Leaf rust of wheat in Canada in 1977

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Leaf rust of wheat was first found in Manitoba on June 17. However, subsequent development was slow and leaf rust caused little damage to wheat in 1977. The leaf rust race survey was carried out with 18 backcross lines with single genes for resistance as differential varieties. Lines with resistance genes *Lr* **11,** *Lr* **16,** *Lr* **19** and *Lr* **21** were resistant to all isolates in 1977 and only one isolate was virulent on *Lr* **9.** Thirty-one virulence combinations on 13 genes for resistance were identified in 1977. A culture virulent on Tobari was isolated for the first time in Canada.

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Le premier cas de rouille des feuilles du ble au Manitoba a ete releve le 17 juin 1977. L'evolution ulterieure a toutefois été lente et les dégâts causes par cette maladie ont ete minimes. L'auteur a mene une etude des races de la rouille des feuilles sur 18 lignees de rétrocroisements a genes de resistance simples utilisees comme varietes reactifs. Les lignees possedant les genes de resistance *Lr* **11,** *Lr* **16,** *Lr* **19** et *Lr* **21** ont resiste a tous les isolats en 1977 et seul un isolat a manifesté de la virulence envers le gene *Lr* **9.** Trente et une combinaisons de virulence sur 13 genes de resistance ont ete identifiees en 1977. Un pathotype virulent sur la variete Tobari a ete isolé pour la premiere fois au Canada.

Disease development and crop losses in western Canada

Leaf rust of wheat (*Puccinia recondita*) was first found in Manitoba on June 17 and was widespread by early July in Manitoba and eastern Saskatchewan. However, subsequent development was slow and leaf rust caused little damage in wheat in 1977. The bread wheat varieties Neepawa, Napayo and Manitou were moderately susceptible while Sinton was resistant and Glenlea was highly resistant to leaf rust. All commercial durum varieties grown in Canada were resistant to leaf rust.

Physiologic specialization

Field collections of leaf rust were established on Little Club wheat in the greenhouse and one single-pustule isolate was taken from each collection. Urediospores from the remaining pustules were collected and bulked with collections from each geographic area to give composites that were used to inoculate a group of highly resistant varieties of wheat.

A total of 203 cultures was established in 1977. These single pustule isolates were used to inoculate 18 backcross lines with single genes for resistance that served as differential varieties (1, 2, 3). Genes Lr **17,** Lr **76, Lr 19** and Lr **21** were resistant to all isolates of leaf rust in 1977 and only one isolate was virulent on Lr **9** (Table 1). Virulence on Lr **9** occurs largely in eastern Canada (1) and few collections were obtained from this area. In 1965, over 50% of leaf rust isolates were virulent on Lr **76.** At that time the variety Selkirk, which possesses Lr **16,** occupied most of the wheat acreage in Manitoba and eastern Saskatchewan. Varieties with adult plant resistance derived from Frontana have largely replaced Selkirk in this area and virulence on Lr **16** has also drastically declined.

A marked increase in virulence on Lr **17** was observed in collections from Manitoba and Saskatchewan. Virulence on Lr **17** was not obtained from this area in 1976 (1) but about 15% of the isolates were virulent in 1977 (Table 1). This may be a consequence of random fluctuations in virulence or may result from varietal changes in the United States. Gene Lr **17** is not present in any Canadian wheat variety.

Thirty-one virulence combinations on thirteen genes for resistance were identified in 1977 (Table 2). Most of the isolates from the Canadian prairies combine virulence on Lr **3,** Lr **10** and **Lr 14a.** Although only a small number of collections were obtained from eastern Canada, most of the isolates represented different virulence combinations. For example, nine different virulence combinations were identified from the twelve isolates obtained from Quebec.

Composite collections of leaf rust were used to inoculate a number of highly resistant varieties of wheat. A number of single pustule isolates that developed on these varieties were studied but most of these were similar to cultures already described (Table 2). One isolate was virulent on Tobari (avirulence/virulence formula B, 3ka, 10, 17, 24, T/1, 2a, 2b, 2c, 3, 14a, 18). This is the first culture isolated in Canada with virulence on Tobari.

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Table 1. Virulence of isolates of ***Puccinia recondira*** on backcross lines containing single genes for resistance to leaf rust in Canada in 1977.

Resistance genes	No. of virulent isolates from:					Total no. of virulent isolates	% virulent isolates
	Alta.	Sask.	Man.	Ont.	Que.		
Lr 1	0	18	24	3	5	50	24.7
Lr 2a	1	13	13	3	1	31	15.3
Lr 2b	1	13	13	7	2	36	17.7
Lr 2c	1	17	17	9	8	52	25.6
Lr B	0	0	2	6	7	15	7.4
Lr 3	3	93	80	12	9	197	97.1
Lr 3ka	0	4	2	5	7	18	8.9
Lr 9	0	0	0	0	1	1	0.5
Lr 10	1	69	54	9	5	138	68.0
Lr 11	0	0	0	0	0	0	0.0
Lr 14a	3	93	82	8	5	191	94.1
Lr 16	0	0	0	0	0	0	0.0
Lr 17	0	15	18	0	2	35	17.2
Lr 18	1	7	8	3	5	24	11.8
Lr 19	0	0	0	0	0	0	0.0
Lr 21	0	0	0	0	0	0	0.0
Lr 24	0	8	8	1	1	18	8.9
Lr T	0	4	4	5	3	16	7.9

Table 2. Virulence combinations of ***Puccinia recondita*** isolates on backcross lines containing single genes for resistance to leaf rust in Canada in 1977.

