Distribution and severity of scald on winter barley in Ontario in 1988 and 1989

G. Xue and R. Hall [1]

All fields of winter barley examined in Ontario in 1988 (24 fields) and 1989 (31 fields) were affected by scald, caused by *Rhynchosporium secalis*. On a scale of 0 (no disease) to 9 (disease severe on the entire plant), average and maximum disease severities were 4.3 and 7.8 on cv. OAC Halton (n=27) and 2.4 and 7.0 on cv. OAC Acton (n=28). In nine research plots, disease severity averaged 5.1, 2.7 and 0.5 for cvs. OAC Halton, OAC Acton and OAC Elmira, respectively. The disease was most severe in Waterloo and nearby counties.

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Tous les champs d'orge d'automne examinés en Ontario en 1988 (24 champs) et 1989 (31 champs) ont été affectés par la tache pâle, causée par le *Rhynchosporium secalis*. Sur une échelle de 0 (aucune maladie) à 9 (maladie sévère sur la plante entière), les sévérités moyennes et maximales de la maladie ont été de 4.3 et 7,8 chez le cultivar OAC Halton (n=27) et de 2,4 et 7,0 chez le cultivar OAC Acton (n=28). Dans 9 parcelles expérimentales, la sévérité moyenne de la maladie a été de 5,1, 2,7 et 0,5 chez les cultivars OAC Halton, OAC Acton et OAC Elmira, respectivement. La maladie a été la plus sévère dans le comté de Waterloo et les environs.

Introduction

Scald, caused by *Rhynchosporium secalis* (Oud.) J. Davis, is a common disease of barley in many regions of the world (7). Epidemics of the disease can cause considerable reductions in the yield and quality of barley grain (6,7). Scald has been recorded in western Canada since the early 1950s (1,3) where it is considered to be highly destructive (1,8,9). In Ontario, the disease was reported to occur irregularly and in trace amounts in the period 1972-1975 (2) but has recently become increasingly widespread and severe (5). This paper reports the prevalence and distribution of scald on winter barley in Ontario during 1988 and 1989.

Materials and methods

The distribution and severity of scald on winter barley in southern Ontario were determined in twenty-four and thirty-one commercial fields in 1988 and 1989, respectively. The fields were distributed across seventeen counties. Research trials were examined at Arkell in 1988, at Nairn and Ridgetown in 1989 and at Elora, Woodstock and Listowel in both years. The counties examined accounted for 90% of the winter barley produced in Ontario those years. Cultivars OAC Halton and OAC Acton were examined in commercial fields and together with cv. OAC Elmira in research trials. Data were collected June 11-25 each year when the cultivars were at stage 73 (milky ripe) on the Zadoks scale (11).

Scald was rated at four random sampling sites in commercial fields and in 3, 4 or 6 replicate plots in research trials. Ten plants were assessed at each site. An assessment scale of 0 (no disease) to 9 (all leaves of the plant severely affected) was used (4).

[1] *Department of Environmental Biology, University of Guelph, Guelph, Ontario, Canada N1G 2W1.*

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Results

Scald symptoms were observed in all fifty-five winter barley fields examined (Fig. 1). The disease was common but severity was variable. The southern county of Kent and northern counties of Grey, Dufferin and Bruce had relatively low levels of scald. The disease was most severe in Waterloo and nearby counties. Disease severity in commercial fields averaged 3.3 and ranged from 0.5 to 7.8. Disease severity did not differ significantly (contrast analysis, P=0.05) between years but did differ significantly between the two cultivars. Scald was more severe on OAC Halton (average 4.3, maximum 7.8) than on OAC Acton (average 2.4, maximum 7.0).

Scald was observed in all the research trials examined. Differences in severity were found among cvs. OAC Halton, OAC Acton and OAC Elmira in each trial. Scald was observed on OAC Halton in all nine trials; disease severity averaged 5.1 and ranged from 2.4 to 7.7. The disease was observed on OAC Acton in eight of the nine trials; the exception was Woodstock in 1989 where a severe infection with powdery mildew occurred. Scald severity on OAC Acton over the eight trials averaged 2.7 and ranged from 1.1 to 5.0. Scald was observed on OAC Eilmira in only four of the nine trials; severity of the disease in these four trials averaged 0.5 and ranged from 0.3 to 0.8.

Discussion

The widespread distribution of scald on winter barley in southern Ontario during the years 1988 and 1989 at moderate to severe levels of infection indicates that the disease may have a significant impact on yield. Studies to determine the economic impact of the disease are warranted.

The disease was equally severe in commercial fields and research plots. This indicates that research plots are suitable sites for testing germplasm for resistance to the disease.

