CROWN RUST OF OATS IN CANADA IN 1963

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Disease development in western Canada

Crown rust of oats, Puccinia coronata Corda f. sp. avenae Erikss., was first found in western Canada in 1963 at Morden, Manitoba on July 2nd. The disease was present in trace amounts throughout the south-eastern part of Manitoba early in July. Favorable weather conditions permitted rapid rust development, and moderate to severe infection occurred on the lower leaves of oats in all fields examined south of Winnipeg on July 20th. The oat crop north of Winnipeg and as far west of the Red River Valley as Swift Current in Saskatchewan sustained only mild crown rust infection, The disease was general throughout all oat growing regions of the western rust belt by August 10th, but remained light (trace to 10%)in intensity in northern Manitoba and in Saskatchewan. A severe rust epiphytotic occurred in southern Manitoba where the intensity of infection ranged between 30 and 90% by August 20th, Figure 1.

Disease losses in western Canada

Quantitative and qualitative losses in oats due to crown rust were small despite the widespread distribution of the disease. In Saskatchewan and northern Manitoba this is ascribed to the very limited intensity of the disease on the oat crop. In southern Manitoba, however, where the crown rust epiphytotic was severe, most of the crop escaped serious damage because the plants had headed prior to the onset of heavy crown rust infection. This was clearly demonstrated by the severe losses suffered in late-sown fields in which the oats headed after initiation of the epiphytotic. Fortunately, late-sown fields were few in number this year.

Experiments are currently being conducted at the Research Station in Winnipeg to determine the degree of correlation which exists between the occurrence, duration and intensity of rust infections, and the yield and quality of oats. Once the tests have been completed, estimates of crown rust damage in terms of bushels loss per acre will accompany these reports. Suffice it to say this year that with the exception of late-sown fields in southern Manitoba crown rust did not significantly damage the western oat crop,

Disease ratings in 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 in the nursery and sent to Winnipeg where the disease rating was assessed, The rust intensity ratings for each of the 10 oat varieties grown at each of the nurseries are presented in Table 1.

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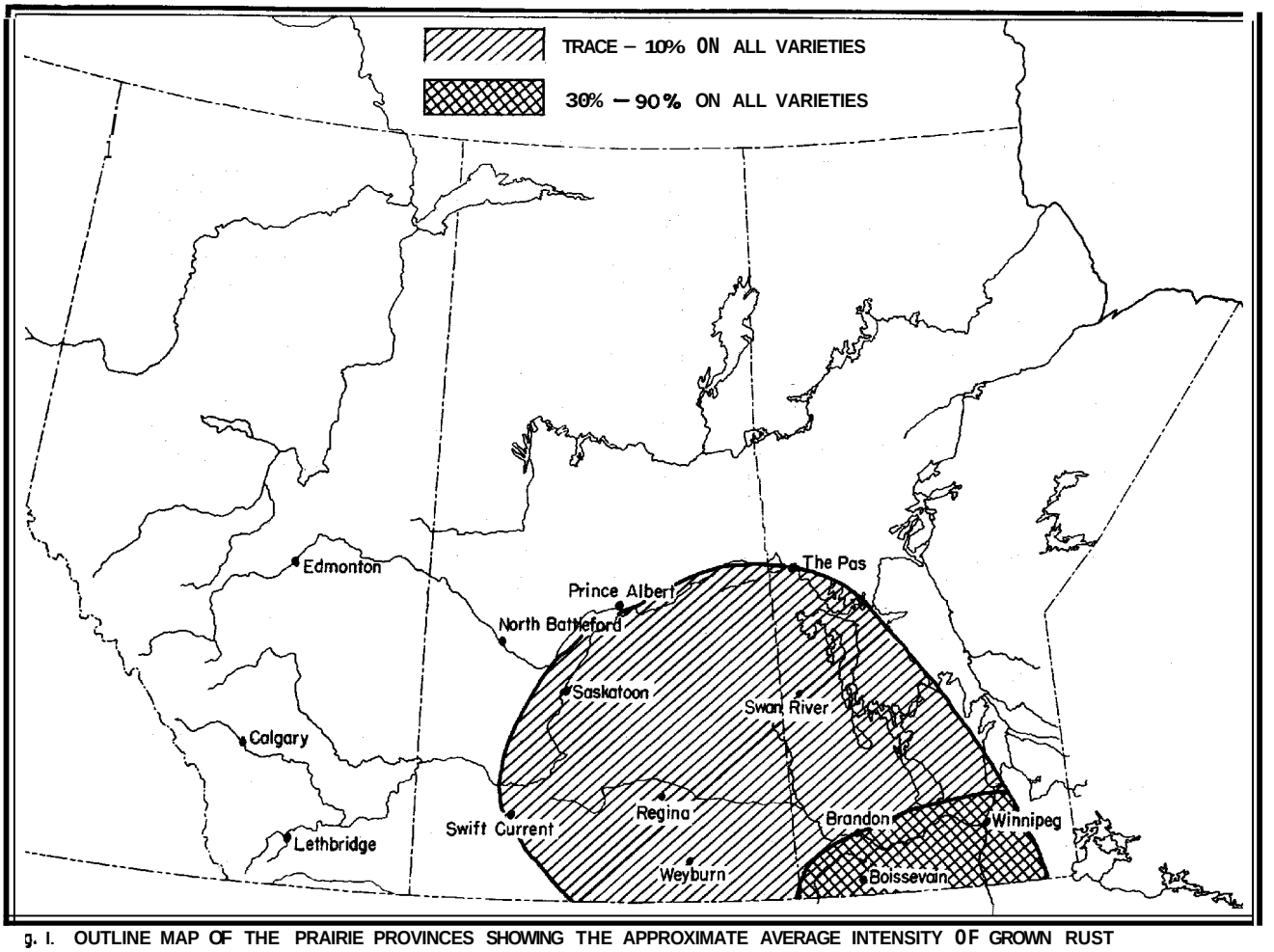

g. I. OUTLINE MAP OF THE PRAIRIE PROVINCES SHOWING THE APPROXIMATE AVERAGE INTENSITY OF GROWN RUST OF OATS IN 1963.

