Forage legumes / Légumineuses fourragères

Crop / Culture: Alfalfa

Location / Emplacement: Nova Scotia

Title / Titre: A SURVEY TO DETERMINE THE DISTRIBUTION OF VERTICILLIUM WILT OF ALFALFA IN NOVA SCOTIA

Name and Agency / Nom et Organisation:

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METHODS: In 1989, 104 alfalfa fields from the major alfalfa producing counties in Nova Scotia were surveyed for verticillium wilt. Fields were visited once in July, August or September and a thorough search was made throughout the fields for wilt symptoms. Samples of plants showing symptoms were collected from each field and infection was confirmed by sporulation of the pathogen on ethanol medium.

RESULTS AND COMMENTS: *Verticillium albo-atrum* was found associated with wilt symptoms in alfalfa in 11 of the 104 fields surveyed. Distribution of infested fields is presented in Table 1.

Table 1. Distribution of Verticillium wilt in alfalfa in Nova Scotia.

Location	No. Infested Fields	No. Fields Surveyed
Cape Breton	3	10
Pictou County	0	11
Cumberland County	0	15
Truro and area	6	10
Annapolis Valley	1	27
Stewiacke and area	0	16
Antigonish County	1	15

Generally, verticillium wilt of alfalfa was concentrated in two centres: North Sydney in Cape Breton, and Truro in Colchester County. Symptoms were observed in fields sown as late as 1987. Infection appeared to be unrelated to host variety.

There is an indication that infested stands went undetected in this survey; a field in Pictou County that was infested in 1988 showed no symptoms in 1989. A similar phenomenon was observed in alfalfa surveys done in Prince Edward Island and New Brunswick in 1989. Perhaps the severe winter of 1988-89 resulted in the death of infected plants, leaving only healthy plants to survive.

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Crop / Culture: Alfalfa

Location / Emplacement: Nova Scotia

Title / Titre: A SURVEY TO IDENTIFY AND DETERMINE THE DISTRIBUTION OF VIRUSES IN ALFALFA IN NOVA SCOTIA

Name and Agency / Nom et Organisation:

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METHODS: In 1988, 82 alfalfa samples were collected from five locations in Nova Scotia: Cape Breton, Digby County, Kings County, Colchester County and Cumberland County. The mechanical sap inoculation technique was used to determine if viruses were present based on symptom expression on indicator plants. Indicator plants included: Vigna uniquiculata, Phaseolns vulgaris, Gomphrena globosa, Autirrhinum majus, Cucumis sativus, Medicago sativa, Pisum sativum, Spinacea oleracea, Trifolium pratense, and Trifolium repens. Samples were collected from May to August and frozen until late October when they were ground individually in 0.085% saline. Leaves of 10-day old indicator plants were dusted with diatomaceous earth, inoculated with alfalfa sap using a sterile cotton swab, and grown in a greeuhouse for three weeks. Each inoculatiou was done separately to prevent cross-contamination.

RESULTS AND COMMENTS: Sap of 81 of the 82 alfalfa samples produced symptoms on the indicator plants suggesting that 98.8% of the samples were infected with a virus. Evidence from symptoms on indicator plants suggested that alfalfa mosaic virus (AMV), clover yellow mosaic virus and white clover mosaic virus were present. There was no evidence to suggest that red clover mottle virus, red clover vein mosaic virus, clover yellow vein virus, and red clover necrotic mosaic virus were present.

AMV is difficult to ideutify from indicator plants because it exists in a number of races. This study did not show clearly the incidence of this virus because symptom expression on indicator plants was inconsisteut from sample to sample. Judging from symptoms produced on V. uniquicalata, however, AMV was present in 87% of the samples collected.

Most of the samples collected for this study were from symptomless plants. Apparently viruses, especially AMV, are present in almost all alfalfa in Nova Scotia. Spread within and between fields is probably aided by harvesting equipment. It is not known what effects latent viruses have on the longevity or yield of alfalfa in Nova Scotia, but if detrimental, this represents a serions problem.