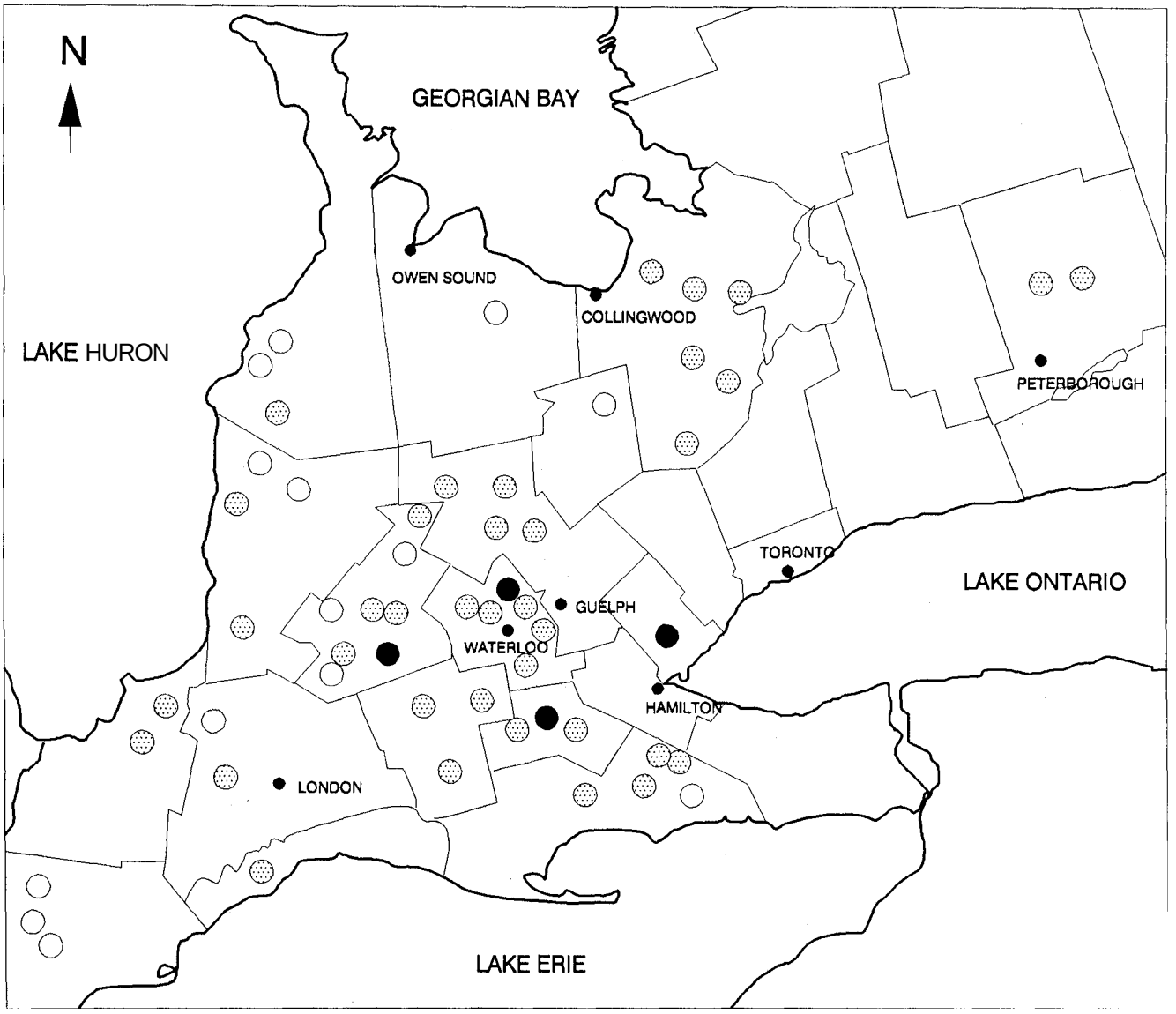

Fig. 1. Distribution and severity of scald in 55 winter barley fields in southern Ontario in 1988 and 1989. Scald severity >0-<2 (O), 2-6 (⊗), >6 (●) on a 0-9 scale.

Significant differences in disease severity were observed among the three commercial cultivars of winter barley examined. Scald was common on both OAC Halton and OAC Acton but was considerably more severe on the former in both commercial fields and research plots. OAC Elmira was developed to provide improved resistance to scald and this higher resistance is evident in the results obtained in research plots. The cultivar was not used to any extent commercially in Ontario during the years of the study.

The results show that agronomically adapted cultivars of winter barley with considerably improved resistance to the Ontario population of *R. secalis* can be developed. However, consideration should be given to the type of resistance deployed. We have identified two kinds of resistance in commercial winter barley in Ontario. OAC Elmira has race-specific resistance to the pathogen (10) which may be short-lived. OAC Acton has quantitative resistance to the disease (10) that appears to be race non-specific and therefore possibly more durable. Since the pathogenic characteristics of the fungus population can change rapidly (10), it will be important to use the various kinds of resistance judiciously.

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