Saskatchewan rapeseed/canola disease survey, 1983[1]

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In July, 1983, the virulent strain of blackleg (*Leptosphaeria maculans*) occurred in 61.3% of Saskatchewan rapeseed fields surveyed in crop district (C.D.) 8; 75.0% of those in C. D. 9, and 19.4% of those in C. D. 1 and 5. Its average incidence in the three areas was 12.1%, 15.0%. and 1.2%. respectively. Overall loss in yield due to blackleg was slight. Five of the 86 fields surveyed had small numbers of plants with severe basal stem cankers. Footrot (*Rhizoctonia solani* and *Fusarium roseum*) was less prevalent than in the period 1978 to 1981, whereas alternaria black spot (primarily *A. brassicad* and late-season aster yellows were more prevalent. White rust (*Albugo candida*) was unimportant due to widespread use of resistant cultivars. A mid-May survey of 22 stubble fields from the 1982 crop in eastern Alberta failed to detect the virulent strain of blackleg.

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Au mois de juillet 1983, la lignée virulente du champignon de la jambe noire (*Leptosphaeria maculans*) était présente dans 61.3% des champs de colza inventories en Saskatchewan dans la region agricole (R.A.) 8; dans 75.0% de ceux inventories dans la R.A. 9 et dans 19.4% de ceux inventories dans les R.A. 1 et 5. Son incidence moyenne dans ces trois regions était respectivement de 12.1%. 15.0% et 1.2% et la perte de rendement totale causée par la jambe noire fut légère. Cinq des 86 champs inventories avaient un petit nombre de plants avec chancres à la base de la tige. La pourriture des racines (*Rhizoctonia solani* et *Fusarium roseum*) était moins répandue qu'en 1978 à 1981, tandis que la tache grise (principalement *Alternaria brassicae*) et la jaunisse des asters de fin de saison, étaient plus répandues. La rouille blanche (*Albugo candida*) était peu importante due à l'usage de cultivars resistants. Un inventaire, effectué à la mi-mai, de 22 champs de l'est de l'Alberta contenant des debris agricoles de la récolte 1982 n'a pas permis de détecter la lignée virulente de la jambe noire.

Introduction

This survey of rapeseed/canola[2] fields (*Brassica napus* L. and *B. carnpestris* L.) conducted during the 1983 growing season is one in a continuing series (6, 7, 8) to monitor the prevalence and severity of the virulent strain of blackleg (*Leptosphaeria rnaculans* (Desm.) Ces. and de Not.) and other rapeseed diseases. Yield losses from stem cankers of blackleg in central Saskatchewan in 1982 were much higher than in previous years. As the southeastern part of Saskatchewan was not visited in 1981 or 1982, considerable attention was devoted to this area, which was largely free of the disease prior to 1981, The virulent strain had not been reported in commercial fields in Alberta before 1983, and recent surveys in Manitoba also failed to detect it (9). As it is prevalent in Saskatchewan near the Alberta border, the 1983 survey was extended into eastern Alberta.

Methods

In the survey for the virulent strain of blackleg in Alberta, stubble plants from 22 fields from the 1982 rapeseed crop were collected in mid-May, 1983. The survey went west to Killam and Viking, north to Vermilion and Lloydminster and south to Wainwright and Hughendon. A random sample of 50 stubble plants was taken in each field, consisting of ten plants at each of five sites. A sample of selected blackleg-infected plants was also collected. Isolations were made from all material suspected of having blackleg, using the technique described previously (6) and blackleg strains identified.

The principal disease survey in Saskatchewan was carried out between July 12 and 27. Thirty-one fields in the northeast (crop district 8) were sampled between July 12 and 14, 24 fields in the northwest (western half of C. D. 9) were sampled from July 19 to 20, and 31 in the southeast (C. D. 1 and 5) were sampled from July 25 to 29. Survey procedures and disease rating schemes have been previously described (3, 4, 5, 6, 8). One modification involved the sampling technique within fields. In the 1983 survey, one plant was collected every five paces along an inverted "V" course until 25 plants were obtained. Severity of blackleg basal stem cankers was assessed as in 1982 (7), with McGee's method (1, 2).

The fall survey of stubble fields was conducted in central Saskatchewan. Of particular interest were the incidence and severity of basal stem cankers. Two stubble plants were pulled every ten spaces for a total of 50 plants per field.

