The occurrence of powdery mildew on rutabagas in southern Ontario

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Commercial rutabaga fields in southern Ontario were surveyed for the incidence and severity of powdery mildew during 1988 and 1989. The mean disease incidence in 1988 and 1989 was 79 and 56%, respectively, and the mean disease severity in 1989 was 14%. In both years, high amounts of powdery mildew were found in fields within Huron and Middlesex counties.

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En 1988 et en 1989, des champs de culture commerciale du rutabaga dans le sud de l'Ontario ont fait l'objet d'une etude visant a verifier la frequence et la gravite du blanc. La frequence moyenne de la maladie en 1988 et en 1989 a ete de 79 et de 56 % respectivement et la gravite moyenne en 1989, de 14 %. Les deux annees, le blanc était present en abondance dans les champs des corntes de Huron et de Middlesex.

Introduction

Powdery mildew of crucifers, incited by the obligate fungus *Erysiphe cruciferarum,* is widespread and has been reported on many commercial crops including brussels sprouts, cabbage, cauliflower, Chinese cabbage, collards, kale, kohlrabi, mustard, radish, rape, rutabaga and turnips (Sherf and MacNab, 1986). The first symptom of this disease is the appearance of small white spots consisting of the interwoven threads of mycelia on older leaves and stems. Under favourable conditions for the disease, the mycelia gradually expand over the surface of tissues, produce conidia, and give the appearance of a greyish powdery coating.

Although powdery mildew has been present in Ontario for many years, this disease has not warranted special attention. An earlier survey on crucifer diseases in Ontario reported this pathogen only on turnips (rutabaga) (*Brassica napus* ssp. *rapifera)* and the incidence in fields small (Reyes, 1969). However, in recent years, growers of rutabaga in southern Ontario have expressed concerns about this disease in commercial fields. 'Laurentian', the most widely grown cultivar, is very susceptible to powdery mildew. Plants infected with this disease typically exhibit premature senescence of foliage. In addition, this disease predisposes rutabagas to other foliage and insect infections. In severe cases the plant canopy is reduced which makes the mechanical harvesting of roots when using a revolving belt-type pulling system difficult. It should be noted that over 85% of the rutabaga growers in southern Ontario currently depend on the revolving belt system for harvesting roots. Although the economic loss attributed to powdery mildew has not been determined, because of the disease, unharvestable roots are left in the field. At present, no fungicides are registered in Ontario for controlling this disease on rutabaga.

As a first step in researching this disease, surveys were conducted in 1988 and 1989 in southern Ontario to estimate the infection percentage and the severity of this disease in commercial rutabaga fields.

Methods

In 1988, 16 late-season rutabaga fields were selected at random and examined to determine the percentage of plants possessing visual signs of powdery mildew infection. Groups of 10 plants in different areas within each field were randomly chosen and the older leaf stems and blades closely examined for the presence or absence of this disease. The number of infected plants was divided by the total number of plants surveyed in each field to calculate infection percentage. No attempts were made to classify the severity of this disease on infected plants. In 1989, the survey included all major rutabaga growing areas of the province and included a total of 18 fields selected at random. As in 1988, the percentage of infected plants was recorded, and also disease severity percentage was evaluated by assessing the leaf area covered with powdery mildew as described by James (1971). The evaluation was made on mid and older aged leaves of each plant and visually rated on a scale of 1, 5, 25 and 50%. In both years, infection data were gathered once for each field, and in 1989, the survey was conducted during the two weeks prior to harvest.

Results and discussion

Both years of the survey were atypically dry with temperatures above normal, and conditions generally conducive to disease development. The results of the survey are shown in Table 1, and indicate thar the disease infection percentage varied among the counties examined. The infection and severity percentages of powdery mildew in both Huron and Middlesex counties were higher than the other counties and greatly exceeded the infection percentage previously reported (Reyes, 1969). It is not surprising that our findings are not in agreement with Reyes (1969) who noted only 1 to 10% infected plants within the fields he surveyed. As revealed in our survey, the occurrence of powdery mildew will depend on the area surveyed. Furthermore, we have noted that rutabagas at certain growth

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Table 1. Incidence and severity of powdery mildew in the late-season rutabaga crops in southern Ontario during 1988 and 1989.

Year	County	Date of survey	Number of fields	Plants infected*	Severity of disease on plants infected*
	Huron	8/18 to 9/1	12	90	-
1988	Middlesex	8/24	1	70	-
	Oxford	8/22	3	3	-
	Huron	10/8	6	100	30
	Middlesex	10/17	2	100	25
1989	oxford	9/26	7	30	1
	Simcoe	9/27	1	0	0
	Wellington	10/6	2	1	5

* Average value of the fields surveyed in each county.

stages are more susceptible to disease development. For example, we have observed that rutabaga leaf tissue becomes more prone to powdery mildew infection as it approaches maturity. Thus, during early vegetative growth stages susceptible plants exhibit much less susceptibility to this disease and a lower field infection percentage than at a mature stage of development. Since the location and plant age of the fields Reyes (1969) surveyed were not reported, no direct comparison can be made between his study and the survey reported here.

It should be noted that during the 1940's and 1950's rutabaga production was more evenly distributed throughout southern Ontario and involved over 600 growers. Currently, the number of growers has declined to less than 25. Much of the rutabaga acreage is concentrated in large operations in Huron and Middlesex counties and involves early, mid and late-season crops which are often planted close to one another. Although our survey investigated only the late rutabaga crop, we also observed pronounced powdery mildew infection on the early and mid-season crops. It is not unreasonable to assume that these crops might serve in this confined production setting as an inoculum source for the late crop. Interestingly, in recent years canola production within Huron and Middlesex counties has rapidly increased. Recent work on canola from Alberta reported that powdery mildew infection was surprisingly widespread in this crop (Slopek and Peters, 1988). Similarily, powdery mildew has also been observed in Ontario-grown canola, although the incidence and significance of this disease in unknown. In view of the fact that canola can serve as an overwinter host for diseases as Turnip Mosaic Virus (Stobbs and Shattuck, 1988), research should be designed to examine if canola could also serve as a "green-bridge" between seasons for powdery mildew.

It is noteworthy that the rutabaga fields in Wellington and Simcoe counties exhibited llittle and no mildew infection percentages, respectively. These isolated late-season fields were the only commercial plantings in their respective counties for 1989.

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