HERBICIDE DAMAGE AND INFECTION OF RAPE BY THE BLACKLEG FUNGUS, LEPTOSPHAERIA MACULANS[1]

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On three occasions in August 1972 an association of herbicide damage and blackleg infection was observed on Brassica nanus L. The herbicide injury consisted of cauliflower-like proliferations of tissue *below* the epidermis and cortex which frequently extended for several inches upwards from ground level. Pronounced stem twisting often accompanied this symptom. Splitting and sloughing off of cortical tissue covering the proliferations was also common (Figure 1). Grayish to pale brown fungal lesions, on which pycnidia were sometimes observed, occurred on the loosened tissue.

Material surface-disinfected in 10% commercial Javex (sodium hypochlorite) for 1-2 minutes and plated on V8 juice agar containing 40 mm rose bengal and 100 ppm streptomycin sulfate consistently yielded the "brassica" strain of Leptosphaeria maculans (Desm.) Ces. & De Not. (1). The fungus was readily isolated from both cortical tissues and hypertrophied inner tissue.

The locations where these observations were made were: a field 6 miles east of Aberdeen, Saskatchewan; a field 10 miles north of Shellbrook, Saskatchewan; and experimental plots belonging to the Crop Science Department, University of Saskatchewan, Saskatoon, in which a study of the effects of herbicides on rape was being conducted.

Herbicide damage and blackleg symptoms were quite uniformly distributed throughout the Aberdeen field. The plants were in swath at the time the field was visited. Stubble

Table 1. Association of herbicide injury and blackleg infection in a field of *Brassica napus* near Aberdeen, Saskatchewan

Site no.	No. of plants	Percentage of plants with: Herbicide injury and blackleg	Herbicide injury only	Blackleg only	Neither symptom
1	10	90	0	0	10
2	10	20	0	20	60
3	10	80	0	0	20
4	10	70	0	30	0
5	10	50	0	0	50
6	10	0	20	0	80
7	10	0	0	0	100
8	10	50	0	20	30
9	8	88	0	0	12
10	9	22	11	22	45
11	10	80	0	0	20
12	10	100	0	0	0
13	10	100	0	0	0
Total	127	Avg: 58%	2%	7%	33%

65% of all plants examined showed symptoms of blackleg; 60% showed damage from herbicide.

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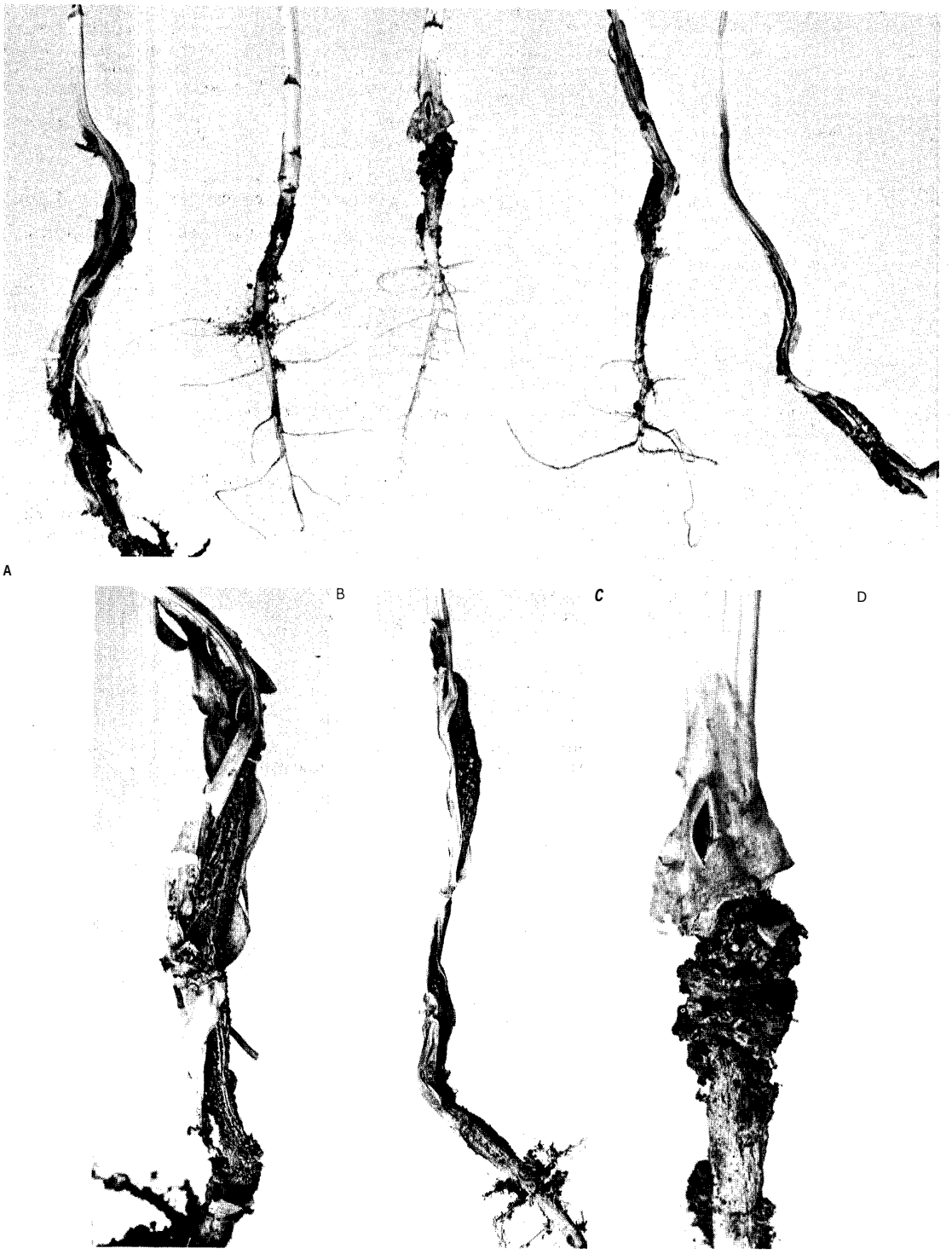

