Forage legumes / Légumineuses fourrageres

CROP: Alfalfa

LOCATION: Southern Alberta

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TITLE: SURVEY OF VERTICILLIUM WILT OF ALFALFA IN SOUTHERN ALBERTA IN 1994

METHODS: Twenty-eight irrigated alfalfa fields in the area south of Calgary, Alberta were surveyed for verticillium wilt (*Verticillium albo-atrum*) in September and October 1994. Fields were surveyed by entering the field at a corner, walking 200 paces toward the middle of the field, and exiting the field perpendicular to one side of the field (Huang et al., 1988). At twenty-pace intervals, plants were counted in a 2 by 2 meter square. Diseased plants were identified by generalized wilting, inward curling of leaves, and the presence of V-shaped lesions on leaf tips. Severity of disease was then estimated according to the following scale: (1) none (0% of plants infected), (2) trace (<1%), (3) light (1—10%), (4) moderate (11—25%), (5) severe (26—50%), (6) very severe (>50%).

RESULTS: Verticillium wilt was found in 18 of the 28 fields surveyed in southern Alberta (Table 1). Of the 18 diseased fields, the incidence was trace in six fields, light in two fields, moderate in seven fields, severe in two fields, and very severe in one field. Diseased fields were found in all the areas surveyed, from Pincher Creek to the Alberta-Saskatchewan border, and from High River to the Canada-United States border (Figure 1). Incidence of verticillium wilt-infected alfalfa was highest in the southwestern part of the province.

TABLE 1. Verticillium wilt of alfalfa in southern Alberta in 1994.

Severity	Incidence (%)	No. Fields
None	0	10
Trace	<1	6
Light	1-10	2
Moderate	11-25	7
Severe	26-50	2
Very Severe	>50	1

DISCUSSION: Verticillium wilt of alfalfa remains as a serious disease in all areas of southern Alberta. The disease occurs mainly in irrigated alfalfa. Two new cultivars, Barrier (Hanna and Huang, 1987) and AC Blue J (Acharya et al., 1994) are resistant to verticillium wilt, and are well adapted to the irrigated region of southern Alberta (Huang et al., 1994). Farmers are strongly encouraged to grow these verticillium wilt resistant cultivars to reduce the risk of crop losses due to this economically important disease.

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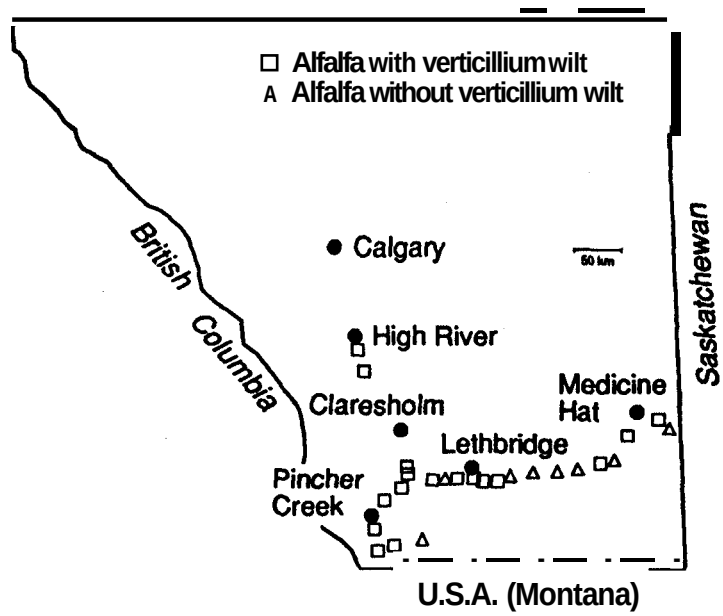

FIG. 1. Survey of verticillium wilt of alfalfa in southern Alberta in 1994.

