CROWN RUST OF OATS IN CANADA IN 1967[1]

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Disease development and crop losses in Western Canada

In 1967 oat crown rust caused by Puccinia coronata Cda. f. sp. avenae Erikss was first found in the vicinity of Winnipeg on July 17. Only traces of crown rust were found on oats in the Red River Valley of Manitoba as late as August 4. There was a slight increase in the intensity of the disease in this region during August. The occurrence of crown rust diminished rapidly west of the Red River Valley and no infections occurred on susceptible varieties grown in the Saskatchewan rust nurseries. Development of crown rust in Western Canada in 1967 was the lightest in recent years due to unfavorable moisture conditions early in the season, and as a result losses to the oat crop were negligible.

Disease ratings in the rust nurseries

Ratings of crown rust intensity on 10 oat varieties grown at nurseries in Manitoba, Ontario, Quebec and Prince Edward Island are presented in Table 1. Omitted from this table are those nurseries in which no crown rust was found on any of the 10 oat varieties, as well as a few nurseries in which rust intensity could not be estimated because of the shrivelled or mildewed condition of the leaves.

No crown rust occurred on oats from any nursery west of Morden, Manitoba, and the small percentage infection on oats grown at Morden is indicative of the light attack of crown rust which occurred in Western Canada in 1967.

Heavy crown rust infections occurred on oats grown in the vicinity of dense buckthorn infestations in Eastern Canada. The nurseries in eastern Ontario (Kemptville, Appleton, Ottawa) received the highest crown rust intensity ratings. 'Rodney ABDH', a backcross line containing additional stem rust resistance, also appears to afford some degree of crown rust resistance as reflected by the lower intensities on it than on ordinary 'Rodney' oats at nearly all of the locations.

Table 1. Percentage infection of crown rust on 10 oat varieties at 13 locations in Canada

Locality	Bond	Trispernia	Landhafer	Ceirch du Bach	Saia	Rodney ABDH	C. I. 3034	Rodney	Garry	C. I. 4023
Morden, Man.	10	0	tr*	tr	0	5	*0*	5	5	5
Williamstown, Ont.	5	0	0	0	0	0	*0*	5	5	5
Alfred, Ont.	0	1	1	0	0	10	*0*	10	10	5
Kemptville, Ont.	25	tr	tr	5	tr	20	40	50	50	40
Fort William, Ont.	5	1	2	tr	0	tr	0	0	tr	5
Ottawa, Ont.	40	3	0	5	0	15	10	40	40	15
Appleton, Ont.	60	2	tr	*0*	*0*	10	5	40	40	40
La Pocatière, Que.	10	0	tr	0	0	0	0	tr	tr	tr
Quebec, Que.	5	0	0	0	0	tr	0	1	1	tr
Macdonald Coll., Que.	80	2	5	tr	0	40	20	80	70	70
Lennoxville, Que.	5	0	0	0	0	0	0	5	0	5
L'Assomption, Que.	25	0	0	0	tr	10	tr	20	25	20
Charlottetown, P.E.I.	15	0	0	0	0	tr	0	10	10	5

* tr = trace infection, less than 1%.

Distribution of physiologic races

The frequency of occurrence and distribution of 37 physiologic races of crown rust identified from 197 Canadian isolates is presented in Table 2. The

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sparsity of crown rust in the west is reflected by the reduced number of isolates identified from this region in comparison to previous years. There was again considerable diversity in the physiologic races comprising the crown rust population in the west, though two races, 295 and 326, made up one third of the isolates identified. Most of the races identified from Manitoba in 1967 attacked the differential varieties 'Landhafer' and 'Santa Fe'.

A wide spectrum of physiologic races was also identified from isolates made in Eastern Canada. The 'classical' Victoria-virulent races 203, 210 and 216 continued to comprise a substantial portion (40%) of the population, but other races, particularly race 341, were also abundant.