Figure 1. Herbicide damage and blackleg symptoms on stems of *Brassica napus*. A) Peeling of cortical tissues and twisting and discoloration of the stems, normal stem second from left. B, C, D) Herbicide damaged stems (enlarged) from which Leptosphoerio *maculans* was isolated; note cauliflower-like gall on upper portion of root (D), and above it a dark blackleg lesion.

Table 2. Extent of blackleg infection in fields of Brassica napus and B. campestris in Saskatchewan from 1970 to 1972*

	Brassica napus			B. campestris		
	1970	1971	1972	1970	1971	1972
No. of fields examined	16	19	19	24	51	19
% of fields having blackleg	19	11	21	13	18	17
% of plants infected per field (avg)	0.1	0.8	<1.0**	0.1	1.0	<1.0
Highest % of plants in a field infected	0.7	11.0	<1.0**	0.8	30.0	<1.0

* Other crops examined included one field of brown mustard [B. juncea (L.) Coss] in 1971 and two fields of yellow mustard [B. hirta Moench] in 1972. In none of these three fields was blackleg detected.

** Does not include the Aberdeen field in which 65% of the plants had blackleg infections.

samples were pulled at equal intervals on a line running diagonally across the field. The results of an examination of these samples are recorded in Table 1. The vast majority of the plants (91%) either had blackleg in conjunction with herbicide injury or were free of any symptoms. Approximately 651 of the stems had blackleg infections, the hiqhest percentage ever found by the author in a commercial rape field. In contrast, the highest level of infection recorded in any field in the 1972 rape disease survev was less than 1% and the highest during the last 3 years, 30% (Table 2).

An obvious relationship between chemical injury and blackleq also was apparent in the Shellbrook field. In an area at one corner of the field almost all of the plants had been damaged by herbicide and also had blackleg infections. About half of the field had been swathed, with the area of interest lying in the swathed portion. No blackleq or herbicide injury whatever was seen in the field apart from the area described.

The experimental plots at Saskatoon had been sprayed with 2,4-D amine at various concentrations (R. Ashford and M. Betts, personal communication). Plants damaged by the treatment frequently exhibited blackleq whereas normal plants in adjacent plots rarely had detectable blackleq symptoms.

These observations represent the only clear example found by the author to date of greater susceptibility of herbicide-damaged rape plants to colonization by a pathogenic fungus.

Acknowledgments

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Literature Cited

1. Petrie, G. A. 1969. Variability in Leptosphaeria maculans (Desm.) Ces. & De Not., the cause of blackleg of rape. Ph.D. thesis, University of Saskatchewan, Saskatoon.