

STEM RUST OF OATS IN CANADA IN 1969¹J. W. Martens²Prevalence and crop losses in Western Canada

Stem rust of oats caused by Puccinia graminis Pers. f. sp. avenae Eriks. & E. Henn. was first found in Manitoba on July 29. Very light infections were common in Manitoba and eastern Saskatchewan by the end of August but there were no crop losses, except in the Red River Valley where infections of 30% or more developed in late fields.

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Uniform rust nurseries

Oat stem rust was scarce in the rust nurseries grown at 35 locations across Canada (Table 1). Rust was observed in only 10 of the nurseries, and infections of over 5% were found only in Manitoba.

Identification and distribution of physiologic races

Physiologic races were identified by the methods used in previous years (1). In addition to varieties with the genes listed in Table 2, a supplementary set consisting of 'Kyto' (pg.12), 'Saia' and a line with resistance from a Tunisian collection of Avena sterilis L. was used. All 186 collections were avirulent on the

Table 1. Percentage infection by Puccinia graminis f. sp. avenae on 11 oat varieties at 10 uniform rust nurseries* in Canada in 1969

Locality											
Creston, B. C.	0	0	tr**	0	0	0	9	0	0	0	0
Brandon, Man.	2	0	0	tr	0	0	0	0	0	0	0
Glenlea, Man.	60	30	30	5	tr	tr	tr	80	10	60	60
Morden, Man.	5	1	0	0	0	0	0	tr	tr	tr	tr
Douglas, Ont.	0	tr	0	0	0	0	0	0	0	0	0
Kapuskasing, Ont.	5	tr	0	0	0	0	0	0	0	0	0
Vineland, Ont.	0	0	0	0	0	0	0	tr	0	0	0
Williamstown, Ont.	0	0	0	0	0	0	0	tr	tr	0	0
La Pocatière, Que.	0	0	0	0	0	0	0	0	0	0	tr
Kentville, N. S.	0	0	0	0	0	0	0	0	tr	0	0

* No rust was observed in 25 other nurseries located at Agassiz, B. C.; Beaverlodge, Edmonton, Lacombe, and Lethbridge, Alta.; Indian Head, Melfort, and Scott, Sask.; The Pas, Man.; Alfred, Appleton, Ft. William, Guelph, Kemptville, Morewood, and Ottawa, Ont.; L'Assomption, Lennoxville, Macdonald College, Normandin, and Québec, Qué.; Truro, N. S.; Charlottetown, P. E. I.; Doyles and St. John's, Nfld.

** tr = trace infection.

Table 2. Distribution by provinces of physiologic races of *Puccinia graminis* f. sp. *avenae* isolates in Canada in 1969

Race formula no.	Virulence formula (effective/ineffective Pg host genes)	Number of isolates from					Total isolates	Percentage of total isolates
		B. C.	Sask.	Man.	Ont.	Que.		
C3	2, 8/1, 3, 4, 9	0	2	10	1	0	13	7.0
c4	1, 4, 8, 9/2, 3	1	0	0	0	0	1	.5
C5	4, 9/1, 2, 3, 8	0	2	7	0	0	9	4.8
C8	3, 8/1, 2, 4, 9	0	0	0	13	0	13	7.0
c9	8/19 2, 3, 4, 9	0	0	0	12	1	13	7.0
C10	9/1, 2, 3, 4, 8	1	16	111	1	0	129	69.4
C14	8, 9/1, 2, 3, 4	0	0	0	1	0	1	.5
C23	2, 4, 9/1, 3, 8	0	1	3	3	0	7	3.8
Total		2	21	131	31	1	186	100.0

supplementary set. The race distribution in Western Canada has changed relatively little since 1965, when C10 first became dominant. In 1969, races C10, C3, and C5 comprised 83%, 8%, and 6%, respectively, of all isolates from Manitoba and Saskatchewan. Race C23, not previously described, was also found in both provinces. In Eastern Canada, race C9 and the closely related C8 have continued to predominate. Race C10, which was common in Ontario in 1967 and 1968 (2), was isolated only once in 1969. The new race, C23, was also found in Ontario. The widespread

appearance of C23 is surprising since this race is avirulent on both Pg2 resistance and Pg4 resistance which are present, singly or in combination, in most of the oat varieties grown in Canada. Race C23 may be similar to the old race 7 that was common from 1953 to 1959, but no such isolate has been found in Canada since the present differential set was first used in 1964.

The virulence range of the rust population has been maintained at a high level (Table 3). Approximately 90% of all

Table 3. Frequency of virulence in the stem rust population on various types of resistance in Canada in 1969

Geographic area	Percentage of isolates virulent on varieties with the following genes for resistance:						Total no. isolates	Mean* virulence capability
	Pg-1	Pg-2	Pg-3	Pg-4	pg-8	pg-9		
Eastern Canada	100	87.5	59.4	90.6	12.5	84.4	32	4.3
Western Canada	99.4	89.6	100	90.9	91.6	7.8	154	4.8

* Mean virulence capability = frequency of virulence on Pg-1 + . . . + pg-9 / total no. isolates.

isolates in both Eastern and Western Canada are virulent on varieties carrying Pg2 and Pg4 resistance. Since these are the only types of resistance present in commercial oat varieties, conditions favoring rust development could result in serious crop losses.

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Literature cited

1. Martens, J.W. 1968. Stem rust of oats in Canada in 1967. *Can. Plant Dis. Surv.* 48:17-19.
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