Table 1. Per cent infection of crown rust of oats in 1963 on 10 oat varieties at 15 locations across Canada

Locality	Bond	Triapermia	Exeter	Garry	Clinton	Landhafer	Rodney	C I 4023	Ceiroh du Bach	Saia
Melfort, Sask.	70	0	40	20	70	0	5	10	0	0
Indian Head, Sask.	70	tr	40	10	50	5	20	30	0	0
Brandon, Man.	70	tr	80	60	70	20	50	70	tr	tr
Morden, Man.	70	30R	80	80	80	50	80	70	20M	5
Glen Lea, Man.	5	tr	30	20	30	tr	10	5	tr	tr
Winnipeg, Man.	40	tr	40	30	50	2	30	10	tr	tr
Fort William, Ont.	50	0	40	30	20	tr	10	20	0	0
Guelph, Ont.	0	0	0	10	0	0	tr	0	0	0
Ottawa, Ont.	20	0	20	20	20	tr	20	20	0	0
Merrickville, Ont.	80	0	80	80	80	0	50	10	5	0
Alfred, Ont.	40	0	40	20	50	0	80	60	6	0
Appleton, Ont.	40	0	40	10	20	fr	20	10	0	0
Williamstown, Ont.	20	0	60	20	40	tr	40	20	0	0
Quebec City, Que.	80	0	60	50	80	0	40	50	0	0
Fredericton, N.B.	0	0	fr	0	0	0	0	0	0	0

Table 2. Distribution by geographic areas of physiologic races of Puccinia coronata avenae collected on oats in Canada in 1963

Physiologic race	Geographic areas								
	Manitoba	Sask.	Total isolates West	% of total isolates West	Que. & P.E.I.	Ontario	Total isolates East	% of total isolates East	Total isolates E. & W.
201	1	3	4	3.6	-	2	2	21	6
202	2	2	4	3.6	-	1	1	11	5
203	10	7	17	15.5	2	9	11	n.5	28
209	-	-	-	-	2	1	3	3.1	3
210	1	2	3	2.7	3	12	15	15.7	18
211	5	7	12	10.9	1	9	10	10.5	22
216	6	3	9	8.2	2	4	6	6.3	15
228	-	-	-	-	1	-	1	11	1
229	-	-	-	-	-	1	1	11	1
230	-	-	-	-	1	-	1	1.1	1
239	-	-	-	-	2	-	2	21	2
241	-	1	1	0.9	1	2	3	3.1	4
264	1	1	2	1.8	-	-	-	-	2
274	1	-	1	0.9	-	2	2	21	3
276	1	-	1	0.9	-	-	-	-	1
281	1	-	1	0.9	-	5	5	5.2	6
284	-	-	-	-	1	13	14	14.7	14
290	5	2	7	6.4	-	1	1	11	8
293	-	3	3	2.7	-	1	1	11	4
294	5	8	13	11.8	-	3	3	3.1	16
295	15	5	20	18.2	-	1	1	11	21
320	-	-	-	-	2	1	3	3.1	3
324	-	-	-	-	-	2	2	2	2
326	7	-	7	6.4	-	-	-	-	7
327	1	-	1	0.9	-	-	-	-	1
332	1	-	1	0.9	-	-	-	-	1
New races	2	1	3	2.7	-	7	7	7.3	10
Totals	65	45	110	100.0	18	77	95	100.0	205

The uniform oat nurseries in southern Manitoba were the most severely infected with crown rust, Oat varieties in eastern Saskatchewan were also rusted, but from western Saskatchewan to the Pacific no infection was detected on any of the 10 oat varieties grown. This nursery data corroborates the information from the field surveys indicating that a widespread crown rust epidemic occurred across the entire rust belt of Manitoba and Saskatchewan in 1963.

Crown rust incidence in eastern Canada, as indicated by its prevalence in uniform oat nurseries, remained much the same as in previous years. Most severe infections again occurred in buckthorn-riddled southeastern Ontario. The buckthorn hedgerows between fields, along roadsides and in wood-lots in the Merrickvflle, Kemptville, Appleton, Williamstown area provide large quantities of aeciospores, which in years of favorable environmental conditions, initiate early and severe crown rust epidemics in neighbouring oat fields.

Distribution of physiologic races

Thirty-three physiologic races of crown rust were identified from 205 isolates made in Canada this year. The Victoria-virulent races 216 and 274, which have been increasing annually since 1957, were greatly reduced in eastern Canada (28% in 1962 to 8% in 1963) and in the west (41% in 1962 to 9% in 1963). In the east these two races were replaced by races common to the region, namely 203, 210, 211, and 284, but in western Canada a dramatic shift occurred towards races virulent on the Landhafer and Santa Fe sources of crown rust resistance. Last year the Landhafer - Santa Fe virulent races comprised about 10% of the western crown rust population, but this year the same group of races headed by 294 and 295 constituted 52% of the isolates identified in the west. This alarming change has undermined the value of the current crown rust resistance breeding program in western Canada in which the Landhafer and Santa Fe sources are being widely used. Nearly every isolate made this year, regardless of race, was able to attack the commercial oat varieties Rodney and Garry.

A number of new physiologic races of crown rust were discovered during the 1963 survey. These, along with the new races identified last year, will be subjected to further testing prior to their submission for race number assignment, One interesting feature of the new races found in western Canada is that all are virulent on Landhafer and Santa Fe.

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