First report of halo spot of barley caused by *Pseudoseptoria stomaticola* in Alberta

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In 1987, halo spot caused by Pseudoseptoria stomaticola (syn. Selenophoma donacis var stomaticola) was found on barley, cv. Harrington, near Innisfail, Alberta. The disease has been found in the province every year since and appears to be increasing in prevalence. The disease, however, remains a minor pathogen of barley in Alberta.

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En 1987, la tache ocellee causee par *Pseudoseptoria* stomaticola (syn. Selenophoma donacis var Stomaticola a ete trouve sur un cultivar d'orge Harrington, pres d'Innisfail, en Alberta. Depuis la maladie a ete observee dans la province a chaque année et semble être de plus en plus frequente. Quoiqu'il en soit, la maladie demeure un pathogene mineur de l'orge en Alberta.

Introduction

Halo spot of barley can be caused by either *Pseudoseptoria* donacis (Pass.) Sutton (syn. Selenophoma donacis (Pass.) Sprague and Johnson) or *Pseudoseptoria stomaticola* (Bauml.) Sutton (syn. Selenophoma donacis var stomaticola (Bauml.) Sprague and Johnson) (2,6). *P.* donacis has been reported on barley (*Hordeum* vulgare L.), in Australia (30,33), New Zealand (1), Europe (1) and South Africa (26). P. stomaticola has been found on barley in Canada (3,23,24), the United States (22), New Zealand (32), Italy (27) and Finland (31). In Canada, there have been no confirmed reports of P. donacis (3). P. stomaticola has been reported on *H.* vulgare in Prince Edward Island, Nova Scotia and Saskatchewan (4) as well as on Secale cereale L. in Manitoba, *Triticum aestivum* L. in Saskatchewan and a number of grasses throughout Canada (3), including Hordeum *jubatum* L. near Beaverlodge, Alberta (5). This is the first report of P. stomaticola on H. vulgare in Alberta.

P. stomaticola can be differentiated from P. donacis primarily by spore size. *P.* stomaticola spores are falcate, aseptate (1,25), variable, 10-20 x 1-3 µm (3,6,22,25), occasionally up to 25 µm long (22,25). P. donacis spores are stoutly falcate to boomerang-shaped, 18-35 x 2.0-4.5 µm (22,25). The fungus overwinters on crop residue and secondary spread is by rain-splashed spores that ooze out of pycnidia during wet periods (6).

Leaf spots caused by Pseudoseptoria are generally considered minor diseases of barley (6,7,8,14,15,16) although epidemics have been observed in south-west England (9) and Norway (10). Halo spot can cause yield losses of 0.6 t/ha and thousand kernel weight reductions of 2.9 g in a susceptible cultivar (28). The susceptibility of barley to halo spot depends on the growth stage of the plant. Brokenshire and Cooke (12) found that plants are susceptible at tillering, more resistant at stem elongation and highly susceptible at heading. Effective control of halo spot has been obtained with benomyl, thiophanate-methyl (13), carbendazim and propiconazole (28). Cultivars differ in resistance (29,33,34) and some are immune to some isolates of the pathogen (29).

Observations

In 1987, halo spot symptoms were observed on barley, cv. Harrington, near Innisfail, Alberta and subsequently identified as *P.* stomaticola (DAOM 210660) by Dr. J. Bissett of the Centre for Land and Biological Resources Research in Ottawa. The disease has been also found every year since and appears to be increasing in prevalence and intensity.

Observed halo spot symptoms have been consistent with previous reports. Lesions on leaves are square or rectangular with characteristic grey-white centres with purple margins with rows of pycnidia almost always observed within the lesions (Fig. 1). Lesions coalesce forming irregular shapes under high disease pressure (Fig. 2). Lesions on the awns (Fig. 3) are similar to those observed on the leaves and are occasionally abundant (Fig. 4). Cooke and Brokenshire (11) reported that typical halo spots were not observed on awns, only small necrotic areas. In Alberta, it has been observed that lesions on stems and awns of some cultivars, in particular the cv. Winchester, usually do not have grey-white centres.

In 1987, halo spot symptoms were observed at trace levels in a cultivar evaluation trial conducted at Olds, Alberta on cultivars Bonanza, Diamond, Harrington, Johnston, Klages, Otal and Samson but not on Empress, Leduc and Heartland. In 1988, halo spot was found in fungicide efficacy trials conducted near Crossfield (17) and Olds (18), Alberta. At growth stage (GS) 13 (21), at the Crossfield site, 48% of the leaves had halo spot. At GS 75 halo spot was present on the top two leaves in all of the treatments and

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was in fact the predominant disease on the flag leaves in some of the treatments. Halo spot was also found at Olds in 1989 (19,20).

In 1990, Ciba-Geigy Canada conducted a barley leaf disease monitoring program in the Parkland area of Alberta ranging from Crossfield in the south to Barrhead and Bonnyville in the north. Sixty fields were monitored. Halo spot was reported in three fields; one near Ponoka on cv. Noble and the other two near Penhold on cv. Harrington.