CROP: Alfalfa

LOCATION: Saskatchewan

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TITLE: SURVEYS FOR VERTICILLIUM WILT OF ALFALFA UNDER IRRIGATION IN SASKATCHEWAN, 1991—94

METHODS: In each year, surveys for verticillium wilt in irrigated alfalfa forage production fields in Saskatchewan were conducted when the plants were at a late vegetative or early flowering stage, just prior to harvest. Each field was assessed by walking either a V-shaped or tear-drop pattern through the field. The identity of the pathogen was confirmed by isolation. In 1991, 22 fields in the westcentral region were surveyed in early to mid-August. In 1992, 20 fields were assessed in either mid-July or early September; 5 fields in the southwest and 15 fields in the westcentral region. No surveys were made in 1993. In 1994, 18 fields in the southwest and 12 fields in westcentral Saskatchewan were assessed in mid to late August.

RESULTS AND COMMENTS: From 1991 to 1994, verticillium wilt of alfalfa continued to spread into new irrigation areas in southern Saskatchewan.

In 1991, trace (<1% of plants infected) levels of verticillium wilt were found in 5 of the 8 fields examined in the Miry Creek irrigation area. Moderate (11—25%) to severe (26—50%) levels of wilt were found in 3 of 6 fields near Riverhurst. No verticillium wilt was found in six fields near Outlook or two fields near Saskatoon. At Miry Creek, wilt was nearly eradicated in the late 1980s [1], but was found at trace levels in 1990 [2]. Many of the fields with wilt in 1991 were custorn-harvested in 1990, and inoculum may have been carried between fields on the harvesting equipment. This was the first report of verticilliurn wilt in the Riverhurst region.

In 1992, verticillium wilt was found at slight (1—10%) levels in one field near Swift Current, at trace levels in 2 of 4 fields at the Ponteix irrigation project, at trace to slight levels in 3 of 11 field in the Grainland irrigation project and at slight to moderate levels in 2 of 4 irrigated fields near Riverhurst. This was the first report of wilt in the Swift Current, Ponteix and Grainland irrigation areas.

In 1994, verticilliurn wilt was found at trace levels in 5 of 12 fields in the Outlook irrigation area. It occurred at trace levels in 2 of 4 fields at Miry Creek, but was not found at other sites in the southwest. Wilt had not been observed in the Outlook irrigation area since the early 1980s [1].

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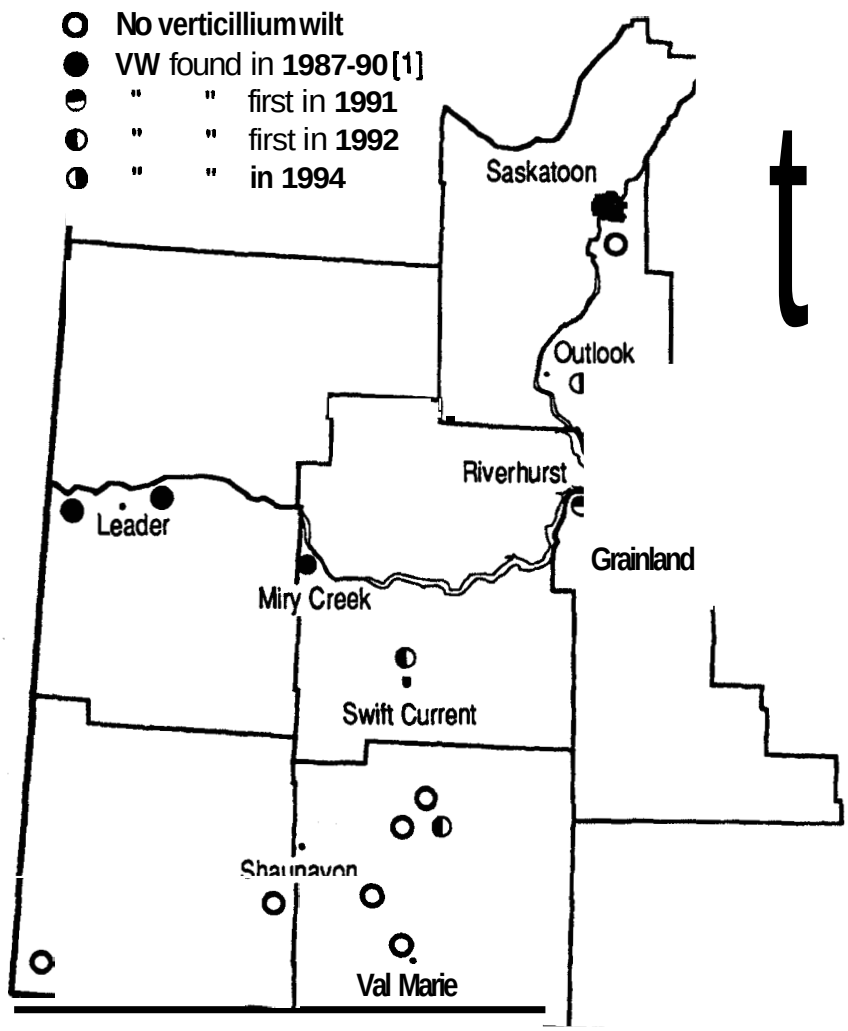