Avirulence/virulence formula	No. of isolates from:					Total no. of isolates
	Alta.	Sask.	Man.	Ont.	Que.	
1, 2a. 2b, 2c, B, 3ka, 10, 17, 18, 24, T/3, 14a	1	5	6	1	2	15
1, 2a, 2b, 2c, B, 3ka, 17, 18, 24, T/3, 10, 14a	0	53	40	2	0	95
1, 2a, 2b, 2c, B, 3ka, 10, 18, 24, T/3, 14a, 17	0	1	1	0	0	2
1, 2a, 2b, 2c, B, 3ka, 10, 17, 24, T/3, 14a, 18	1	1	0	0	0	2
1, 2a. 2b, 2c, B, 3ka, 10, 17. 18, T/3, 14a, 24	0	5	7	0	0	12
2a, 2b, 2c, B, 3ka, 10, 17, 18, 24, T/1, 3, 14a	0	1	0	0	0	1
1, 2a, 2b, 3, 3ka, 10, 14a, 17, 24, T/2c, B, 18	0	0	0	1	0	1
1, 2a, 2b, 2c, B, 3ka, 17, 18, T/3, 10, 14a, 24	0	1	0	1	0	2
1, 2a, 2b, 2c, 8, 3ka, 17, 24, T/3, 10, 14a, 18	0	1	0	0	0	1
1, 2a. 2b, 2c, B, 17. 18, 24, T/3, 3ka, 10, 14a	0	0	0	1	0	1
1, 2a. 2b, 2c, 10, 17, 18, 24, T/B, 3, 3ka, 14a	0	0	0	0	2	2
2a. 2b. 2c, B, 3ka, 17, 18, 24, T/1, 3, 10, 14a	0	0	2	0	0	2
2a, 2b, 2c, B, 3ka, 10, 18, 24, T/1, 3, 14a, 17	0	6	8	0	0	14
2a. 2b. B, 3ka, 14a, 17, 18, 24, T/1, 2c, 3, 10	0	0	0	0	1	1
1, 2a. 2b, 3, 3ka, 14a, 17, 24, T/2c, B, 10, 18	0	0	0	0	2	2
2a. 2b. 2c, B, 3, 10, 17, 18, T/1, 3ka, 14a, 24	0	0	0	0	1	1
2a, 2b. 2c, B, 3ka, 17, 18, T/1, 3, 10, 14a, 24	0	2	1	0	0	3
1, 2a, 2b, 10, 14a, 17. 24, T/2c, B, 3, 3ka, 18	0	0	0	0	1	1
B, 3, 3ka, 10, 14a, 18, 24, T/1, 2a, 2b, 2c, 17	0	0	0	0	1	1
1, B, 3ka, 17, 18, 24, T/2a, 2b, 2c, 3, 10, 14a	1	8	5	0	0	14
2a, 2b. 3, 3ka, 18, 24, T/1, 2c, B, 10, 14a, 17	0	0	2	0	0	2
1, 8, 3ka, 17, 18, 24, T/2a, 2b, 2c, 3, 10, 14a	0	0	0	3	0	3
1, 2a, 3, 3ka, 14a, 17, 24/2b, 2c, B, 10, 18, T	0	0	0	1	0	1
B, 3ka, 10, 17, 24, T/1, 2a, 2b, 2c, 3, 14a, 18	0	1	1	0	0	2
2a, 10, 14a, 17, 18, 24/1, 2b, 2c, B, 3, 3ka, T	0	0	0	3	0	3
2a. 2b. B, 14a, 18, 24/1, 2c, 3, 3ka, 10, 17, T	0	0	0	0	1	1
1, 2a, 10, 14a. 17, 24/2b, 2c, B, 3, 3ka, 18, T	0	0	0	0	1	1
1, 2a, 2b, 14a, 17, 24/2c, B, 3, 3ka, 10, 18, T	0	0	0	1	0	1
B, 3ka, 10, 24, T/1, 2a, 2b, 2c, 3, 14a, 17, 18	0	4	5	0	0	9
2a. 2b. B, 18, 24/1, 2c, 3, 3ka, 10, 14a, 17, T	0	4	2	0	0	6
2a. 2b, 14a. 17, 24/1, 2c, B, 3, 3ka, 10, 18,T	0	0	0	0	1	1

Literature cited

1. Samborski, D. J. 1976. Leaf rust in Canada in 1976. Can. Plant Dis. Surv. 56: 123-125.
2. Samborski, D. J. 1976. Leaf rust in Canada in 1975. Can. Plant Dis. Surv. 56: 12-14.
3. Samborski, D. J., and P. L. Dyck. 1976. Rust reaction of backcross lines with single genes for resistance to leaf rust. Wheat Newsletter XXII: 45-46.