In addition to the monitoring program, two fields near Olds were examined. A survey of a field of Harrington barley near Olds was conducted at GS 55. The percent leaf area diseased was assessed using diagrams developed for assessing halo spot (11). A total of twenty-five stems were collected from five locations along an inverted "V" pattern through the field. Percentage leaf area diseased by halo spot and scald (*Rhynchosporium secalis* (Oud.) J.J.Davis), were assessed on the top three leaves. Disease levels on the flag-2, flag-I and flag leaves were 0.1, 1.1 and 0.6 for halo spot and 2.0, 0.9 and 0.2 for scald. These results are consistent with comments by Cooke and Brokenshire (11) that upper leaves appear to be more susceptible than lower leaves. At GS 87/92 a field of barley, cv. Winchester, was evaluated for awn damage resulting from halo spot infection. Ten heads were collected along a transect at ever twenty-five paces. The area of diseased awn averaged 8.8%.

Although the prevalence of this disease appears to be increasing it remains a minor pathogen of barley in Alberta. Epidemics of halo spot may occur in the future because inoculum levels appear to be increasing and many of the present cultivars are susceptible to the pathogen.

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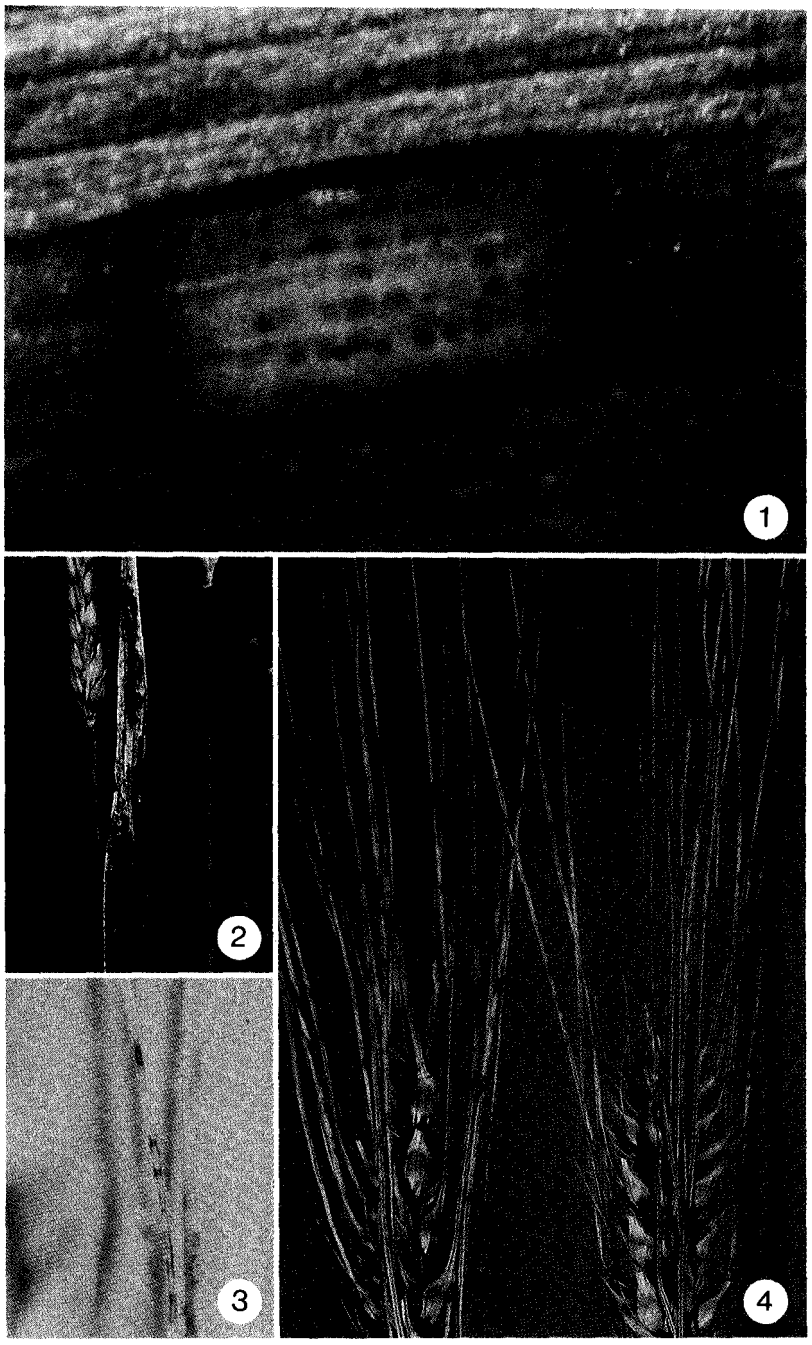

Fig. 1. Halo spot lesion on a barley leaf. Rows of pycnidia are visible within the lesion.

Fig. 2. Coalescing lesions of halo spot on flag leaf of barley, cv. Harrington at GS 73.

Fig. 3. Halo spot lesions on a barley awn.

Fig. 4. Severe infection of barley awns by halo spot.