FIG. 1. Distribution of verticillium wilt of irrigated alfalfa in southern Saskatchewan, 1991—94.

CROP: Alfalfa

LOCATION: Saskatchewan and Manitoba

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TITLE: SURVEY OF *BOTRYTIS CINEREA* IN ALFALFA SEED IN SASKATCHEWAN AND MANITOBA, 1993

METHODS: Alfalfa seed (50-100 seeds per sample) harvested in **1993** from 16 fields in Saskatchewan was surface sterilized for 5 minutes in 0.6% NaOCl, plated on PDA plus streptomycin, incubated at room light and temperature for **8-10** days, and then assessed for infection with ***Botrytis cinerea.*** Samples from 45 fields in Manitoba were assessed using washing for disinfestation. In addition, several samples of seed harvested under dry conditions from **1988–91** were assessed to compare infection incidence with that observed in samples from **1993.** The efficacy of several protocols for isolating ***B. cinerea*** was examined using a seedlot from a field in Manitoba where botrytis blossom blight was severe in **1993.** In a four replicate trial with 100 seeds per sampling unit, disinfesting the seed by washing in running water for **30** min was compared with surface sterilization for 2, 5 or 10 min in 0.6% NaOCl.

RESULTS AND COMMENTS: The incidence of B. ***cinerea*** was low (generally 0%) in all of the samples and never exceeded 6% (Table 1), even in fields severely damaged by blossom blight in **1993.** ***Botrytis*** inoculum was abundant in many of these fields right up until harvest, and the cool, wet fall conditions prevalent throughout the region should have favoured disease spread. Initially, we suspected that the surface sterilization procedure was too stringent to detect the pathogen. However, there were no differences among surface disinfection treatments for the incidence of isolation of ***B.cinerea***. The pathogen was only rarely isolated, irrespective of treatment (data not shown). Also, we had no difficulty in isolating B. ***cinerea*** from NaOCl-treated lentil seed in another study. Surface sterilization with NaOCl greatly reduced the incidence of saprophytic fungi in the isolations from alfalfa seed. This often made estimates of pathogens such as ***Phoma medicaginis*** more reliable because they were not being overgrown by saprophytes. Only a small number of seeds per field were tested because our primary interest was to screen seedlots for a high incidence of *Botrytis* infection, rather than to assess small differences in infection frequency.

The samples from **1993** generally showed a high incidence of saprophytic fungi. In most fields, roughly 20% of the seed was contaminated, and incidence was close to **90%** in one field (Table 1). The incidence of ***P. medicaginis*** ranged from ***0*** to 10%, with mean incidence of just over 1%. In contrast, the incidence of fungi in seed produced in dry years was very low, generally 1% (data not shown).

It is likely that blossoms that escaped infection by ***B.cinerea*** until pod initiation became resistant to further infection by this pathogen. If pods were susceptible to infection during filling and maturation, the pathogen would penetrate through the pod wall and either contaminate the seed surface or penetrate into the seed, resulting in a high incidence of seed infection. The observation that otherwise healthy leaves, pods, and even flower buds are not susceptible to infection [1] lends credence to this hypothesis.

We conclude that ***B. cinerea*** is not carried at high frequency in or on alfalfa seed from fields affected by blossom blight. Other work indicates that the pathogen is not transmitted to young seedlings grown from seed from infected fields [2]. Therefore, seed from fields affected by botrytis blossom blight is unlikely to represent a significant source of inoculum in stands established from this seed.

TABLE 1. Incidence of fungal pathogens and saprophytes and percent seed germination of alfalfa seed harvested from commercial fields in Manitoba and Saskatchewan in 1993.

