BOTRYTIS FABAE AND ASCOCHYTA FABAE ON BROAD BEANS IN NOVA SCOTIA[1]

C.O. Gourley and R.W. Delbridge[2]

Abstract

Chocolate spot [Botrytis fabae] and leaf and pod spot [Ascochyta fabae] were found on plants of tickbean, Vicia faba var. minor, cultivar Maris Bead, for the first time in Nova Scotia. B. fabae has not heretofore been reported in North America. It occurred primarily on the foliage and had no apparent effect on yield of spring-grown tickbeans. The effect of A. fabae was most severe on the seed and it may be the greater threat to bean production.

Introduction

The broad bean (Vicia faba L.) is a cool-season plant widely grown as a field crop in Great Britain and Europe where the gross margin of profit per acre approximates that of barley (3). Mazagan, windsor, English bean and horse bean are names frequently used for this plant. The tickbean cultivar Maris Bead, one of the small seeded varieties of horse bean, Vicia faba L. var. minor (Peterm.)Beck., has recently been intoduced for commercial production in Nova Scotia.

In August 1970, the leaves, pods, and stems of tickbean plants in Annapolis and Kings counties, Nova Scotia, were severely spotted. Botrytis fabae Sard. was the dominant organism isolated from leaf spots and Ascochyta fabae Speg. fruited on pod lesions. These fungi were determined to be the cause of specific infections on leaves, pods, and stems.

B. fabae, has not heretofore been reported in North America. It has been recorded previously from Africa, Asia, Australasia, Europe, including Great Britain, and South America (2). B. fabae and A. fabae probably came to Nova Scotia via tickbean seed imported from England. Since 1970 varying intensities of leaf and pod spot occurred on tickbeans in commercial fields. A specimen of B. fabae has been filed in the National Mycological Herbarium, Plant Research Institute, Ottawa, Ontario, as DAOM 137145. Specimens of A. fabae on leaves and pods were filed as DAOM 142288 and DAOM 142290, respectively.

[1] Contribution No. 1492, Research Station, Canada Department of Agriculture, Kentville, Nova Scotia.

[2] Plant Pathologist, Nova Scotia Department of Agriculture and Marketing, Kentville, N. S.

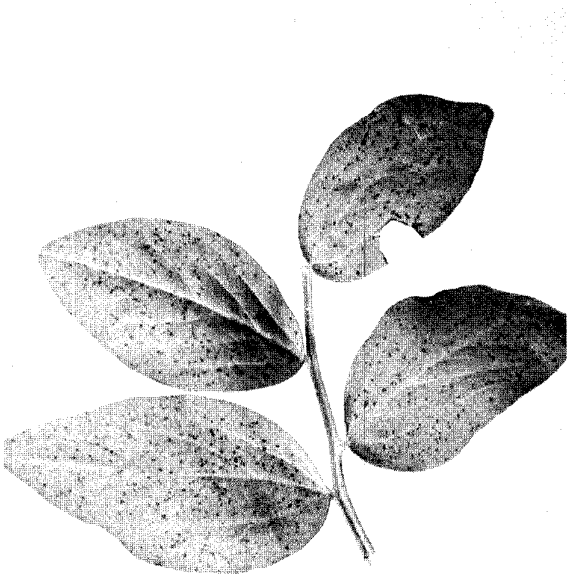
Symptoms

Chocolate spot disease caused by B. fabae occurs on leaves, pods and stems. Leaf lesions vary from small reddish brown spots (Fig. 1) to conspicuous well defined lesions with reddish brown margins and tan colored centers (Fig. 2). Later these lesions become entirely reddish brown. Under favorable conditions the disease becomes aggressive and lesions may coalesce causing blackening and partial defoliation. On pods, spots may be merely brown markings or may be similar to those on the leaves. On stems, infections may be similar to those on leaves (Fig. 3) or they may occur as streaks.

A. fabae occurs on leaves, pods and stems. Few leaf lesions were seen and then only on plants in areas where the disease was severe on the pods. Leaf spots were slightly sunken, circular to irregular, and up to 8 mm in diameter. Most spots had definite reddish brown margins with paler centers (Fig. 5). At a later stage spots often coalesce forming irregular patches and turning almost black. Lesions may be dotted with numerous pycnidia which exude spores in tendrils during damp weather.

The intensity of A. fabae infection was greater on pods than on leaves or stems. Pod lesions are similar to those on the leaves except they are more sunken and often larger. These spots become black, coalesce and bear abundant pycnidia which exude spores in tendrils (Fig. 6). The mycelium often grows through the pod onto the seed (Fig. 7). On mature seed infected areas may be circular or irregular and dark brown to black in color (Fig. 8). Seed from pods which become infected early in the season may be black and shrivelled.

