LEAF RUST OF WHEAT IN CANADA IN 1971[1]

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Disease development and crop losses in Western Canada

Leaf rust was first found in Manitoba on June 21, which is a little later than usual. Inoculum was scarce in June and early July and infections were light. In early August, leaf rust was widespread and infections on 'Manitou' and 'Neepawa' ranged 'from 20% to 70%. Field observations indicated yield reductions of up to 10%in individual fields, but the average loss from rust was probably less than 5%of the potential yield.

Leaf rust in the rust nurseries

Ratings of leaf rust intensity on 16 wheat varieties grown at nurseries across Canada are shown in Table 1. Leaf rust was widely distributed in Canada, but infections were generally light.

Physiologic specialization

In 1971, field collections of leaf rust were established on 'Little Club' wheat in the greenhouse and one single-pustule isolate was taken from each collection. Most of the collections in Manitoba and Saskatchewan were obtained from commercial fields of 'Manitou' or 'Neepawa'. These varieties do not possess any seedling genes for leaf rust resistance. Collections from other areas were largely obtained from susceptible varieties in the uniform rust nurseries.

In 1971, as in 1970, eight single-gene backcross lines were used to study physiologic specialization in leaf rust. The distribution of virulence on the individual single-gene lines (Table 2) is very similar to the distribution in 1970 except for a decreased number of isolates virulent on Lr10. The replacement of 'Selkirk' by 'Manitou' as the most widely grown variety in Manitoba and Saskatchewan has been accompanied by a decreased number of isolates virulent on Selkirk, which possesses gene Lr10.

Table 1. Percentage infection by Puccinia recondita on 16 wheat varieties in uniform rust nurseries at 19 locations in Canada in 1971

Location	Lee	Pitic 62	Selkirk	Red Bobs	Manitou	Neepawa	Kenya Farmer	CT 432	Hercules	Mindum	Stewart 63	DT 317	Exchange	Frontana	Tc^6 X Transfer	R.L. 4255
Agassiz, B.C.	0	0	3	50	5	5	tr*	0	0	0	0	0	0	0	0	0
Creston, B.C.	tr	5	25	90	tr	0	15	tr	10	0	0	0	0	0	0	0
Indian Head, Sask.	tr	5	tr	30	10	5	20	10	0	0	0	0	0	0	0	0
Melfort, Sask.	0	0	tr	15	tr	tr	tr	tr	0	0	0	0	0	0	0	0
Brandon, Man.	25	25	15	65	40	40	25	25	tr	0	0	tr	0	tr	0	0
Morden, Man.	5	15	15	50	20	20	20	25	10	0	0	0	0	0	0	0
Glenlea, Man.	5	2	3	20	10	5	1	5	tr	0	0	0	tr	tr	0	0
Kapuskasing, Ont.	0	0	5	5	tr	tr	0	5	0	0	0	0	0	0	0	0
Thunder Bay, Ont.	10	tr	5	15	20	20	5	5	tr	tr	0	tr	0	0	0	0
Guelph, Ont.	10	10	0	40	tr	0	tr	tr	10	0	0	10	0	0	0	0
Ottawa, Ont.	0	0	0	25	tr	0	tr	tr	tr	0	0	0	0	0	0	0
Appleton, Ont.	0	tr	0	10	tr	0	0	5	0	0	0	0	0	0	0	0
Apple Hill, Ont.	0	20	tr	30	tr	tr	tr	0	tr	0	0	10	0	0	0	0
Vineland, Ont.	tr	10	0	50	0	0	tr	0	0	0	0	tr	0	0	0	0
Qubbec, Qué.	0	0	tr	20	0	0	0	0	0	0	0	tr	0	0	0	0
Macdonald College, Qub.	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0
Lennoxville, Qub.	5	15	25	70	20	20	0	0	10	0	0	0	0	0	0	0
Normandin, Qub.	tr	0	tr	5	0	0	tr	0	tr	0	0	tr	0	0	0	0
Fredericton, N.B.	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0

* tr = trace

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Table 2. Virulence of isolates of Puccinia recondita on backcross lines containing single genes for resistance to leaf rust in Canada in 1971

