

# White mold of dry bean (*Phaseolus vulgaris*L.) in southern Alberta, 1983-87

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Surveys in 1983-1987 revealed that white mold caused by *Sclerotinia sclerotiorum* (Lib.) de Bary is a serious disease of dry beans (*Phaseolus vulgaris*L.) in southern Alberta. The disease was found in 13 of the 17 fields surveyed in 1983, in all the 21, 31, and 33 fields surveyed in 1984, 1985, and 1986, respectively, and in 24 of the 25 fields surveyed in 1987. The percentage of infected plants in each field varied from 0 to 90%. The disease was distributed throughout the entire dry bean growing region of southern Alberta, but was most concentrated in the area between Grassy Lake and Bow Island.

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Selon des enquêtes menées entre 1983 et 1987, la pourriture sclérotique causée par *Sclerotinia sclerotiorum* (Lib.) de Bary est une grave maladie du haricot sec (*Phaseolus vulgaris*L.) dans le sud de l'Alberta. La présence de la maladie était visible dans 13 des 17 champs inspectés en 1983, dans la totalité des 21, 31 et 33 champs examinés en 1984, 1985 et 1986 respectivement et dans 24 des 25 champs inspectés en 1987. Le pourcentage de plants infectés dans chaque champ variait entre 0 et 90%. La maladie était répandue dans toute la région de culture du haricot sec du sud de l'Alberta mais était plus fréquente dans la région située entre Grassy Lake et Bow Island.

## Introduction

Dry beans (*Phaseolus vulgaris*L.) are one of the important irrigated specialty crops in southern Alberta. Production is concentrated in an area south of the Bow and South Saskatchewan Rivers and the acreage was 970 ha in 1974, 3440 ha in 1981, 4980 ha in 1986, and 8300 ha in 1987 (B. Roth, personal communication). Both white and colored beans are grown including cultivars of Red Mexican, Pink, Pinto, Great Northern, and navy beans.

White mold caused by *Sclerotinia sclerotiorum* (Lib.) de Bary is the most important disease of dry beans in southern Alberta. A survey carried out in 1982 showed that the average incidence of white mold in bean fields was 29.2% (Howard and Huang 1983). The disease is incited by infection from airborne ascospores released from the apothecia produced on sclerotia in the soil (Abawi and Grogan 1975, Cooke *et al.* 1975). Secondary spread of the disease is due to direct contact between diseased and healthy tissue (Abawi and Grogan 1979). Infected plants develop pale white or tan-colored lesions on leaves, petioles, stems, and/or pods, sometimes with white mycelial mats or black sclerotia on the infected tissue. Severe infection often results in the premature death of plants.

This paper reports the results of a 5-year survey on the distribution and incidence of white mold of dry beans in southern Alberta.

## Materials and methods

Surveys of dry bean fields for white mold were carried out in southern Alberta during early to mid-September 1983-1987. Prior to the survey in 1983 the field production supervisor of

the Alberta Wheat Pool Bean Plant, Bow Island, Alberta, was consulted for information on the bean production area and the distribution of bean fields in Alberta. Fields were randomly selected from the entire bean production area and were surveyed for incidence of white mold. Ten sites of 3-m row samples, with approximately 18 m between samples, were selected and surveyed in each field following a U-shaped pattern (Howard and Huang 1983). The number of plants with white mold symptoms and the total number of plants in each site were recorded. The disease incidence in each field was calculated based on average percent of infected plants from the 10 sites. The disease incidence was divided into six categories based on percent of infected plants in each field: (1) no disease, (2) trace (<1%), (3) light (1-10%), (4) moderate (11-25%), (5) severe (26-50%), (6) very severe (>50%).

## Results

White mold was found in 13 of 17 bean fields surveyed in southern Alberta in 1983, in all 21, 31 and 33 fields surveyed in 1984, 1985 and 1986, respectively, and in 24 of the 25 fields surveyed in 1987 (Table 1). The frequency of the surveyed fields with moderate to very severe disease was 29, 62, 52, 45 and 44% for 1983, 1984, 1985, 1986 and 1987, respectively. The disease occurred on cultivars of Red Mexican, Pink, Great Northern, and Pinto. Disease incidence varied among years and fields, 0.7-19% (avg. 9%) of infected plants in 1983, 1-73% (avg. 23%) in 1984, 0.2-80% (avg. 19%) in 1985, 0.2-90% (avg. 17%) in 1986, and 0.2-64% (avg. 18%) in 1987. Despite the difference in disease incidence among fields, it appears that all these cultivars were susceptible to white mold.