Stem lesions are similar to those on leaves except they are more deeply sunken and often somewhat elongated (Fig. 9). They may coalesce to form extended areas of infection and in severe attacks may weaken the stem and kill the plant. Few pycnidia formed in stem lesions.



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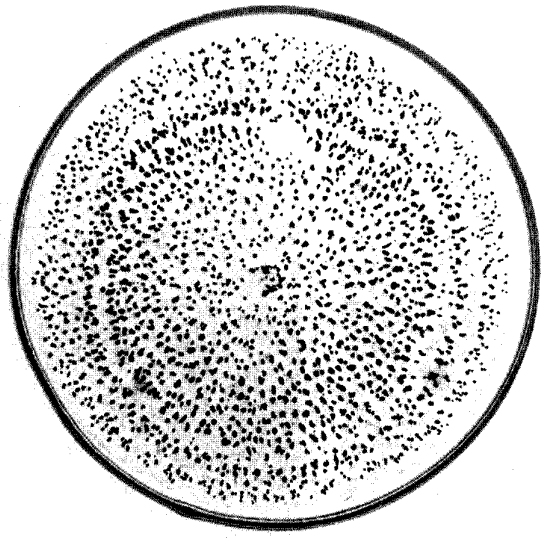

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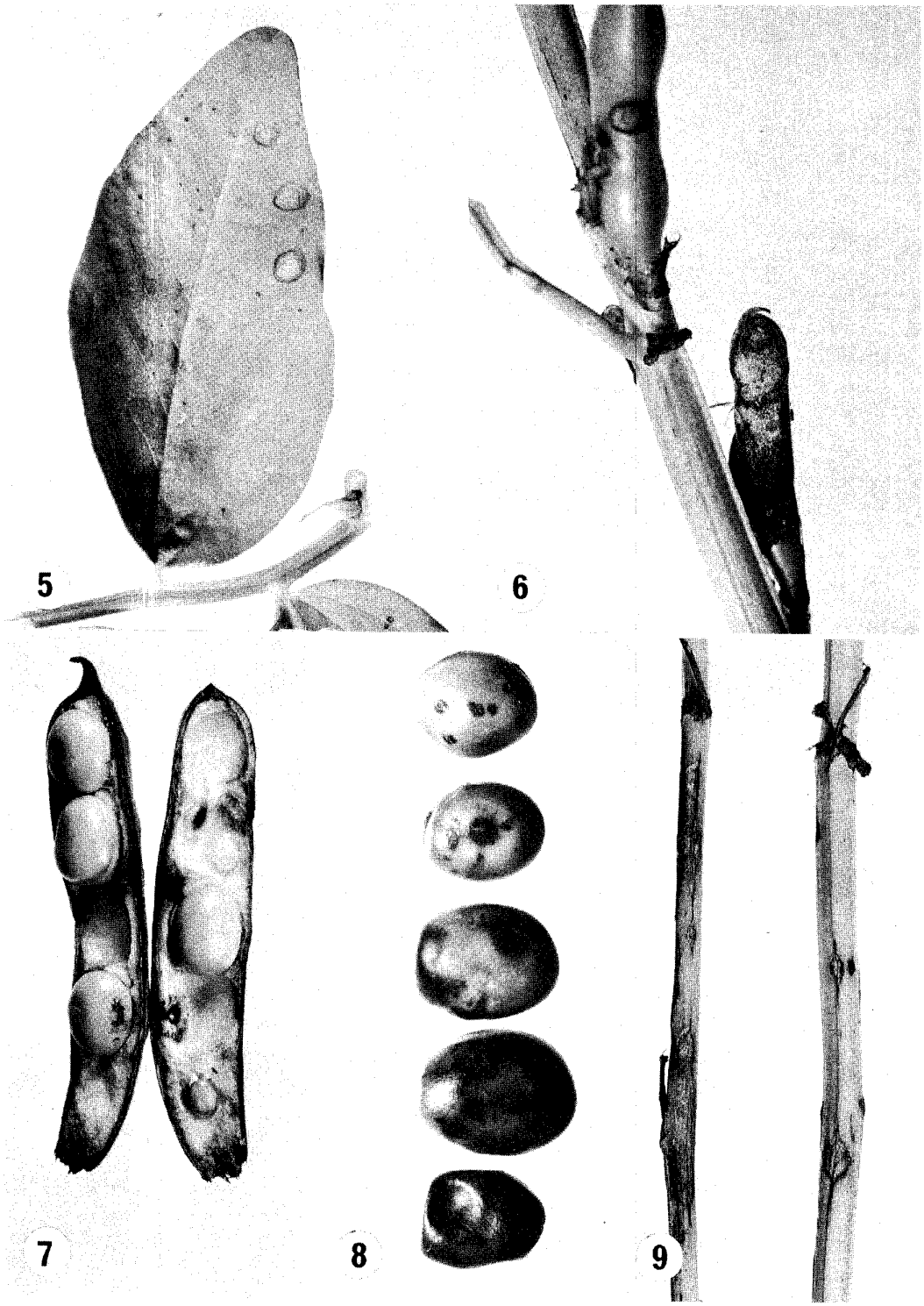
Figures 1–4. *Botrytis fabae* on tickbean cv. Maris Bead; 1) small lesions on leaf; 2) leaf lesions with dark margins and tan centers; 3) lesions on stem; 4) sclerotia in culture.



