Incidence and severity of downy mildew of buckwheat in Manitoba in 1979 and 1980

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The results of surveys conducted in 1979 and 1980 show that the disease, downy mildew, was widespread in the buckwheat production areas of Manitoba. The average incidence of downy mildew in 1979 varied between production areas and was considerably greater than in 1980. Although the average incidence in 1980 was very low the incidence and the severity level in one field in the Emerson — Vita area was high. The low incidence in 1980 probably reflects unfavorable moisture-temperature conditions.

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Les résultats des inventaires effectués au cours des années 1979 et 1980 montrent que le mildiou était répandu dans les régions productrices de sarrasin du Manitoba. En 1979, l'incidence moyenne du mildiou variait entre les zones de production et fut de beaucoup supérieure à celle observée en 1980. Il est à remarquer qu'en 1980, malgré une incidence moyenne très basse due probablement aux conditions de température et d'humidité défavorables, un champ avec des niveaux d'incidence et de sévérité élevés a été inventorié dans la région Emerson-Vita.

Introduction

Buckwheat (*Fagopyrum esculentum* Mill.) has become an important cash crop in western Canada. Since the early 1960's buckwheat production has increased due to improved exports, mainly to Japan. At the present time approximately 70% of the Canadian crop is grown in Manitoba.

Buckwheat has remained relatively free of destructive diseases. At the Morden Research Station, Morden, Manitoba, a new disease (4) was observed in 1972, which was later identified as downy mildew. The pathogen (5), appeared similar to *Peronospora ducometi* Siemaszko & Jankowska (syn. = *P. fagopyri* Elen., reported by Sidorova (1) from the U.S.S.R. and Tanaka (3) from Japan). Following the initial observation in 1972, downy mildew was observed with regularity the following years. In 1978, while on a disease survey of other special crops in southern Manitoba, ten buckwheat fields were examined. Downy mildew was found in each field. This led to implementation of disease surveys in 1979 and 1980 to determine the extent of downy mildew throughout the production areas in Manitoba. The results of these surveys are reported in this paper.

Methods

The areas of commercial buckwheat production in 1979 and 1980 were obtained through the courtesy of companies contracting buckwheat acreage. Several growers from each region were selected at random and their consent obtained for a survey to be conducted of their fields. The locations of the fields surveyed each year are given in Figure 1. Each field was identified as to cultivar, or if this information was not obtainable it was identified as 'common'. The only cultivar identified in the survey was 'Mancan'.

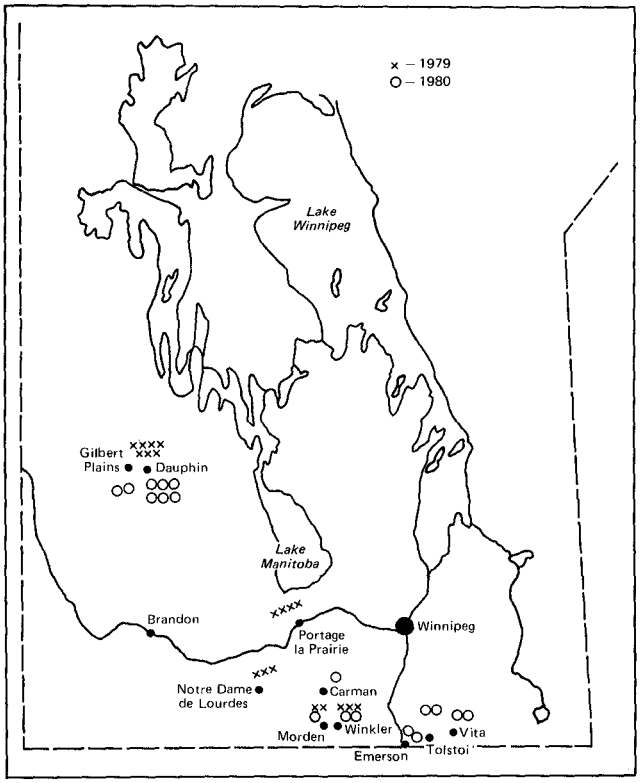

Fig. 1. Distribution of buckwheat fields surveyed in 1979 and 1980 in Manitoba.

The surveys were carried out each year during the first and second weeks of August. Each field was visually divided into quadrants. After walking 50 paces into each quadrant, samples were taken within a capital letter 'M' configuration with 50 paces between the points of the letter. Ten plants were selected at random at each point. By this method 200 plants were examined per field. Each plant was rated for the

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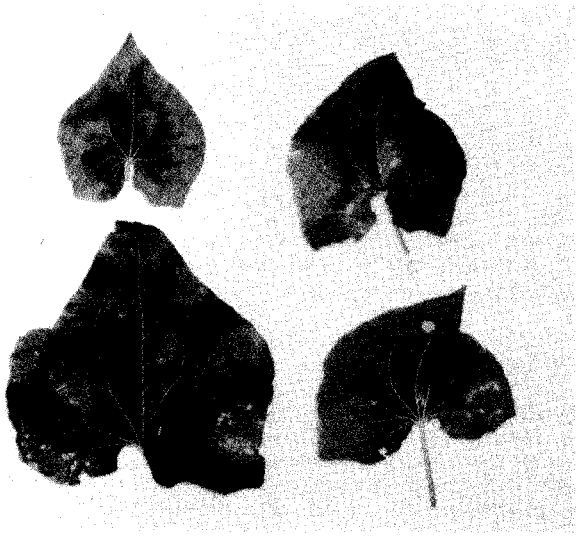

Fig. 2. Foliage symptoms of downy mildew on buckwheat.

incidence of downy mildew symptoms and the percentage leaf area infected was estimated. Foliage symptoms are portrayed in Figure 2. Ratings for downy mildew severity were based on percentage leaf area infected as follows: 0 — no infection, 1 — up to 25 percent leaf area infected, 2 — 25-50 percent leaf area infected, 3 — more than 50 percent leaf area infected.