Results

Alberta blackleg survey. All Alberta isolates of *L. rnaculans* from the previous year's stubble were identical to Saskatchewan's most common weakly virulent strain. Its presence was confirmed in 91% of the fields. The mean blackleg incidence per field was 22%. In six fields over 40% of the plants had blackleg symptoms; in one, 65% infection was recorded. The infections were superficial, probably developing late in August and in September, 1982.

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[2] *"Canola" refers to cultivars of rapeseed low in erucic acid and glucosinolates.*

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Table 1. Prevalence and incidence of the virulent strain of blackleg in standing crops of *Brassica* spp. in 1983

Crop District	% of fields having plants with infections				% of fields with over		% of plants per field having infections			
	on leaves	on stems	at stem base	on any part	10% blackleg	20% blackleg	on leaves	on stems	at stem base	on any part
8	58.1	3.2	6.5	61.3	32.3	19.4	11.2	0.2	0.7	12.1
9*	66.7	16.7	29.2	75.0	37.5	20.8	12.9	2.4	2.9	15.0
1, 5	9.7	6.5	6.5	19.4	3.2	0.0	0.6	0.4	0.3	1.2
Means	44.8	8.8	14.1	51.9	23.3	12.8	8.2	1.0	1.3	9.4

*Western half

Saskatchewan July blackleg surveys. Much less of the virulent strain was found in the southeast (C. D. 1, 5) than in the other two areas (Tables 2 and 3). Five of the six infected fields found in the southeast occurred in C. D. 5b, the sixth was found near Langenburg in C. D. 5a. No infected fields were found in C. D. 1. Crop districts are shown in an earlier paper (8).

The most severely affected fields encountered in C. D. 9 were near Marshall, Baldwinton, and Cutknife, and in C. D. 8, near Tisdale, Ridgedale, and Humboldt. All six had an incidence of virulent blackleg of over 40%. Symptoms consisted mostly of leaf spots. Only five of the 86 fields had plants with severe basal stem cankers (over 50% of the stem circumference cankered), and usually only one plant per 25-plant sample was this severely infected. In the most heavily diseased field, which was in the Cutknife-Baldwintonarea of C. D. 9b, 23% of the plants had severe basal cankers. This would represent a 17% loss in yield (2).

In the fall stubble survey 36 fields were sampled, 31 of canola, three of yellow mustard (*B. hirta* Moench = *Sinapis alba* L.) and two of brown mustard (*B. juncea* (L.) Coss). The average incidence of blackleg (all strains) was 18% for the 31 canola fields and 10% for the five mustard fields. The virulent strain occurred in all the canola fields and in 60% of the mustard fields. A mean of 65% of the isolates from canola were virulent and 35% weakly virulent. Only 2.6% of the isolates from the five mustard fields were virulent and 97.5% weakly virulent. Both mustard species are highly resistant to the virulent strain (Petrie, unpublished). Stubble plants of canola with severe basal stem cankers were uncommon in this survey.

Other diseases in Saskatchewan surveys. Footrot (*Rhizoctonia solani* Kiihn and *Fusarium roseum* Lk. emend. Snyder and Hansen) occurred in 50% of the 86 standing crops, with a mean incidence of 6.7%. These values are somewhat lower than the average for the four years 1978 to 1981 (Table 2). In 1983, the prevalence and incidence of footrot were highest in C. D. 8 and lowest in C. D. 1 and 5. Crop district 8 also had a large proportion of the fields with over 20% incidence of infection; C. D. 1 and 5 had none (Table 2).

The July survey was too early in the growing season to adequately assess sclerotinia stem rot (*Sclerotinia sclerotiorum* (Lib.) de Bary). However, 25% of the fields entered in C. D. 9 had stem rot, with a mean incidence of 1.8%. The disease was much less prevalent in the other two areas in July, occurring in approximately three percent of the fields.

Alternaria black spot (A. *brassicae* (Berk.) Sacc. and *A. raphani* Groves and Skolko) occurred in approximately 90% of the 86 standing crops, including all fields in C. D. 9 (Table 3). Leaf spot incidence was high in all areas but severity was low. Pod and stem spotting were scarcely observed in the two earlier surveys but were prevalent in fields in C. D. 1 and 5 which were surveyed later (Table 3). Other observations indicated that *Alternaria* pod and stem infections were common by the end of July throughout the proviince. However, stem and pod spot severity averaged less than 0.5 on a 0-3 rating scale (4). The most severely damaged fields were two of the high erucic acid B. *campestris* cultivar, R-500, located near Blucher and Lanigan in central Saskatchewan, which were examined in late August. Numerous pod spots and elongated, coalesced stem lesions were noted.