The disease was distributed throughout the entire bean production area in southern Alberta (Fig. 1). The highest concentration of diseased fields was in the area south of Grassy Lake and Bow Island (Fig. 2). In this area, more than 35% of the fields surveyed had a disease incidence ranging from moderate, 11 to 25% of infected plants, to very severe, more than 50% of infected plants in the field. Although the disease was

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Table 1. White mold of dry bean (*Phaseolus vulgaris* L.) in southern Alberta (1983-1987)

Cultivar	1983				1984				1985			
	No. fields		%infected plants		No. fields		%infected plants		No. fields		%infected plants	
	Surv.	Dis.	Range	Avg.	Surv.	Dis.	Range	Avg.	Surv.	Dis.	Range	Avg.
Red Mexican	7	4	0.8-17	8	12	12	2-73	21	13	13	0.2-45	14
Pink	5	4	0.7-13	7	4	4	7-59	36	7	7	0.3-80	32
Great Northern	5	5	4-19	11	4	4	1-27	10	3	3	24-62	38
Pinto	—	—	—	—	1	1	46	46	8	8	0.6-36	9
Cultivar	1986				1987							
	No. fields		%infected plants		No. fields		%infected plants					
	Surv.	Dis.	Range	Avg.	Surv.	Dis.	Range	Avg.				
Red Mexican	12	12	0.2-66	17	10	10	3-64	18				
Pink	9	9	1-37	12	5	4	2.5-55	23				
Great Northern	9	9	1-90	23	6	6	0.4-54	24				
Pinto	3	3	1-28	14	4	4	0.2-7	3				

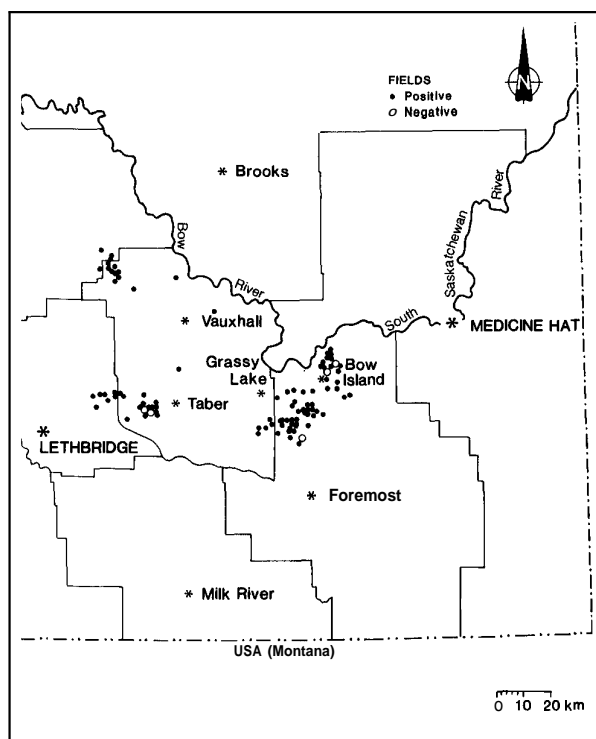


Figure 1. Distribution of white mold of dry bean fields surveyed in southern Alberta (1983-1987). ● = fields with the disease; ○ = fields without the disease.

found in most of the surveyed fields west of Taber and northwest of Vauxhall (Fig. 1), the disease incidence in these areas was generally lighter than in the Grassy Lake - Bow Island area (Fig. 2).

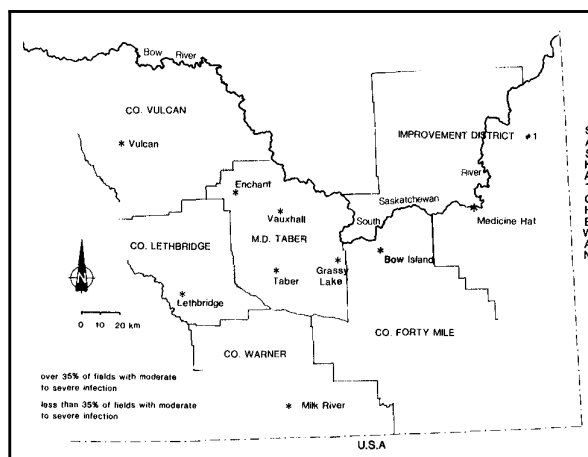


Figure 2. Severity of white mold of dry bean in southern Alberta in 1983-87. Note the disease in the area between Grassy Lake and Bow Island area was more severe than in the areas west of Taber and northwest of Vauxhall.

### Discussion

The results of the survey in 1983-1987 indicate that white mold is a serious disease of field beans in southern Alberta. The disease is not only widespread but also severe in many of the bean fields. The most devastated area is from Grassy Lake to Bow Island. The widespread nature of the disease in this area may be related to heavy concentrations of dry beans and other host crops such as canola, sunflowers, field peas, and lentils.

Irrigation is a major factor in the development and severity of white mold of dry beans in southern Alberta. Hunter *et al.* (1984) reported that in New York State, an outbreak of white

mold on snapbeans in a *S. sclerotiorum*-infested field is likely to occur whenever the average soil matric potential ( $\Psi_m$ ) is equal to or greater than -30 kPa for 1- to 2-week periods just prior to or during bloom. Le Tourneau (1979) reported that sclerotia of *S. sclerotiorum* germinated carpogenically when cool, moist conditions existed for several weeks. Irrigation of bean fields in southern Alberta provided soil moisture conditions conducive to the production of apothecia and release of ascospores from sclerotia of *S. sclerotiorum*. This allowed white mold to become serious on irrigated crops such as dry beans in southern Alberta in 1984 and 1985 despite a serious drought in the region in those two years.

#### Acknowledgements

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