Leaf rust of wheat in Canada in 1974[1]

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Conditions were favorable for a leaf rust (*Puccinia recondita*) epidemic on the Prairies in the spring of 1974 since a large acreage was planted late to moderately susceptible varieties of wheat (*Triticum aestivum*) and there were heavy leaf rust infections in southern areas of the United States. However, very dry conditions during the summer delayed rust development and leaf rust did not cause any significant damage. The survey for races of leaf rust showed an increased level of virulence in the rust population on alleles for resistance at the *Lr2* locus in wheat.

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Les semailles tardives de varietes de ble *Triticum aestivum* et *T. durum* moyennement sensibles a la rouille et d'importantes infestations de la rouille de la feuille *Puccinia recondita* dans le sud des Etats-Unis ont favorisé une épidémie de cette derniere maladie dans les Prairies au printemps de 1974. Cependant, l'été tres sec a retarde la croissance du champignon et celui-ci n'a pas occasionne de dégâts d'importance. Un releve des races de rouille a revele une recrudescence de la virulence des populations de rouille sur les alleles de resistance situes au locus *Lr2*.

Disease development and crop losses in western Canada

The late planting of moderately susceptible varieties of wheat and reports of considerable leaf rust in southern areas of the United States indicated that appreciable losses could occur in wheat from leaf rust in 1974. However, very dry conditions during the summer delayed rust development and only trace to light infections of leaf rust occurred on wheat in most of Manitoba and Saskatchewan. These infections did not cause any significant damage to the wheat crop.

Leaf rust in the rust nurseries

Ratings of leaf rust intensity on 17 wheat varieties grown at nurseries across Canada are shown in Table 1. The dry conditions limited rust development at all nurseries in Manitoba and Saskatchewan. Leaf rust infections on individual varieties were similar to those observed in 1973. The commercial durum (*Triticum durum* Desf.) varieties Hercules and Wascana are not as resistant to leaf rust as older varieties such as Mindum.

Physiologic specialization

Field collections of leaf rust were established on Little Club wheat (*T. aestivum* L.) in the greenhouse and one single-pustule isolate was taken from each collection. A total of 179 cultures were established. Most of the collections were obtained from commercial fields of wheat varieties that do not possess any genes for seedling resistance.

The single-gene backcross lines used to study physiologic specialization in leaf rust have been described previously (1).

The distribution of virulence on the individual single-gene lines (Table 2) shows some marked differences from that obtained in 1973 (1). Virulence on gene *Lr1* increased in Ontario and Quebec, and a marked increase in virulence occurred on alleles of the *Lr2* locus. Gene *Lr2a* is present in some spring wheat varieties grown in the United States and the acreage is apparently sufficient to influence the leat rust population. Virulence on *Lr16* has declined markedly in recent years. In 1966, when the variety Selkirk occupied most of the wheat acreage in Manitoba, over 50% of the leaf rust isolates from Manitoba were virulent on *Lr16*. At present, Manitou and Neepawa wheats, which do not possess *Lr16*, occupy most of the wheat acreage in Manitoba.

Twenty-two virulence combinations were obtained in 1974 (Table 3). The leaf rust population in eastern Canada was particularly variable; 15 races were identified in the 31 isolates obtained from Ontario.

Composite collections of leaf rust were used to inoculate a number of highly resistant varieties of wheat (1) but no unusual virulence was detected.

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Table 1. Percentage infection by ***Puccinia recondita*** on 17 wheat varieties in uniform rust nurseries at 18 locations in Canada in 1974