Crop / Culture: Luzerne

Name and Agency / Nom et Organisation:

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Location / Emplacement: Ontario et Québec

Title / Titre: GRAVITÉ DES MALADIES FOLIARES DE LA LUZERNE LE LONG DE LA 401 ET DE LA 138 EN ONTARIO ET AU QUEBÉC

METHODES: On a échantillonné des champs de luzerue de la région de Guelph jusqu'à la region de Trois-Rivières le 2 et le 3 octobre 1990. Dix plantes furent échantillonnées à dix pas de distance le long d'un parcours en triangle dans sept champs de luzerne en Ontario sitnés près de l'autoroute 401 et huit champs au Québec le long de la route 138. Ou a évalué le pourcentage de la surface foliaire couverte par les symptômes sur l'ensemble des feuilles en utilisant des figures de référence (1). Ce pourcentage fut établi sans etablir de distinction entre les maladies.

RESULTATS: En Ontario, le pourcentage de la surface foliaire couverte par les symptômes a varié entre 1 et 4%, avec une moyenne de 2,6%. Au Québec, ce pourcentage a varié entre 0.5 et 6% avec une moyenne de 3,1%. La maladie la plus fréquemment observée dans les deux provinces fut la tache commune.

1. Broscious, S.C., J.K. Pataky and H.W. Kirby. 1987. Quantitative relationships between yield and foliar diseases of alfalfa. Phytopathology 77:887-892.

Crop / Culture: Irrigated Alfalfa

Location / Emplacement: Saskatchewan

Title / Titre: VERTICILLIUM WILT AND FOLIAR DISEASES OF IRRIGATED ALFALFA IN SASKATCHEWAN IN 1990

Name and Agency / Nom et Organisation:

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METHODS: Thirteen fields of irrigated alfalfa in southwestern Saskatchewan (Crop Districts 3 and 4) were surveyed on June 18 and 19, 1990 for symptoms of verticillium wilt (*Verticillium albo-atrum*). The survey concentrated primarily on areas with a history of verticillium wilt problems. All fields examined were produced for forage. Growth stage varied from late vegetative to early bloom. Samples of plants showing wilt symptoms were collected and taken to the laboratory for pathogen identification. Foliar diseases were identified based on visual symptoms.

RESULTS AND COMMENTS: Verticillium wilt was confirmed in two fields in the Miry Creek irrigation area near Cabri (Crop District 3). Verticillium had been found in this area during surveys conducted in 1983 and 1984, but not in 1987 to 1989. No verticillium wilt was found in the Chesterfield Flats irrigation area along the South Saskatchewan River near the Alberta border (Crop District 4). The disease had been found in this area each year from 1987–1989 but due to a coordinated clean-up effort, all affected fields had been rotated out of alfalfa for 1990.

The incidence and severity of foliar diseases was generally low. Spring black stem (*Phoma medicaginis* var. *medicaginis*) was present in most fields surveyed at trace to low levels. Trace levels of downy mildew (*Peronospora trifoliorum*) were found in eight fields.

Crop / Culture: Alfalfa

Location / Emplacement: Northeastern Alberta

Title / Titre: CROWN AND ROOT ROT OF ALFAFA SURVEY IN NORTHEASTERN ALBERTA 1990

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METHODS: Twenty-eight alfalfa fields in northeastern Alberta were surveyed in 1990 for the incidence and severity of crown and root rot. Five plants were dug up at each of 10 sites, spaced equally along the arms of a W pattern. The plants were shakeu free of soil, placed in a paper bag and stored in a cooler until processing. Plants were rinsed with tap water and split longitudinally to visually assess the severity of crown and root rot. Severity scores were assigned based on a scale of 0 to 3 where 0 = clean, 1 = 1-20%, 2 = 21-50%, and 3 = 51-100% of the crown and root discolored.

RESULTS AND COMMENTS: Crown and root rot occnrred in all alfalfa fields surveyed, although considerable variation occurred in disease incidence and severity among locations (Table 1). The highest disease incidence occurred in fields near Lamont and the lowest incidence occnrred near Lloydminster. The mean disease incidence for all fields was 74.9% and the mean disease severity was 1.26.

Table 1. lncidence and severity of crown and root rot of alfalfa in northeastern Alberta in 1990.