Pod drop (4) occurred in several fields but was generally of minor importance. Virtually no aster yellows was recorded on plants collected in July. By late August, however, infection was unusually plentiful in several fields, including some in the Shellbrook and Shell Lake areas of C. D. 9a, west of Prince Albert (L. Burgess, personal communication).

White rust (*Albugo candida* (Pers. ex Lev.) Ktze) was uncommon, leaf symptoms occurring in only 14% of the 86 fields sampled. In only two fields did leaf rust incidence exceed 50%, and stagheads were observed in only two fields. The highest incidence of staghead was 12% in a field south of Grenfell in C. D. 1b.

Hail damage on stems and pods was noted in seven fields in the southeast. In a field north of Ituna, 74.1% of the plants were slightly damaged. Hail injury was moderately severe on 53.6% of the plants in a field near Leslie. Both fields are in C. D. 5.

Discussion

There has been a striking increase in the prevalence and incidence of the virulent strain of *L. maculans* during the last six years (7, 8). Fortunately, with the exception of 1982 (7), severe basal stem cankering has occurred only sporadically during this period. Stem canker severity is directly related to earliness of infection, which in turn depends upon ascospores being released from infected canola residue prior to the end of June.

A large area of southeastern Saskatchewan has remained essentially free of the virulent strain of blackleg. In 1980 it was collected in one field in the Churchbridge-Langenburg area in

Table 2. Prevalence and incidence of footrot *(Rhizoctonia solani* and *Fusarium roseum)* in standing crops of *Brassica* spp. in 1983.

Crop district	% fields infected	% plants infected	% fields with over 10% footrot	% fields with over 20% footrot
8	54.8	10.7	32.3	22.6
9*	54.2	6.5	20.8	8.3
1, 5	41.9	2.8	6.5	0.0
Means	50.0	6.7	19.8	10.5
4-year means (1978-81)	67.0	8.2	23.3	12.6

*Western half.

C. D. 5a, the only occurrence reported prior to 1983 from the southeast (8). The virulent strain likely is scarce here because the southeast is not a major canola-producing area. More intensive cropping of canola in central and northern agricultural areas of the province no doubt contributed greatly to its rapid spread in those areas. Discovery of several infected fields in C. D. 5b indicates that the virulent strain of blackleg may be moving gradually into the southeast. Continued fungicidal treatment of seed sown in southeastern crop districts should help to delay spread of infection throughout these districts.

The attempt to find the virulent strain of blackleg in the part of Alberta closest to the heavily infected Cutknife-Maidstone area of Saskatchewan was unsuccessful. However, Saskatchewan's most common weakly virulent strain was prevalent in eastern Alberta. It had been found in several fields there as early as May, 1973 (Petrie, unpublished data). It may be safe to conclude that the virulent strain was rare in eastern Alberta, if it occurred there at all, in 1982.

Footrot was less prevalent in 1983 in Saskatchewan than in previous years, whereas alternaria black spot and late-season infections of aster yellows were more noticeable than they had been for several years. *Alternaria* pod and stem lesions developed rapidly from the latter part of July to harvest, so that they were detected only in the last of the three survey trips (Table 4).

White rust is declining in importance except on B. *juncea,* because of the widespread use of race 7-resistant cultivars, including the new *B. campestris* cultivar Tobin.

Table 3. Prevalence, incidence, and severity of alternaria black spot in standing crops of *Brassica* spp. in 1983

Crop Districts	Leaf spots: %fields infected	Leaf spots: % plants infected	Leaf spots: Severity (0-3)	Pod spots*: % fields infected	Pod spots*: % plants infected	Stem spots: %fields infected	Stem spots: % plants infected
8	80.7	51.8	0.4	0.0	0.0	0.0	0.0
9**	100.0	90.3	0.8	8.3	2.1	0.0	0.0
1.5	96.6	73.5	0.7	71.0	35.4	41.9	15.0
All areas	89.5	70.5	0.6				

*Severity of pod and stem spots < 0.5 on 0–3 scale.
**Western half.

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