Resistance genes	No. of isolates from:							Total no. of virulent isolates	% total isolates
	Maritimes	Qué.	Ont.	Man.	Sask.	Alta.	B.C.		
Lr 1	2	0	1	2	0	0	1	6	2.7
Lr 2A	2	0	1	1	0	0	1	5	2.2
Lr 2D	8	5	14	2	0	7	8	44	19.5
Lr 3	7	6	20	128	36	8	7	212	94.2
Lr 10	8	3	10	25	5	8	8	67	29.8
Lr 16	0	0	0	7	2	0	0	9	4.0
Lr 17	1	0	0	0	0	7	8	16	7.1
Lr 18	6	7	15	21	3	0	0	52	23.1

Table 3. Virulence combinations of *Puccinia* recondita isolates on backcross lines containing single genes for resistance to leaf rust in Canada in 1971

Avirulence/virulence formula	No. of isolates from:							Total no. of isolates
	Maritimes	Qué.	Ont.	Man.	Sask.	Alta.	B.C.	
1, 2A, 2D, 10, 16, 17, 18/3	1	3	8	84	28	0	0	124
1, 2A, 3, 10, 16, 17, 18/2D	0	0	1	0	0	0	0	1
1, 2A, 2D, 16, 17, 18/3, 10	0	0	2	15	3	1	0	21
1, 2A, 2D, 10, 16, 17/3, 18	0	1	1	18	3	0	0	23
1, 2A, 3, 10, 16, 17/2D, 18	0	2	4	0	0	0	0	6
2A, 2D, 16, 17, 18/1, 3, 10	0	0	0	1	0	0	0	1
1, 2A, 2D, 17, 18/3, 10, 16	0	0	0	6	2	0	0	8
1, 2A, 2D, 16, 17/3, 10, 18	0	1	1	1	0	0	0	3
1, 2A, 16, 17, 18/2D, 3, 10	0	0	0	1	0	0	0	1
1, 2A, 10, 16, 17/2D, 3, 18	0	1	1	0	0	0	0	2
1, 2A, 3, 16, 17/2D, 10, 18	0	2	1	0	0	0	0	3
1, 2A, 2D, 17/3, 10, 16, 18	0	0	0	1	0	0	0	1
3, 16, 17, 18/1, 2A, 2D, 10	1	0	0	0	0	0	0	1
1, 2A, 16, 18/2D, 3, 10, 17	0	0	0	0	0	7	7	14
1, 2A, 16, 17/2D, 3, 10, 18	6	0	6	0	0	0	0	12
10, 16, 17/1, 2A, 2D, 3, 18	0	0	1	1	0	0	0	2
3, 16, 18/1, 2A, 2D, 10, 17	1	0	0	0	0	0	1	2

Seventeen virulence combination were obtained in 1971 (Table 3). The majority of isolates were virulent only on gene Lr3. This pattern of virulence corresponds to the old standard race 15 which has predominated in Western Canada for many years.

The present wheat varieties grown in Manitoba and Saskatchewan do not possess any seedling genes for resistance to leaf rust. 'Manitou' and 'Neepawa' have gene Lr13 that conditions resistance in adult plants. In 1971, adult plants of 'Manitou' were inoculated in the greenhouse with 78 isolates of leaf rust from Manitoba and Saskatchewan. 'Manitou' was resistant to 12 isolates, moderately susceptible to 15 isolates, and susceptible to 51 isolates. In the last few years, there has been a steadily increasing number of isolates virulent on Lr13, paralleling the decreasing number of isolates virulent on Lr10.

Composite collections of leaf rust were used to inoculate the highly resistant varieties Agatha, Transfer, Aniversario,

Wanken, El Gaucho, Terenzio, Preska, Timpaw, Agent, Einkorn, and Tobari. A composite from Saskatchewan produced a susceptible-type pustule on El Gaucho. This proved to virulent on El Gaucho and avirulent on Aniversario, indicating that resistance in these varieties is conditioned by different genes. In 1970, several isolates from Nova Scotia were virulent on both El Gaucho and Aniversario (1).

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Literature cited

1. Samborski, D. J. 1971. Leaf rust of wheat in Canada in 1970. Can. Plant Dis. Surv. 51:17-19.