STEM RUST OF OATS IN CANADA IN 1963

G.J. Green [1/]

Prevalence and importance in western Canada

Stem rust of oats (Puccinia graminis Pers. f. sp. avenae Erikss. & Henn.) was first found in western Canada on July 4. It developed slowly, mainly because the varieties Rodney and Carry were resistant to the predominant race, but it was widespread. By early August moderate infections were present on wild oats (Avena fatua L.) throughout Manitoba and infections of 10 to 20 per cent occurred in fields of the variety Rodney, Xnfections were lighter to the west but traces of *rust* spread to southwestern and north-central Saskatchewan.

.Losses occurred only in south-eastern Manitoba where a few late fields of the variety Rodney were attacked by race 7A.

Incidence in the .rust Nurseries

There was little oat stem rust in the nurseries west of Manitoba but severe infections occurred on the susceptible variety Bond in the nurseries from Brandon, Man., eastwards to Fort William, Ont. (Table I). In these nurseries Garry was nearly free from infection and Rodney had light infections. In eastern Canada the severe infections on Garry and Rodney as well as on Bond in several nurseries were probably caused by race 6A which has predominated in the barberry areas of eastern Canada since 1957. The most resistant variety in the nurseries, C.T. 4023, was lightly infected at Kemptville and Appleton, Ont.

Distribution of physiologic races

Race 6F predominated in western Canada for the third consecutive year. Isolates from susceptible varieties (Table 3) demonstrate its predominance more clearly than the isolates from all sources (Table 2), including resistant varieties. Race 7A, the only other race that occurred commonly in the west, was isolated frequently from the variety Rodney that is susceptible to it but resistant to 6F.

A few cultures of the very dangerous races 6A and 6AF were identified for the first time in western Canada (Table 2). Both races can attack all oat varieties licensed in Canada. For the last 5 years race 6A has severely damaged Rodney and Garsy in the barberry areas of eastern Canada. If it becomes prevalent in the prairie provinces it could severely damage all the varieties now grown there. Resistance gene F protects

---

1/ Plant Pathologist, Canada Department of Agriculture Research Station, Winnipeg, Manitoba.

Table 1. Per cent infection of stern rust of oats (Puccinia graminis avenae) in 24 uniform rust nurseries in Canada, in 1963[1]

Locality	Bond	Trispermia	Exeter	Garry	Clinton	Landhafer	Rodney	C.I. 4023	Ceirch du Bach	Sala
Agassiz, B.C.	0	t	0	0	0	0	0	0	0	0
Creston, B.C.	t[2]	1	t	0	0	1	0	0	1	0
Melfort, Sask.	3	0	0	0	0	0	0	0	0	0
Indian Head, Sask.	2	t	2	0	20	t	1	0	t	0
The Pas, Man.	2	t	t	0	t	t	t	0	0	0
Brandon, Man.	60	50	10	t	20	10	1	0	5	0
Morden, Man.	60	-	10	0	50	-	1	t	-	0
Glenlea, Man.	1	t	2	t	10	0	0	t	t	0
Winnipeg, Man.	60	t	40	t	30	5	5	t	20	0
Fort William, Ont.	60	10	20	0	40	30	t	0	30	0
Kapuskasing, Ont.	1	0	t	0	3	t	0	0	t	0
St. Catharines, Ont.	0	0	0	t	1	0	0	0	0	0
Kemptville, Ont.	60	-	70	70	50	t	70	10	20	t
Ottawa, Ont.	30	-	30	20	30	-	30	t	-	0
Verner, Ont.	0	t	t	0	0	t	0	0	t	0
Appleton, Ont.	50	70	50	70	70	60	80	20	30	t
Alfred, Ont.	1	-	1	t	t	0	t	0	0	0
Williamstown, Ont.	5	0	t	1	10	0	5	t	t	0
Macdonald College, Que.	10	5	40	5	2	10	40	t	t	0
Lennoxville, Que.	5	t	t	1	5	0	t	0	-	0
La Pocatiere, Que.	50	t	20	40	50	t	20	t	t	0
Normandin, Que.	t	t	0	0	0	t	0	0	0	0
L'Assomption, Que.	20	30	10	5	5	-	10	t	-	0
Quebec, Que.	70	1	20	20	5	1	50	0	-	-

[1] No rust was observed in nurseries grown at Saanichton, B.C., Beaverlodge, Edmonton, Lethbridge, and Lacombe, Alta., Scott, Sask., Guelph, Ont., Fredericton, N.B., Kentville, Nappan, Brule, and Boulardarie, N.S., and St. John's West and Doyles, Nfld.

[2] t = trace

Table 2. Distribution by provinces of physiologic races of Puccinia graminis f. sp. avenae identified in Canada in 1963.

Race	Virulence Formula *Effective/, Ineffective Host Genes	Province					Total Isolates	Per cent of Total Isolates
		Que.	Ont.	Man.	Sask.	B. C.		
1	ABDEF/	-	-	-	-	1	1	.6
2	ABDF/E	-	-	-	-	2	2	1.2
4A	EF/ABD	-	2	-	-	-	2	1.2
6	BF/ADE	-	1	-	-	-	1	.6
6A	F/ABDE	15	28	-	2	-	45	26.5
6F	B/ADEF	-	12	25	12	-	49	28.8
6AF	/ABDEF	-	2	4	-	-	6	3.5
7A	AF/BDE	2	4	25	7	-	38	22.3
8	BDF/AE	-	-	-	-	1	1	.6
8A	DF/ABE	2	8	-	-	-	10	5.9
10A	DEF/AB	-	1	-		-	1	.6
11A	DEF/AB	-	-	1	-	-	1	.6
13A	EF/ABD	5	8	-	-	-	13	7.6
Total Isolates		24	66	55	21	4	170	

Table 3. Distribution by provinces of physiologic races of Puccinia graminis f. sp. avenae collected on susceptible varieties of cultivated oats and wild oats in Canada in 1963.

Race	Province					Total Isolates	Per cent of Total Isolates
	Que.	Ont.	Man.	Sask.	B.C.		
1	-	-	-	-	1	1	1.8
2	-	-	-	-	2	2	3.6
4A	-	1	-	-	-	1	1.8
6A	6	5	-	1	-	12	21.8
6F	-	6	15	6	-	27	49.1
7A	-	1	4	2	-	7	12.7
8A	1	1	-	-	-	2	3.6
13A	3	-		-	-	3	5.5
Total Isolates	10	14	19	9	3	55	

against race 6A. Race 6AF is potentially more dangerous than race 6A. It was first identified among isolates from an artificially-inoculated barberry plant in the greenhouse at Winnipeg and then was found, late in 1962, in the field in eastern Canada by F. J. Zillinsky and P. Dyck. It is virulent on varieties

carrying all the resistance genes currently identified, but a search for new sources of resistance has revealed that several varieties, notably Rosen's Mutant and Arkansas 674, are resistant to some cultures.

The race distribution in eastern Canada is unchanged from 1962. Race 6A, and the related races 13A and 4A continue to predominate. Two isolates of race 6AF were identified.

Acknowledgements

The author is grateful for the assistance of many cooperators in the care of the rust nurseries and the collection of rust specimens, Mr. J.H. Carripbell, Mr. T. Watson and Mr. S. Nichol assisted in identifying physiologic races and in making disease ratings in the rust nurseries.