LEAF RUST OF WHEAT IN CANADA IN 1966[1]

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Disease development and crop losses in Western Canada

Drought and frost in Kansas and drought in Oklahoma and Texas restricted rust development in those states and greatly reduced the amount of inoculum moving northinto Western Canada in the early part of the 1966 growing season. Consequently, 1966 can be regarded as a "light" leaf rust year and it is cloubfful whether leaf rust reduced yields in most of Western Canada. A slight yield reduction probably occurred in late fields of susceptible varieties.

By the end of July, leaf rust was widespread in Western Canada but infections were much lighter than are normally found at that time. Heavy infections were observed later on 'Pembina', 'Selkirk', 'Thatcher' and 'Canthatch', but this developmentwas too late to have much effect on yield. As the crop matured, considerable leaf rust was observed on 'Manitou'. However, earlier observations recorded trace to 1% infections on 'Manitou' when 'Selkirk' in adjacent fields had infections of 80 percent. These observations suggest that the resistance of 'Manitou' declines as the crop matures since 'Manitou' is still resistant to all rust races studied in Canada in 1966.

leaf rust in the rust nurseries

Severe infections of leaf rust occurred in many nurseries (Table 1). 'Manitou', a newly released variety, showed good resistance at all locations and the rust infections observed on this variety were all of the resistant or moderately resistant type. The durum varieties 'Ramsey', 'Mindum', 'Stewart 63' and 'D.T. 184', and the common wheats 'Thatcher[6] × Transfer', 'Exchange' and 'Frontana' were highly resistant at all locations.

Distribution of physiologic races

Six races of wheat leaf rust were isolated in the 1966 race survey (Table 2). Race 15 constituted 81% of the isolates in Canada while races 58 and 161, which are very similar, comprised 13% of the isolates. Races 5 and 9 were very scarce while race 11 was important only in British Columbia. In Canada, the leaf rust population is largely characterized by virulence on the varieties 'Mediterranean' and 'Democrat', and to a lesser extent, virulence on 'Loros'.

Table 2. Distribution by geographic areas of physiologic races of Puccinia recondita isolated in Canada in 1966.

	Geographic Area						
Race	Que. & Ont.	Man.	Sask.	Alta.	B. C.	Total Isolates	% Total Isolates
5	1	4	1			6	1.9
9		1				1	0.3
11	2				10	12	3.7
15	10	121	118	6	4	259	80.9
58	13					13	4.1
161		1	1	19	8	29	9.1
	25	123	124	26	22	320	100.0

Table 3. Distribution by geographic areas of NA65 races of Puccinia recondita isolated in Canada in 1966.

	Geographic Area					
Race	Que. & Ont.	Man.	Sask.	Alta.	B.C.	Total Isolates
1	3		1		4	8
3	9	10	25	7	4	55
9	4	33	50	3	6	96
10	8	66	48	2		124
11	1	10		12	8	31
12		4		2		6

Table 4. Percent of isolates of Puccinia recondita studied in Canada in 1966 virulent on each of the NA65 differential wheat varieties.

Geographic Area	Percent of isolates virulent on: Dular	Waban	Lee	Sinvalocho	Exchange
Que. & Ont.	0	0	52.0	16.0	32.0
Man.	0	0	91.9	19.5	56.9
Sask.	0	0	79.0	21.6	38.7
Alta.	0	0	73.8	80.8	15.4
B. C.	0	0	63.4	54.5	0.0

Analysis of the rust population with supplementary differential varieties demonstrates further variability in the rust population (Table 3). However,,

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Table 1. Percent infection of leaf rust of wheat (Puccinia recondita) in 1966 on 15 wheat varieties in uniform rust nurseries at 23[a] locations in Canada.