Figures 5–9. *Ascochyta fabae* on tickbean cv. Maris Bead; 5) lesions on leaf; 6) lesions on pods; 7) infected seed; 8) lesions on dried beans; 9) lesions on stems.

Fungus morphology and cultural characteristics

B. fabae sclerotia were numerous in agar culture (Fig. 4), discrete or sometimes confluent and they were within the diameter range of 1-1.7 mm given by Ellis (2). His conidial dimensions of 14-29 x 11-20 µm (mostly 16-25 x 13-16 µm) coincide with measurements of conidia for our isolate. No perfect stage is know.

A. fabae grew well in agar culture but produced few pycnidia. On sterilized bean seed this fungus grew luxuriantly and produced abundant pycnidia which spored profusely (Kentville Plant Pathological Specimen 2811). Our observations agree with those of Beaumont (1) who gives pycnidial dimensions on the host plant as being mostly 120-150 m (range 80-200 µm), ostiole 30-50 µm, pycnospores 15-18 x 4-5 µm (range 12-23 x 4-6 µm) with rounded ends, 1 septate, rarely continuous, not constricted, hyaline. In culture pycnospores were 14-23 x 3-6 µm, mostly 18-20 µm, and commonly showed a proportion of 2- or 3-septate spores, not generally found on the natural host.

Epidemiology and control

Weather conditions determine the severity of attack of B. fabae and A. fabae on broad bean (3). Cool, moist conditions in the early part of the growing season are most favorable for development and spread of these diseases. In dry seasons infections may be confined to the lower parts of the plant. There are no resistant cultivars and there is no satisfactory seed treatment. In England, B. fabae seldom does much damage to spring beans but winter beans may be completely killed (3). In Nova Scotia no spring-grown tickbean plants were free of chocolate spot and the disease did not appear to have any apparent affect on plant growth. The fungus persist from season to season in old bean haulm and on the seed. A. fabae is seed borne and the only satisfactory method of control is the use of clean seed.

Survey

On August 28, 1972, a random selection of fields of tickbeans grown from three grades of seed were surveyed for A. fabae infection (Table 1). Because infections were numerous on the pods and scanty on the foliage the survey was limited to determining the intensity of pod infection. The pods on at least 20 plants per field were examined for disease. The number of pods per plant ranged from 0 to 39, and averaged 11. Imported seed was not free of A. fabae infection because the disease appeared in plants grown from basic seed in fields where broad beans had never been grown previously. The percentage of basic seed plants per field having infected pods ranged from 15 to 40, and the percentage of infected pods ranged from 1 to 6. The number of A. fabae infected plants increased rapidely in each crop grown and seeded in succession from basic seed.

Table 1. Intensity of *Ascochyta fabae* infection on Maris Bead tickbeans

Bean grade seeded*	Acreage surveyed	Percent infected	
		Plants	Pods
Basic	12	21	3
Commercial	8	57	16
Commercial (+)	25	75	36

* Basic - seed imported from England; Commercial - local seed from basic stock; Commercial (+) - local seed from commercial stock.

On September 20, the survey was repeated on the same fields examined on August 28. The amount of A. fabae on plants and pods did not differ for the two dates. On September 20 many plants had matured and turned black which made it difficult to see disease symptoms, whereas on August 28 the infections contrasted well with the green color of the plants.

Conclusions

The cool, moist climate of Nova Scotia provided ideal conditions for development and spread of B. fabae and A. fabae diseases of tickbean. Commercial growers have not been concerned about these diseases but they do recognize the importance of disease-free seed.

Beaumont (1) stated: "A. fabae, although widely distributed throughout the world, rarely causes appreciable economic damage". However, it may be the more damaging of the two diseases in Nova Scotia because infections were most severe on pods and seeds.

This report extends the host range of both pathogens to Nova Scotia and that of B. fabae to North America.

Acknowledgment

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Literature cited

1. Beaumont, A. 1950. On the ascochyta spot disease of broad beans. Trans. Brit. Mycol. Soc. 33:345-349.

2. Ellis, M. B. 1971. Dematiaceous hyphomycetes. Commonwealth Mycological Inst., Kew, Surrey, England.

3. Great Britain Ministry of Agriculture, Fisheries and Food. 1970. Field Beans. Short term leaflet 60. Revised.