Location & Cultivar	No. of fields	% Germination	*Botrytis** Mean	*Botrytis** Range	*Phoma* Mean	*Phoma* Range	*Cladosporium* Mean	*Cladosporium* Range	*Alternaria* Mean	*Alternaria* Range	Other Mean	Other Range	Total Mean
Manitoba													
- Algonquin	15	60	>1	0-2	1	0-6	5	0-28	6	0-48	6	0-26	18
- Beaver	12	57	0	0	1	0-4	6	0-36	6	0-66	5	0-22	18
- Vernal	7	52	>1	0-2	3	0-10	4	0-10	4	0-10	8	0-16	20
- Angus	4	67	0	0	1	0-2	4	0-10	1	0-2	3	0-8	9
- AC Caribou	3	72	0	0	4	0-10	11	2-24	9	6-14	nd	nd	23
- Arrow	2	45	3	0-6	1	0-2	37	24-50	4	16-52	11	8-14	86
- Saranac	2	78	0	0	3	2-4	0	0	0	0	1	0-2	4
- Other	4	53	1	0-2	2	0-8	3	0-12	3	0-8	14	2-38	23
Saskatchewan													
- Other	16	nd	>1	0-2	3	0-9	1	0-7	2	0-8	10	5-42	16

* Botrytis = *Botrytis cinerea*, Phoma = *Phoma medicaginis*. *Cladosporium* and *Alternaria* spp. are saprophytes commonly associated with seed.
nd = not done

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CROP: Tall Fescue, *Festuca arundinacea*

LOCATION: Peace Region of Alberta

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TITLE: OCCURRENCE OF ENDOPHYTIC FUNGI IN TALL FESCUE CULTIVARS IN THE PEACE REGION IN 1993 AND 1994

BACKGROUND: Tall fescue is a perennial grass used for turf, erosion control and for livestock feed. Variety trials at the Northern Research Centre in Beaverlodge show that tall fescue is well adapted to this region (1). Several cultivars were seeded in the Peace Region since 1992 and many growers are interested in growing tall fescue for seed and forage production. Growers should be aware of fescue toxicosis for livestock grazing or feeding on tall fescue. In 1977, Bacon et al. (2) reported the close association of endophyte-infested tall fescue and the incidence of fescue toxicity in cattle. The objective of this survey was to determine if the endophytic fungi survives and is present in tall fescue cultivars grown in the Peace region.

METHODS: In 1993, five tall fescue crops were surveyed. In each field, 10 plants were collected from widely separated locations for subsequent laboratory analysis. A single basal leaf was selected from each plant. The epidermal surface was separated by slicing through the mesophyll tissue with a scalpel. The thinly sliced leaf was stained with 1% aqueous aniline blue and examined for the presence of dark corkscrew shaped hyphae running parallel to the mesophyll cell walls characteristic of the fescue endophyte, *Acremonium coenophialum* (3). Samples were considered positive, if any of the corkscrew mycelium was observed. In 1994, 20 plants from each of the four fields were sampled.

RESULTS AND COMMENTS: The endophytic fungi was present at high levels in all of the tall fescue fields surveyed in 1993 and 1994 (Table 1).

TABLE 1. Incidence of endophytic fungi in tall fescue cultivars, in the Peace River region in 1993 and 1994.

YEAR	CULTIVAR	LOCATION	(%) ENDOPHYTE INFECTED PLANTS
1993	Jaquar	Rycroft	90
1993	Pengrazer	Beaverlodge	100
1993	Peace	Fairview	90
1993	K31	Fairview	100
1993	K31	Hines Creek	100
1994	K31	Worsley	90
1994	K31	Fairview	95
1994	K31	Hines Creek	100
1994	Mustang	Bonanza	65

A single field of Mustang had 65% incidence of endophyte; incidence in all the other cultivars approached 100%. Livestock consuming tall fescue with high levels of endophytic fungi could suffer from fescue toxicity which causes symptoms similar to ergot poisoning. These symptoms include reduced feed intake, lower weight gains, decreased milk production, higher body temperatures, rough hair coats, abortions and birth problems and gangrene of hooves, feet and ears.

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