

LEAF RUST OF WHEAT IN CANADA IN 1967<sup>1</sup>D.J. Samborski<sup>2</sup>Disease development and crop losses in Western Canada.

Development of leaf rust on the United States winter wheat crop was limited by drought and an extended period of low temperatures. Consequently, only small numbers of spores of *Puccinia recondita* Rob. ex Desm. were carried into Western Canada, where dry weather further delayed rust development. In some areas of Manitoba considerable leaf rust was present on 'Selkirk' wheat at maturity, but the rust developed too late to reduce yields.

Leaf rust in the rust nurseries

Although severe infections of leaf rust occurred in a number of nurseries (Table 1), it must be emphasized that these infections do not necessarily represent the severity of infections in commercial fields. In some nurseries plants were examined when they were nearly ripe, while in others observations were made at an earlier stage of plant development. 'Frontana', which was highly resistant in all the nurseries, has been extensively used in breeding programs, and 'Chris' and 'Manitou', which

Table 1. Percentage infection by *Puccinia recondita* on 15 wheat varieties in uniform rust nurseries at 22 locations in Canada in 1967

Locality	Lee	Thatcher	Selkirk	Red Bobs	Manitou	Marquis	Kenya Farmer	McMurachy	Ramsey	Mindum	Stewart 63	D. T. 184	Thatcher's Transfer	Exchange	Frontana
Saanichton, B. C.	5 2 5	0	25	0 4 0	5 4 0	0	0	0	0	0	0	0	0	0	0
Creston, B. C.	tr*	25	tr	25	tr	25	2	20	0	0	0	0	0	0	0
The Pas, Man.	20	80	40	70	2	40	20	20	tr	0	0	0	0	0	0
Morden, Man.	70	90	70	100	5	80	50	80	0	0	0	0	0	0	0
Winnipeg, Man.	40	50	40	70	5	50	40	50	0	0	0	0	0	0	0
Glenlea, Man.	30	40	20	60	3	40	20	30	0	0	0	0	0	0	0
Verner, Ont.	30	90	30	90	5	90	35	90	tr	0	tr	tr	0	0	0
Williamstown, Ont.	10	50	10	50	5	50	15	50	0	0	0	0	0	0	0
Douglas, Ont.	10	75	10	75	5	75	10	70	0	0	0	0	0	0	0
Alfred, Ont.	20	75		7 5	1 0	7 5	2 0	7 5	0	0	0	0	0	0	0
Kemptville, Ont.	15	75	15	80	5	75	15	80	0	0	0	0	0	0	0
Fort William, Ont.	15	30	10	35	5	30	15	30	0	0	0	0	0	0	0
Guelph, Ont.	20	70	10	70	2	65	15	65	0	10	10	tr	0	0	0
Ottawa, Ont.	25	70	40	75	10	75	25	65	10	20	10	0	0	0	0
Appleton, Ont.	20	85	20	90	10	85	20	85	0	0	0	0	0	0	0
St. Catharines, Ont.	2 0	6 5	5	70	5 7	0 1	0 6	5	1	1	0	1	0	0	0
La Pocatière, Que.	5	35	5	35	tr	35	15	35	0	0	0	0	0	0	0
Quebec, Que.	1 0	1 0	5	10	0 1	0	5 1	0	0	0	0	0	0	0	0
Macdonald College, Que.	5	60	5	50	0	60	5	65		10	tr		0	0	0
Lennoxville, Que.	5	50	10	50	10	60	5	50	tr	tr	0	0	0	0	0
L'Assomption, Que.	20	85	35	85	10	80	30	80	tr	tr	1	5	0	0	0
Kentville, N. S.	1 0	6 5	5	80	5 6	5 1	0 6	5	0	0	0	0	0	0	0

\* tr=trace

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have adult plant resistance inherited from 'Frontana', are being widely grown in the spring wheat area of North America.

#### Distribution of physiologic races

Studies on the inheritance of resistance in the standard differential varieties and on the inheritance of virulence on these varieties have indicated that a comparable differentiation of the leaf rust population

in Canada could be obtained by using genes Lr1, Lr2, Lr2<sup>4</sup> and Lr3 (1,4). Backcross lines containing these genes for leaf rust resistance have been developed and they were used in the 1967 leaf rust survey. The distribution of isolates that were virulent on these single-gene lines is shown in Table 2. Virulence formulae (2) were used to describe virulence combinations obtained in the 1967 survey. Avirulence on genes Lr1, Lr2 and Lr2<sup>4</sup>, and virulence on Lr3 is predominant in the rust population.

Table 2. Virulence of isolates of Puccinia recondita on backcross lines containing genes Lr1, Lr2, Lr2<sup>4</sup> and Lr3 for resistance to leaf rust in Canada in 1967

Virulence formula (effective/ineffective host genes)	Typical race	Number of isolates from:					Total isolates	% total isolates
		Maritimes	Ont. & Que.	Man.	Sask.	B.C.		
1, 2, 2 <sup>4</sup> /3	15	7	25	72	44	3	151	63.5
1, 2, 3/2 <sup>4</sup>	11	1				2	3	1.3
1, 2/24, 3	58 or 161	8	42		14	11	75	31.3
2, 2 <sup>4</sup> /1, 3	5		1	2			3	1.3
2/1, 2 <sup>4</sup> , 3	126		3				3	1.3
/1, 2, 2 <sup>4</sup> , 3	30		3				3	1.3
							238	100.0

Table 3. Distribution by geographic area of NA65 races of Puccinia recondita isolated in Canada in 1967

Race	Number of isolates from:				
	Maritimes	Que. & Ont.	Man.	Sask.	B.C.
1	1				2
3	13	57	5	22	11
7		3			
9		4	35	13	1
10	2	9	33	23	
11		1	1		2

Only three cultures in 1967 were virulent on the backcross line containing gene Lr2.

All cultures of leaf rust isolated in 1967 were tested on the NA65 supplementary differential varieties, and the distribution of NA65 races is shown in Table 3. The survey data from each area are also expressed as the percentage of isolates virulent on the individual supplementary differential varieties (Table 4). The results are very similar to those obtained in 1966, and no important shift in virulence occurred on these varieties in 1967.

A number of highly resistant varieties (3) were inoculated with bulked collections of uredospores to detect scarce or new virulent strains in the rust population. Susceptible-type pustules were obtained only on 'Maria Escobar' and 'Klein Titan'. This type of virulence is normally present in the leaf rust population.

Table 4. Percentage of isolates of Puccinia recondita studied in Canada in 1967 virulent on each of the NA65 differential wheat varieties

Geographic area	Dular	Waban	Lee	Sinvalocho	Exchange
Maritimes	0	0	12.5	81.3	12.5
Que. & Ont.	0	4.0	17.7	82.4	12.2
Man.	0	0	93.2	8.0	44.7
Sask.	0	0	62.0	38.0	40.0
B. C.	0	0	19.0	81.2	0.0

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