CROWN RUST OF OATS IN CANADA IN 1964

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Disease development in Manitoba and Saskatchewan

Oat crown rust, Puccinia coronata Cda. f. sp. avenae Erikss., was found in experimental plots at Winnipeg and Morden, Man. on July 7. The first appearance of this rust in a commercial oat field occurred near Morris, Man., on July 9. The pathogen was present in trace amounts in southern Manitoba as late as the end of July. Crown rust developed gradually in the Red River Valley in early August, reaching intensities of 20-40 per cent in oat fields by mid-month. North of the Trans-Canada highway in Manitoba, infections were generally light in mid-August, with the amount of rust varying from field to field but rarely reaching intensities of 10 per cent. Only trace amounts of crown rust were detectable in Saskatchewan s~ far west as Weyburn and Indian Head late in the growing season. Crown rust distribution and intensity in western Canada are illustrated in Figure 1.

Crown rust yield losses in the western rust area

Losses in oats due to crown rust were small in 1964 despite the widespread occurrence of the disease by mid-August. Damaging infections were probably limited to late-sown fields in the Red River Valley of Manitoba. Yield loss trials with 'Garry' oats under conditions of natural crown rust infection conducted near Winnipeg showed losses of 10 and 25 per cent in groats production in plots seeded on May 25 and June 16 respectively. It is unlikely that *any* damage to oats was caused by crown rust outside of the Red River Valley in 1964.

Disease ratings in the crown rust nurseries

Uniform rust nurseries were grown at many localities across Canada. When the plants were approaching maturity a small sheaf was cut from each row of every nursery and shipped to Winnipeg where the disease rating for each variety was assessed. The crown rust intensity readings for varieties *grown* at the nurseries are presented in Table 1. Nurseries in which no crown rust was detected, and those in which crown rust intensity could not be estimated because of the poor condition of the leaves, are not included in Table 1.

lo crown rust was observed on any of the oat varieties from 8 crown rust nurseries west of Indian Head, Saskatchewan to the Pacific. Only traces of crown rust were detected on some varieties from the Melfort and Indian Head nurseries. The crown rust nurseries in the Red River Valley of Manitoba were heavily infected, though 'Garry' and 'Rodney' were somewhat less heavily attacked than 'Exeter', 'Bond' and 'Clinton'. The results from the rust nurseries grown in Saskatchewan and Manitoba are in agreement with the survey data with respect to the distribution and intensity of crown rust in 1964.

Crown rust in nurseries in eastern Canada was not ## severe as in those in the western Red River Valley. The incidence of crown rust recorded in south-eastern Ontario can be attributed largely to the presence of the alternate host, common buckthorn, Rhamnus cathartica L., which is abundant in hedgerows between fields, along road allowances and in small woodlots. Aeciospores shed from buckthorn infections in the early spring furnish the primary inoculum required to initiate crown rust epidemics in adjoining oat fields.

Distribution of physiologic races

In 1964, 34 physiologic races of crown rust were identified from 202 isolates. The 'Landhafer-Santa Fe' virulent races continued to predominate in the west, comprising 53 per cent of the isolates. However, the recently evolved races 326 and 338 have replaced races 294 and 295 (1) as the most frequently occurring ones in this race group. This represents an increase in the number of isolates virulent on the differential variety 'Victoria'. This year there was also increased virulence on 'Trispernia' and 'Bondvic', with 14 per cent of the western isolates attacking these differential varieties.

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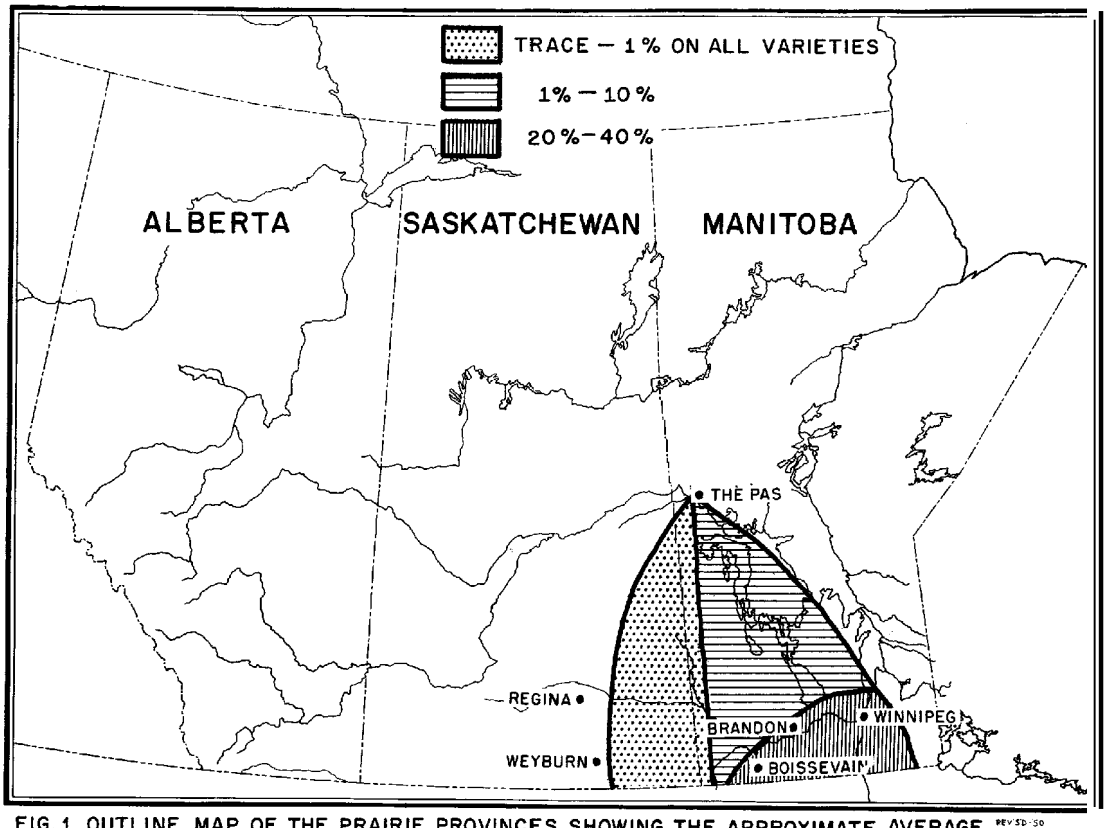

