INCIDENCE OF PHOMA MEDICAGINIS IN ALFALFA SEED PRODUCED IN CANADA AND THE U.S.A[1]

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Abstract

Phoma medicaginis Malbr. & Roum. was isolated from alfalfa seeds produced in five provinces in Canada and nine states in the U.S.A. The highest incidence was in seed produced in the Prairie Provinces. Eighty-five percent of the samples of Saskatchewan grown seed yielded P. medicaginis, with infestation levels ranging from 0 to 34.2% (average 7.8%).

Introduction

Black stem, caused by *Phoma medicaginis* Malbr. & Roum., is the most widespread and one of the two most important foliage diseases of alfalfa in western Canada. Several workers have shown that the causal organism is seed-borne (1, 3, 5, 6) and the present study was initiated to determine the incidence of *P. medicaginis* in alfalfa seed obtained from several locations in Canada and the U.S.A.

Materials and methods

Seed was obtained from five provinces and 10 states in the U.S.A. With two exceptions, all seed was produced in 1969. The New York (Geneva) seed was grown between 1966 and 1969 and two of the Kansas samples were harvested in 1968. Nonsterilized seeds were plated onto malt extract agar (2.0% Difco malt extract, 1.5% Bacto agar) containing 50 ppm vancomycin hydrochloride (Vancocin, Eli Lilly Co.) and 100 ppm streptomycin sulphate (Nutritional Biochemicals Co.) (4). Thirty plates of 12 seeds/plate were prepared from each sample. Plates were incubated in the laboratory at about 24C for 7–10 days and the number of P. medicaginis colonies was recorded. Three reference samples, each of which had a high level of infestation, were plated out at intervals over the time taken to test all the samples.

Results

A total of 198 samples were examined and *P. medicaginis* was obtained from 75.3% of them. The number of colonies obtained from the three reference samples did not change appreciably over the 6-month period needed to test all the samples. The highest incidence was found in seed produced in the Prairie Provinces (Table 1). Seed produced in Ontario and most of the U.S.A. samples had a low level of infestation. Of seed produced in Saskatchewan, 85% of the samples yielded *P. medicaginis*. Table 2 shows the incidence of *P. medicaginis* in seed of named alfalfa varieties produced in several locations in Saskatchewan. Most of the samples from the main seed-growing area around White Fox were quite heavily infested, including three samples of Foundation seed. The lowest incidence was found on the variety 'Roamer', while almost all of the 'Rambler' samples yielded *P. medicaginis*.

Discussion

The present data indicate that the black stem fungus is present on most of the alfalfa seed produced in western Canada, and this probably contributes to the continued widespread nature of the disease. Disease surveys have shown that black stem is relatively unimportant in well managed forage crops (2) and the use of clean seed would probably further decrease the incidence of the disease. The disease is most prevalent in seed crops, particularly in old stands. It would be enlightening to find out the average age of seed-producing stands in Saskatchewan; and also what measures of crop hygiene are being employed. Certainly, an average of 8% infestation by a plant pathogen in any seed crop is highly undesirable.

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Table 1. Incidence of Phoma medicaginis in alfalfa seed samples produced in Canada and the U.S.A.

Location	No. of samples tested	No. of samples yielding Phoma medicaginis	% seeds yielding P. medicaginis	
			Range	Average
Saskatchewan	64	55	0-34.2	7.8
Alberta	14	13	0-45.3	15.0
Manitoba	13	13	<1.O-27.8	7.5
Ontario	15	13	0-3.3	1.3
British Columbia	3	3	<1.o-8.0	5.4
Idaho	12	3		<0.1
New York	11	9	0-3.6	1.3
Nebraska	5	4	0-6.4	2.2
S. Dakota	18	16	0-2.5	1.0
Minnesota	3	1		<0.1
Kansas	3	2		0.3
Oregon	12	2		<0.1
Montana	12	8	0-2.5	0.9
Iowa	2	0		0
N. Dakota	7	5	0-2.8	0.8

Table 2. Incidence of Phoma medicaginis in alfalfa seed samples produced at several locations in Saskatchewan

Variety	Designation	Location	% seeds yielding P. medicaginis	
			Range *	Average
Rambler	Foundation	White Fox	4.7-14.4 (3)	10.9
Rambler	Certified	White Fox	<1.0-23.3 (10)	13.5
Rambler	Certified	Prince Albert	(1)	13.3
Rambler	Commercial	Moose Jaw	6.1-34.2 (3)	21.6
Rambler	Commercial	Swift Current	4.2-5.6 (2)	4.9
Rambler	Commercial	White Fox	5.6-10.6 (2)	8.1
Rambler	Commercial	Prince Albert	1.9-13.9 (3)	7.1
Rambler	Commercial	Nipawin	9.4-16.7 (2)	13.0
Rambler	Commercial	Kinley	(1)	3.8
Rambler	Commercial	Saskatoon	(1)	21.9
Roamer		Swift Current	(2)	<1.0
Roamer	Commercial	White Fox	(2)	<1.0
Vernal	Certified	White Fox	8.9-15.6 (2)	12.2
Vernal	Commercial	White Fox	(1)	12.5
Beaver	Commercial	Prince Albert	(1)	1.1
Beaver	Commercial	White Fox	(1)	<1.0
Grimm		Saskatoon	(1)	16.4

* Figures in parentheses represent number of samples.

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