CROWN RUST OF OATS IN CANADA IN 1968[1]

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Disease development and crop losses in Western Canada

Oat crown rust caused by Puccinia coronata Cda. f. sp. avenae Eriks was first found in the vicinity of Morden, Manitoba, on July 22nd. This disease increased in intensity in the Red River Valley and westward in Manitoba during the remainder of the summer. The occurrence of crown rust was general on oats as far west as Yorkton, Saskatchewan. Crown rust development in Western Canada in 1968 was the heaviest in recent years due to favourable moisture conditions and the prolonged cool growing season.

Yield reductions from oat crown rust were negligible in experimental plots if disease development did not precede heading (1) In farm fields in 1968 damage was appreciable, although disease development did not occur until after heading. This late attack caused losses because of the unusually cool season that delayed maturity of the crop while encouraging rust development. Thus losses of 20 to 27 bushels per acre due to crown rust were observed in experimental plots despite the fact that the disease did not reach serious proportions on the crop till after heading.

Disease ratings in the nurseries

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

The intensity of crown rust infection from the Manitoba nurseries reflects conditions prevailing during the first part of August. Crown rust severity subsequently increased to 60-100% on most commonly grown varieties. The readings on material from nurseries in Ontario and Quebec were also taken fairly early in the season. Considerable infection was already noticeable, however, on oats grown in the vicinity of dense buckthorn infestations, i.e. the Kemptville, Williamstown, Appleton, and Ottawa nurseries.

'Table 1. Percentage infection of crown rust on 10 oat varirties at 14 locations in Canada

Locality	Band	Trispernia	Landhafer	Ceirch du Bach	Saia	Rodney ABDH	C.I. 3034	Rodney	Garry	C.I. 4023
Brandon, Man.	20	tr*	5	tr	tr	10	10	20	20	5
Morden, Man.	30	tr	10	tr	tr	20	10	30	30	20
Glenlea, Man.	30	tr	5	0	0	30	5	30	30	30
Verner, Ont.	20	0	0	0	2	5	10	10	10	20
Williamstown, Ont	40	0	0	0	0	10	10	20	30	30
Kemptville, Ont.	30	0	tr	2	5	10	30	20	30	30
Fort William, Ont.	30	tr	5	tr	5	20	10	30	30	30
Ottawa, Ont.	40	0	5	tr	5	10	10	30	20	30
Appleton, Ont.	40	0	0	0	0	30	5	40	40	40
Morewood, Ont.	40	0	tr	0	0	30	5	40	40	30
La Pocatibre, Que.	30	0	0	0	0	10	0	20	20	10
Macdonald College, Que.	30	0	tr	0	2	20	20	30	30	30
Lennoxville, Que.	10	0	0	0	0	10	0	10	10	10
L'Assomption, Que.	20	0	0	0	0	30	20	30	30	20

* tr = trace infection, less than 1%

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The 'Rodney ABDH' backcross line containing additional stem rust resistancr genes, once again appeared *to* afford some degree of crown rust resistance. This was reflected by the lowrr intensity of crown rust on it than on ordinary 'Rodney' at nearly all of the locations where rust occurred.

Nurseries from eastern Saskatchewan were read prior *to* the development *of* crown rust in that area

Distribution of physiologic races

The frequency of occurrence and distribution of 29 physiologic racrs of crown rust idrntified from 170 Canadian isolates is presented in Table 2. Despite the occurrence of a considerable number of physiologic races in the west, two of these, 295 and 326. comprised 6070 of the isolates identified. These two races prrdominated in the western crown rust population last year, but *to* a lesser extent. These races **as** well as most of the others isolated attacked thc differential varieties 'Landhafer' and 'Santa Fe'.

A greater spectrum of physiologic races was identified from isolates made in Eastern Canada. The 'classical' Victoria-virulent races 203, 210, and 216 comprised 60% of the population. In contrast to Western Canada, there was a decrease in the prevalence of races attacking 'Landhafer' and 'Santa Fe' in the east. These races represented only 8% of the eastern crown rust population this year.

Table 2. Distribution of physiologic races of crown rust in Canada in 1968

Physiologic race	West		East		W & E totals	
	Number of isolatrs	% of all isolatrs	Numbrr of isolates	% of all isolates	Number of isolates	% of all isolates
202	0	0	1	1.1	1	0.6
203	8	10.4	31	33.4	39	23.4
210	1	1.3	7	7.6	8	4.8
211	0	0	1	1.1	1	0.6
213	0	0	1	1.1	1	0.6
216	2	2.6	17	18.3	19	11.4
226	1	1.3	5	5.4	6	3.6
228	0	0	2	2.2	2	1.2
241	1	1.3	4	4.3	5	3.0
259	1	1.3	3	3.2	4	2.4
264	3	3.9	0	0	3	1.8
274	0	0	1	1.1	1	0.6
275	0	0	1	1.1	1	0.6
270	1	1.3	0	0	1	0.6
283	0	0	1	1.1	1	0.6
290	1	1.3	0	0	1	0.6
295	21	27 3	3	3.2	24	14.4
297	1	1.3	0	0	1	0.6
299	0	0	1	1.1	1	0.6
325	3	3.9	2	2.2	5	3.0
326	25	32.5	3	3.2	28	16.8
332	0	0	2	2.2	2	1.2
333	1	1.3	0	1.1	1	0.6
341	0	0	6	6.5	6	3.6
367	0	0	1	1.1	1	0.6
415	3	3.9	0	0	3	1.8
427	1	1.3	0	0	1	0.6
446	2	2.6	0	0	2	1.2
New race	1	1.3	0	0	1	0.6
Total races	18		20		29	
Total isolates	77		93		170	
Race:isolate ratio	1:4.3		1:4.6			

Table 3. Percentage of Canadian crown rust isolates virulent on differential host varieties in 1966, 1967, and 1968

Location and year	Anthony	Victoria	Appler	Bond	Landhafer	Santa Fe	Ukraine	Trispernia	Bondvic	Saia
Western Canada										
1968	90	48	90	95	82	81	95	10	10	3
1967	72	59	72	89	68	68	80	24	31	13
1966	66	58	62	82	24	23	83	2	2	4
Eastern Canada										
1968	79	40	83	87	8	9	96	2	2	7
1967	47	54	50	86	10	11	95	2	1	13
1966	51	45	30	77	9	9	85	0	0	9

One race with a previously undescribed combination of virulence on the differential varieties was discovered in Canada during the 1968 survey. The resistance formula of this race is: 1, 2, 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 previous years with virulence on 'Anthony' and 'Appler' increasing once again.

In Western Canada virulence on the varieties 'Landhafer' and 'Santa Fe' increased from 24% in 1966 to 68% in 1967 and again increased in 1968 to 82%. The contrast between the virulence of the western crown rust population versus the avirulence of the eastern population (8% in 1968) is striking.

Acknowledgments

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Literature cited

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