FIG. 1 OUTLINE MAP OF THE PRAIRIE PROVINCES SHOWING THE APPROXIMATE AVERAGE INTENSITY OF CROWN RUST OF OATS IN 1964 REV-SD-50

Table 2. Distribution by geographic area of physiologic races of Puccinia coronata avenae collected in oats in Canada in 1964.

Physiologic race	Number isolates West	Per cent of total isolates West	Number isolates East	Per cent of total isolates East	Total isolates East & West
201	1	0.7	-	-	1
203	8	5.8	1	1.6	9
209	-	-	1	1.6	1
210	2	1.4	8	12.5	10
211	7	5.0	-	-	7
212	2	1.4	1	1.6	3
213	1	0.7	1	1.6	2
216	9	6.5	5	7.8	14
237	-	-	1	1.6	1
241	3	2.2	-	-	3
242	1	0.7	-	-	1
262	1	0.7	-	-	1
263	1	0.7	-	-	1
264	10	7.2	2	3.1	12
272	-	-	1	1.6	1
274	11	7.9	1	1.6	12
275	3	2.2	-	-	3
276	5	3.6	1	1.6	6
279	1	0.7	-		1
281	1	0.7	3	4.7	4
284	4	2.9	7	11.9	11
285	-	-	2	3.1	2
290	1	0.7	-	-	1
293	1	0.7	-		1
294	6	4.3	3	4.7	9
295	4	2.9	-	-	4
299	1	0.7	-	-	1
320	1	0.7	4	6.2	5
325	1	0.7	1	1.6	2
326	20	14.4	4	6.2	24
332	2	1.4	1	1.6	3
338	15	10.8	7	11.9	22
341	2	1.4	7	11.9	9
345	1	0.7	-	-	1
New races	12	8.6	2	3.1	14
TOTALS	138		64		202

Table 1. Per cent infection of crown rust of oats in 1964 on 10 oat varieties at 17 locations across Canada

Locality	Bond	Trispermia	Exeter	Garry	Clinton	Landhafer	Rodney	C I 8	Ceirch du Bach	Sair
Melfort, Sask.	1	0	0	0	0	0	tr	0	0	0
Indian Head, Sask.	tr	0	tr	tr	0	0	tr	tr	0	0
Brandon, Man.	60	0	80	40	60	10	40	40	1MR	1MR
Morden, Man.	50	0	50	40	50	10	50	30	1	tr
Glenlea, Man.	70	trM	50	30	40	10	40	40	0	0
Winnipeg, Man.	70	tr	60	50	--*	20	50	40	0	0
The Pas, Man.	20	0	40	5	20	tr	5	tr	0	0
Guelph, Ont.	4	0 0	30	30	30	tr	30	--*	0	0
Kemptville, Ont.	10	0	20	10	20	tr	10	1	0	0
Appleton, Ont.	4	0 0	4 0	1 0	2 0	0	20	20	0	0
Macdonald College, Que.	20	0	30	10	--*	1	10	10	0	0
Lennoxville, Que.	tr	0	--*	tr	--*	0	tr	0	0	0
Quebec City, Que.	4	0 0	40	30	30	0	30	20	0	0
L'Assomption, Que.	20	0	20	5	20	0	5	1	0	0
Fredericton, N.B.	0	0	tr	tr	tr	0	tr	0	0	0
Kentville, N.S.	tr	0	tr	0	0	0	0	0	0	0
Charlottetown, P.E.I.	0	0	tr	0	tr	0	0	0	0	0

*No rust reading taken.

A sharp increase in the number of cultures virulent on 'Landhafer-Santa Fe' occurred in eastern Canada. In 1963, less than 5 per cent (1) of eastern isolates possessed this virulence whereas this year 38 per cent of the identified cultures attacked 'Landhafer' and 'Santa Fe'. A separate survey of aecial isolates from buckthorn was also made in Ontario. The marked variability in the composition of the physiologic race population isolated from the alternate host was clearly in evidence, and it substantiates previous findings (2) in this area.

A total of 9 races with previously undescribed virulence combinations on the differential varieties were isolated in 1964. These are being subjected to further purification and identification prior to submitting them for race number assignment. Their tentative resistance formulae on the crown rust differential varieties are: 1) 1,2,3, 5,8,9,10; 2) 1,2,3,8,9,10; 3) 1,2,8,9; 4) 1, 2,10; 5) 1,5,6,7,8,9; 6) 1,5,6,8,9; 7) 1,8, 9; 8) 1,10; 9) 2,4,8,9,10.

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literature cited

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