Four races with previously undescri'ued combinations of virulence on the differential varieties

Table 2. Distribution of physiologic races of crown rust in Canada, 1967

Physiologic race	West		East		W & E Totals	
	Number isolates	% of all isolates	Number isolates	% of all isolates	Number isolates	% of all isolates
202	0	0	2	1 4	2	1.0
203	2	3 7	19	13 3	21	10.5
207	0	0	1	0 7	1	0.5
209	0	0	3	2 1	3	1.5
210	0	0	18	12 6	18	9.0
211	0	0	2	1 4	2	1.0
216	2	3 7	21	14 7	23	11.5
226	0	0	1	0 7	1	0.5
228	1	1.9	7	4 9	8	4.0
230	0	0	1	0 7	1	0.5
239	1	1 9	2	1 4	3	1.5
241	0	0	2	1.4	2	1.0
258	0	0	1	0 7	1	0,5
259	0	0	3	2 1	3	1.5
264	5	9 2	1	0 7	6	3.0
272	0	0	1	0.7	1	0.5
274	0	0	2	1.4	2	1.0
276	2	3 7	0	0	2	1.0
295	7	13 0	1	0 7	8	4.0
297	0	0	4	2 8	4	2.0
320	0	0	2	1 4	2	1.0
325	2	3 7	0	0	2	1.0
326	11	20 3	7	4.9	18	9.0
327	2	3 7	0	0	2	1.0
330	1	1 9	6	4 2	7	3.5
332	0	0	5	3 5	5	2.5
333	2	3.7	0	0	2	1.0
341	6	11 1	24	16 8	30	15.0
342	0	0	3	2 1	3	1.5
345	0	0	1	0 7	1	0.5
363	0	0	1	0.7	1	0.5
365	4	7 4	0	0	4	2 0
446	1	1.9	3	2 1	4	2.0
New races	5	9 2	1	0 7	10	5.0
Total-Races	18		29		37	
Total-Isolates	54		143		197	
Race. Isolate Ratio	1:3 0		1:4 9			

* Five isolates representing three new races.

** One isolate representing one new race.

were discovered in Canada during the 1967 survey. The race numbers and resistance formulae of these races are: race 450 = 1, 2, 3, 4, 9, 10; race 451 = 1, 2, 3, 7, 8, 9, 10; race 452 = 1, 2, 3, 7, 10; and race 453 = 1, 3, 10.

Virulence on the differential varieties

The virulence of Canadian crown rust isolates on the sources of resistance represented by the differential varieties is presented in Table 3. The situation in Eastern Canada was much the same as in 1966 (1).

In Manitoba there was a marked increase in virulence on the varieties 'Landhafer', 'Santa Fe', 'Trispernia' and 'Bondvic'. The two first-mentioned varieties were attacked by two-thirds of the crown rust isolates identified in 1967 but by less than one-quarter of the isolates the previous year. 'Trispernia' and 'Bondvic' were attacked by one-quarter of the crown rust isolates compared with only 2% of the isolates in 1966. The virulence of the crown rust population on all four of these varieties was greater in 1967 than had been reported since these differentials were first used in 1952 (2). The present situation undermines the utilization of these sources of resistance in a breeding program.

Table 3. Virulence of Canadian crown rust biotypes, 1966 and 1967, on the differential varieties

	Anthony	Victoria	Appler	Bond	Landhafer	Santa Fe	Ukraine	Trispernia	Bondvic	Saia
Western Canada: (Manitoba)										
No. virulent isolatrs (1967)	39	32	39	48	37	37	43	13	17	7
% virulent isolates (1967)	72	59	72	89	68	68	80	24	31	13
% virulent isolates (1966)	66	58	62	82	24	23	83	2	2	4
Eastern Canada:										
No. virulent isolates (1967)	67	77	72	123	14	15	136	3	2	18
% virulent isolates (1967)	47	54	50	86	10	11	95	2	1	13
% virulent isolates (1966)	51	45	30	77	9	9	85	0	0	9
Canada - Total										
No. virulent isolatcs (1967)	106	109	111	171	51	52	179	16	19	25
% virulent isolatcs (1907)	53	54	55	85	25	26	90	8	9	12
% virulent isolates (1966)	61	54	53	80	20	20	82	2	2	6

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literature cited

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