Locality	Lee	Thatcher	Selkirk	Red Bobs	Manitou	Marquis	Kenya Farmer	McMurachy	Ramsey	Mindum	Stewart 63	D. T. 184	Thatcher[6]× Transfer	Exchange	Frontana
Saanichton, B. C.	15	70	10	70	5	60	10	7	0 0	0	0	0	0	0	0
Agassiz, B. C.	2	10	3	10	10	10	1	1	0 0	0	0	0	0	0	0
Creston, B. C.	1	80	5	80	1	60	1	8	0 0	0	0	0	0	0	0
Lacombe, Alta.	0	1	0	5	0	1	0	1	0	0	0	0	0	0	0
Lethbridge, Alta.	40	80	60	90	5	70	20	8	0 0	0	0	0	0	0	0
Indian Head, Sask.	70	90	60	90	3	80	70	*9*	*0 0*	0	0	0	0	0	0
Scott, Sask.	40	80	40	80	5	70	30	8	0 0	0	0	0	0	0	0
Melfort, Sask.	20	50	20	60	1	50	10	5	0 0	0	0	0	0	0	0
Brandon, Man.	40	80	50	80	1	80	30	8	0 0	0	0	0	0	0	0
The Pas, Man.	10	40	10	50	2	40	50	4	0 0	0	0	0	0	0	0
Morden, Man.	60	90	60	90	3	80	40	*9*	*0 0*	0	0	0	0	0	0
Winnipeg, Man.	20	60	20	60	1	40	10	6	0 0	0	0	0	0	0	0
Glenlea, Man.	60	80	50	60	20	80	15	6	0 0	0	0	0	0	0	0
Kapuskasing, Ont.	t	5	t	5	t	3	t	3	0	0	0	0	0	0	0
Kemptville, Ont.	5	40	5	40	1	40	5	4	0 0	0	0	0	0	0	0
Fort William, Ont.	40	70	30	80	1	60	20	8	0 0	0	0	0	0	0	0
Guelph, Ont.	50	80	20	80	5	70	20	8	0 0	0	0	0	0	0	0
Ottawa, Ont.	2	5	2	5	t	2	t	2	0	0	0	0	0	0	0
La Pocatiere, Que.	1	30	0	30	0	30	0	4	0 0	0	0	0	0	0	0
Lennoxville, Que.	10	70	20	80	3	60	5	7	0 0	0	0	0	0	0	0
Normandin, Que.	0	1	0	4	0	1	0	1	0	0	0	0	0	0	0
Kentville, N. S.	t	1	t	5	0	1	t	0	0	0	0	0	0	0	0
St. John's, Nfld.	t	10	t	5	0	3	0	1	0 0	0	0	0	0	0	0

[a] Leaf rust was not found on nurseries from Beaverlodge, Alta., Williamstown, Douglas, Alfred, Merrickville and St. Catherines, Ont., Macdonald College and L'Assomption, Que., Fredericton, N.B., Charlottetown, P.E. I.

only 'Lee', 'Sinvalocho' and 'Exchange' acted as differentials in 1966 (Table 4). In addition, the resolving power of these supplementary differentials is low since several varieties contain the same gene while others contain genes identical to some in the standard differentials.

An interesting relationship was observed between 'Lee' and 'Sinvalocho' to cultures of race 15. Cultures virulent on 'Sinvalocho' were almost invariably avirulent on 'Lee' while cultures avirulent on 'Sinvalocho' were virulent on 'Lee'. Avirulent cultures of race 15 produce an intermediate reaction ($1 \pm - 2+$) on 'Sinvalocho' and this reaction is quite variable for different cultures.

A group of highly resistant varieties were inoculated with bulked collections of urediospores in order to detect scarce or new virulence types in the rust population. These varieties were 'Agrus', 'Transfer', 'Klein Lucero', 'Aniversario', 'South Africa 43', 'Wanken', 'C.I. 13523', 'Klein Titan', 'Maria Escobar', 'Rio Negro', and 'Agatha'. A few susceptible pustules were observed on 'Klein Titan', 'Maria Escobar' and 'Rio Negro', but this type of virulence is normally present in the leaf rust population.

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