Results and Discussion

In 1979, 19 fields were surveyed for downy mildew (Table 1), and in 1980, 18 fields were examined (Table 2). Since there did not appear to be a significant difference in the disease levels or incidence on Mancan vs. 'common' that distinction was not made in either table. The average incidence among survey areas in 1979 ranged from a low of 63.2% in the Notre Dame de Lourdes area to 82.6 and 82.7% in the Morden-Winkler and Dauphin areas, respectively. In the Portage la Prairie area the incidence was 71.1%. The level of severity was quite low with the greatest number of infected plants occurring in disease category 1 (up to 25 percent leaf area infected). The level of infection was more severe in the following fields: No. 3 (Morden-Winkler), No. 1 (Notre Dame de Lourdes), No. 3 (Portage la Prairie) and No.'s 2, 3, 4, 5 and 7 (Dauphin).

Table 1. Incidence and severity of downy mildew of buckwheat in several buckwheat production areas in Manitoba in 1979.

Survey Area	Field No.		Incidence (%)	% Plants/Disease* Severity Category 0	1	2	3
Morden – Winkler	1		95.0	5.0	94.0	1.0	0.0
	2		81.9	18.1	77.6	4.3	0.0
	3		82.6	17.4	68.9	13.7	0.0
	4		88.0	12.0	80.0	8.0	0.0
	5		69.9	30.1	64.5	5.4	0.0
		Ave.	82.7				
Notre Dame de Lourdes	1		84.2	15.8	68.8	14.7	0.7
	2		50.9	49.1	50.0	0.9	0.0
	3		54.5	45.5	52.5	1.5	0.5
		Ave.	63.2				
Portage la Prairie	1		70.5	29.5	69.5	1.0	0.0
	2		60.5	39.5	59.5	1.0	0.0
	3		73.2	26.8	49.2	22.8	1.2
	4		81.5	18.5	78.5	3.0	0.0
		Ave.	71.1				
Dauphin	1		66.0	34.0	56.0	7.0	3.0
	2		77.7	26.5	46.2	26.2	1.2
	3		92.2	7.8	62.7	25.4	1.6
	4		76.0	24.0	24.0	40.0	12.0
	5		89.8	10.2	62.2	25.5	2.1
	6		73.0	27.0	68.0	5.0	0.0
	7		84.9	15.1	61.3	19.7	3.8
		Ave.	80.3				

*Disease Severity Categories: 0 = no foliage infection, 1 = 1-25% leaf area infected, 2 = 25-50% leaf area infected, 3 = more than 50% leaf area infected.

Table 2. Incidence and severity of downy mildew in buckwheat in several buckwheat production areas in Manitoba in 1980.

Survey area	Field No.		Incidence (%)	% Plants/Disease* Severity Category 0	1	2	3
Carman-Morden-Winkler	1		7.0	93.0	5.4	2.0	0.0
	2		3.5	96.5	2.0	1.0	0.5
	3		7.3	92.7	4.4	2.9	0.0
	4		0.0	100.0	0.0	0.0	0.0
		Ave.	4.4				
Emerson – Vita	1		44.4	55.6	26.8	15.2	2.4
	2		11.0	89.0	8.2	2.8	0.0
	3		2.1	97.9	1.5	0.6	0.0
	4		6.0	94.0	4.0	1.5	0.5
	5		1.9	98.1	1.4	0.5	0.0
	6		2.9	97.1	2.4	0.5	0.0
		Ave.	11.4				
Dauphin-Gilbert Plains	1		0.0	100.0	0.0	0.0	0.0
	2		4.0	96.1	2.0	2.0	0.0
	3		3.6	96.4	3.1	0.5	0.0
	4		1.5	98.5	1.0	0.5	0.0
	5		8.0	92.0	6.5	1.0	0.5
	6		4.7	95.3	3.3	0.9	0.5
	7		3.3	96.7	2.9	0.4	0.0
	8		4.0	96.0	3.0	0.5	0.5
		Ave.	3.6				

*Disease Severity Categories: 0 = no foliage infection, 1 = 1-25% leaf area infected, 2 = 25-50% leaf area infected, 3 = more than 50% leaf area infected.

In 1980, the incidence as well as severity of infection was lower than in 1979. The average incidence of downy mildew was 4.4% for the Carman-Morden-Winkler area, 11.4% for the Emerson-Vita area, and 3.6% for the Dauphin-Gilbert Plains area. If Field No. 1 was not included the average incidence for the Emerson-Vita area was 4.8%. The incidence of infection for Field No. 1 was 44.4% and concomitantly a higher level of severity also occurred.

The results show that for both years downy mildew was widespread in the buckwheat-growing areas of Manitoba. The low incidence in 1980 and low severity in both years probably reflect the lack of rainfall and temperature patterns conducive for optimum disease development.

The severity of downy mildew development on the Morden Research Station was much higher both years than that found in the commercial buckwheat growing areas. Approximately 50% or more of the leaf area was affected. The incidence and severity levels were probably higher at Morden because the disease ratings were made later in the season and perhaps the microclimate was more favorable for disease development.

These surveys indicate that downy mildew pervades the buckwheat-growing regions in Manitoba. The widespread nature of this disease is probably due to the fact that it is seedborne (2). Investigations are underway to determine sources of resistance for incorporation into the breeding program and to study the efficacy of fungicides to control the disease.

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