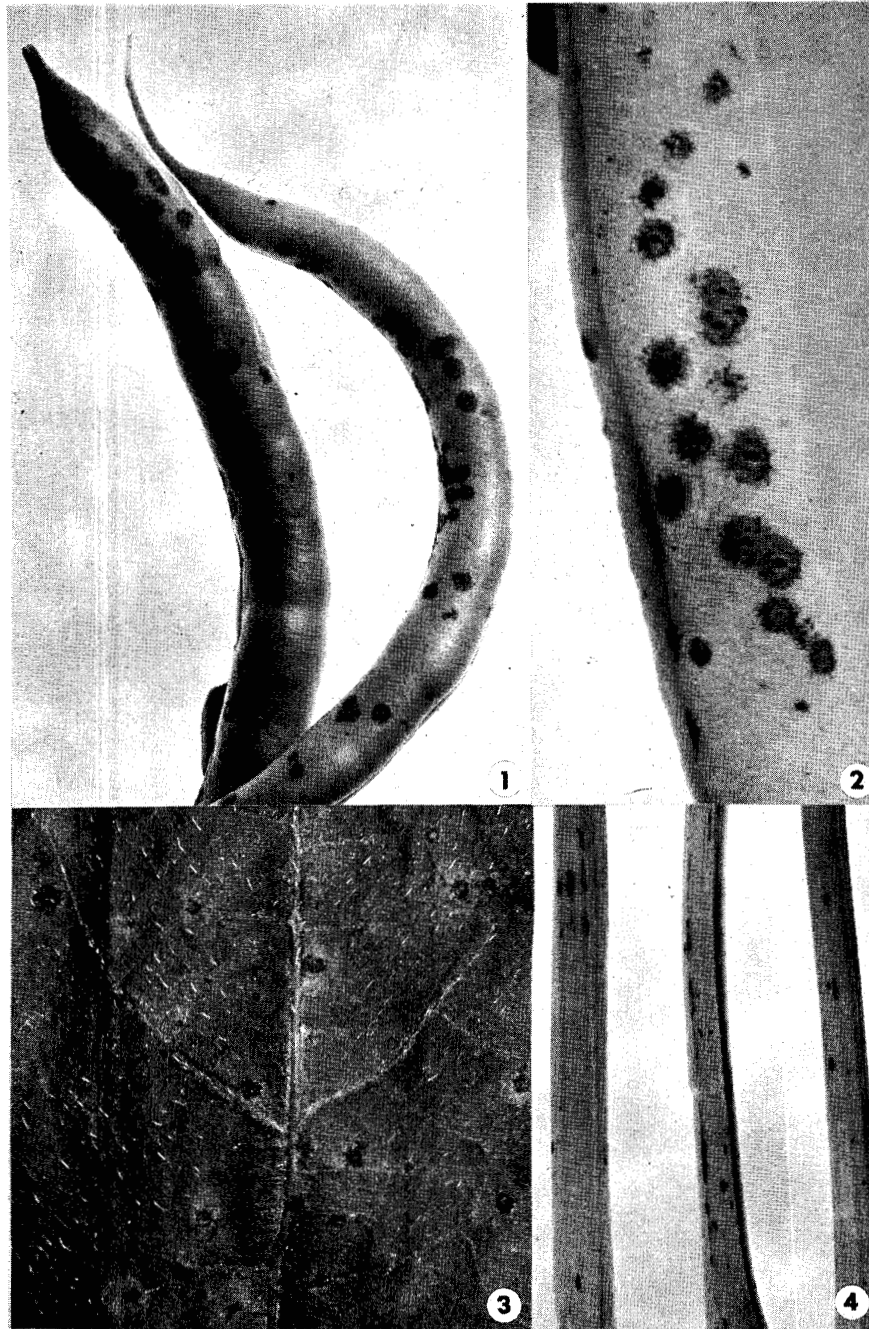
Infected tissue was surface sterilized in a 1:1000 HgCl₂ solution, rinsed in two changes of sterile water, and plated on potato-dextrose agar. The yield of *B. sorokiniana* was 100% from infected leaf tissue, 40% from pods, and 75% from lesions on leaf veins, petioles, and stems.

Discussion and conclusions

In New Brunswick *B. sorokiniana* was reported to cause the same type of lesion on both pods and stems of beans (1). These infections were first evident as black pinpoints with water-soaked halos.

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Figures 1-4. Symptoms on 'Tendercrop' bean (*Phaseolus vulgaris*) caused by natural infection with *Bipolaris sorokiniana*. Figures 1 and 2. Pods showing circular, reddish-brown, water-soaked lesions with central black necrotic spots. Figure 3. Leaf lesions. Figure 4. Narrow black streaks on A) and C) stems, and B) petiole.

Mature lesions were lenticular, crateriform, brown to black, and 1 to 5 mm in size. Similar symptoms were described for B. victoriae infections on pods in North Carolina, but the lesions were only about 1 mm in diameter (2). In Nova Scotia the circular, reddish-brown areas surrounding the dark central portion of B. sorokiniana lesions on pods were quite distinctive from those caused by the same fungal species in New Brunswick and from B. victoriae spots on pods in North Carolina. The interveinal spots on bean leaves in Nova Scotia were similar to those reported from New Brunswick, but they were larger and more prominent than the small dark spots on infected leaves in North Carolina. The shothole effect reported from New Brunswick did not occur in Nova Scotia. The small, narrow, black lesions on the leaf veins, petioles and stems of infected bean plants in Nova Scotia were quite different from those on the pods. A similar type of lesion was reported on stems in New Brunswick (1) and on leaf veins, petioles, and stems in North Carolina (2). The differences in symptoms of B. sorokiniana on the same variety of snap bean may have been due to more favorable climatic conditions for fungus development in Nova Scotia in 1967 than in New Brunswick in 1963. The 1967 season appeared to be ideal for the development of B. sorokiniana.

The source of inoculum of B. victoriae on beans in North Carolina was traced to an adjacent field of 'Victorgrain' oats heavily infected with victoria blight (2). In New Brunswick the probable source of B. sorokiniana inoculum was reported to be in adjacent fields containing infected cereals or cereal stubble (1). In Nova Scotia only a ditch separated

the infected bean field from a 5-acre field of oats (Avena sativa L.). At the time of examination, the oats had been harvested, but the stubble and volunteer oat seedlings were severely infected with B. sorokiniana. Couch grass (Agropyron repens L.) growing in the oat field was also severely infected. Numerous conidia of the pathogen were present on infected oat seedlings and couch grass as well as on the inner and outer surfaces of the hollow oat straw stubble. Since B. sorokiniana failed to sporulate on infected beans in the field, the inoculum apparently originated in the adjoining oat field. The bean field was directly in the path of the prevailing west winds that blew across the oat field, and the bean plants farthest away from the oats were as severely infected as those nearest the oats.

B. sorokiniana has not been heretofore reported as the cause of a disease of beans in Nova Scotia, although cereals are often the preceding crop in the rotation. The disease is not considered important and probably would not have occurred had the bean planting not been adjacent to the oat field and in the direct path of the air-borne inoculum.

literature cited

1. Graham, K. M., R. A. Shoemaker, and S. R. Colpitts. 1964. Bipolaris sorokiniana on snap beans in New Brunswick. Can. Plant Dis. Surv. 44:113-117.
2. Winstead, N. N., and T. T. Hebert. 1956. A disease of beans incited by Helminthosporium victoriae. Phytopathology 46:229-231.