Location	Red Bobs	Lee	Pitic 62	Neepawa	Napayo	Kenya Farmer	C.I. 8154 X Frocor[2]	Glenlea	Exchange	Thatcher[6] X Transfer	Frontana	R.L. 4255	Agatha	Hercules	Mindum	Wascana	D.T. 332
Agassiz, B.C.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Creston, B.C.	50	0	tr*	0	tr	tr	0	0	0	0	0	0	0	2	0	tr	2
Indian Head, Sask.	20	5	10	10	10	10	tr	0	0	0	0	0	0	20	tr	5	10
Melfort, Sask.	10	tr	5	tr	0	tr	0	0	0	0	0	0	0	0	0	t r	0
Brandon, Man.	10	5	5	tr	tr	5	0	0	0	0	0	0	0	0	0	0	0
Durban, Man.	40	10	10	20	20	5	5	0	0	0	0	0	0	5	tr	5	2
Morden, Man.	15	tr	tr	10	10	10	0	0	0	0	0	0	0	0	0	t r	0
New Liskeard, Ont.	65	30	35	5	10	30	5	5	0	0	0	0	0	1	5	tr	1
Thunder Bay, Ont.	15	5	5	5	tr	tr	0	0	0	0	0	0	0	0	0	0	0
Guelph, Ont.	60	tr	15	5	10	20	5	5	0	0	0	0	0	2	0	tr	5
Ottawa, Ont.	80	10	30	20	25	25	tr	5	0	0	0	0	0	30	tr	30	30
Appleton, Ont.	80	tr	tr	tr	15	tr	tr	0	0	0	0	0	0	3	0	0	t r
Sunbury, Ont.	2	0	0	5	t r	0	0	5	0	0	0	0	0	0	0	0	5
La Pocatière, Qué.	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	t r
Québec, Qué.	70	tr	15	tr	5	5	tr	5	0	0	0	0	0	10	tr	5	10
Macdonald College, Qué.	20	10	tr	tr	tr	tr	tr	0	0	0	0	0	0	1	0	0	10
Lennoxville, Qué.	4	0	t r	0	0	5	0	0	0	0	0	0	0	5	0	tr	5
Normandin, Qué.	30	0	tr	tr	tr	tr	0	0	0	0	0	0	0	0	0	tr	5

* tr = trace

Table 2. Virulence of isolates of ***Puccinia recondita*** on backcross lines containing single genes for resistance to leaf rust in Canada in 1974

Resistance genes	No. of virulent isolates from: Que.	Ont.	Man.	Sask.	Alta.	B.C.	Total no. of virulent isolates	% total isolates
Lr1	2	12	0	1	0	0	15	8.3
Lr2a	0	1	3	4	0	0	8	4.4
Lr2d	8	22	4	7	13	10	64	35.4
Lr3	5	23	46	66	5	2	147	81.2
Lr3ka	4	10	0	0	0	0	14	78
Lr10	3	14	3	45	13	10	88	48.6
Lr16	0	0	0	▮	0	0	▮	06
Lr17	0	2	0	4	5	2	13	72
Lr18	8	20	11	13	8	8	68	37.6

Table 3. Virulence combinations of *Puccinia recondita* isolates on backcross lines containing single genes for resistance to leaf rust in Canada in 1974

Avirulence/virulence formula	No. of isolates from: Qué.	Ont.	Man.	Sask.	Alta.	B.C.	Total no. of isolates
1,2a,2d,3ka,10,16,17,18/3	0	2	9	17	0	0	28
1,2a,3,3ka,10,16,17,18/2d	1	1	0	0	0	0	2
1,2a,2d,3ka,16,17,18/3,10	1	4	24	31	0	0	60
1,2a,3,3ka,10,16,17/2d,18	4	8	0	0	0	0	12
1,2a,2d,3ka,10,16,17/3,18	0	1	5	5	0	0	11
1,2a,2d,10,16,17,18/3,3ka	1	0	0	0	0	0	1
2a,2d,3ka,10,16,17,18/1,3	0	1	0	0	0	0	1
1,2a,2d,3ka,17,18/3,10,16	0	0	0	1	0	0	1
1,2a,2d,3ka,16,17/3,10,18	0	0	5	6	0	0	11
1,2a,2d,10,16,17/3,3ka,18	1	0	0	0	0	0	1
1,2a,3,3ka,16,17/2d,10,18	1	1	1	0	8	8	19
2a,2d,3ka,16,17,18/1,3,10	0	1	0	0	0	0	1
1,2a,3ka,16,18/2d,3,10,17	0	0	0	3	5	2	10
1,2a,10,16,17/2d,3,3ka,18	0	2	0	0	0	0	2
1,3ka,16,17,18/2a,2d,3,10	0	0	3	1	0	0	4
1,3ka,16,17/2a,2d,3,10,18	0	0	0	2	0	0	2
3,3ka,16,18/1,2a,2d,10,17	0	2	0	1	0	0	3
2a,10,16,17/1,2d,3,3ka,18	1	3	0	0	0	0	4
3ka,10,16,17/1,2a,2d,3,18	0	1	0	0	0	0	1
2a,16,17/1,2d,3,3ka,10,18	1	2	0	0	0	0	3
2a,3ka,16,18/1,2d,3,10,17	0	1	0	0	0	0	1
2a,16,18/1,2d,3,3ka,10,17	0	1	0	0	0	0	1

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Literature cited

1. Samborski, D. J. 1974. Leaf rust of wheat in Canada in 1973. Can. Plant Dis. Surv. 54:8-10.