Location	No. of fields surveyed	Incidence %		Severity	
		Mean	Range	Mean	Range
Lamont	4	90.0	68-100	1.83	1.3-2.1
Lloydminster	4	58.8	36-80	0.93	0.4-1.5
Ryley	4	76.3	64-97	1.25	0.9-2.2
St. Paul	4	66.5	52-84	0.88	0.6-1.2
Smoky Lake	4	68.8	40-96	1.00	0.4-1.8
Vegreville	4	84.3	73-96	1.48	1.0-1.8
Vermilion	4	79.3	42-100	1.43	0.5-2.1
Total/Average	28	74.9	--	1.26	--

Crop / Culture: Forage Grasses

Location / Emplacement: Saskatchewan and Alberta

Name and Agency / Nom et Organisation:

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Title / Titre: HEAD AND STEM SMUT OF GRASSES IN 1990.

METHODS: One hundred and sixty-nine sites in Saskatchewan and eight sites in southern Alberta were examined between June 18 and July 19, 1990, for the presence of head smut (Ustilago bullata) and stem smut (U. hypodytes) of grasses. This included almost all of the meadow bromegrass (Bromus riparius) fields grown for certified seed production and seed fields of numerous other grasses, but most of the sites were ditches, pastures and potholes, where a number of grass species were found. At each site, the dominant grass species was identified. Where these diseases occurred, the percentage of infected plants of each species was assessed. A teardrop pattern was used for sampling, and identification of pathogens was based on symptoms. Samples of smutted heads were collected and the identity of U. bullata in several samples was confirmed by examination of spore morphology and germination.

RESULTS AND COMMENTS: The results are summarized in Table 1 and Figure 1. Head smut was found in six of the 10 seed fields of meadow bromegrass which were examined, but disease incidence was generally less than 1%. The pathogen was not found in two stands where it was observed in 1989. In northern and central areas, the pathogen was found at trace levels in many stands of foxtail barley (Hordeum jubatum). In southern areas, stands of foxtail barley were occasionally heavily infected (up to 40% infection, with localized areas over 80%). Downy brome (B. tectorum) was found at only two sites and plants infected with U. bullata (5% and 1%) were observed at both locations. Infection of slender wheatgrass (Elymus trachycaulus) and quackgrass (Agropyron repens) was noted infrequently and generally at trace levels.

The high incidence and severity of head smut in southern Alberta may be an artifact of sampling rather than a reflection of the importance of the pathogen in this region. Six of the eight grass stands examined were meadow bromegrass and foxtail barley, which are both hosts of the pathogen. Seed fields of meadow bromegrass in central Alberta and in British Columbia were also infested with the pathogen (G. Jesperson and D. Orr, personal communication). The pathogen was not found on crested wheatgrass (A. cristatum) or smooth bromegrass (B. inermis), two grass species which are widely grown throughout the survey area.

Stem smut was commonly observed on crested wheatgrass throughout southern Saskatchewan. Its distribution was highly variable. In several instances, the pathogen was found at moderate to high levels (>10%) on one side of a road, and only at trace levels on the other side. Infection of 5-10% of the plants was common. Infection levels were generally lower in pastures than in ditches and waste areas. Stem smut was occasionally observed on slender wheatgrass and quackgrass and was noted very infrequently, and only at trace levels, on western wheatgrass (A. smithii).

Table 1. The occurrence and severity of head and stem smut of grasses in Saskatchewan (by Crop District) and southern Alberta in 1990.

Location	Number of sites	Head smut		Stem smut	
		Incidence	%Plants	Incidence	%Plants
Saskatchewan					
CD 2 (south-east)	10	0	-	30%	1-25%
CD 3 (south-central)	26	0	-	46%	1-50%
CD 4 (south-west)	25	16%	1%	24%	1-80%
CD 6 (central)	49	4%	1%	33%	1-15%
CD 7 (west-central)	16	0	-	38%	1-40%
CD 8 (north-west)	19	21%	1-40%	5%	Trace
CD 9 (north-west)	24	13%	1-40%	0	-
Sonthern Alberta	8	75%	1-40%	0	-

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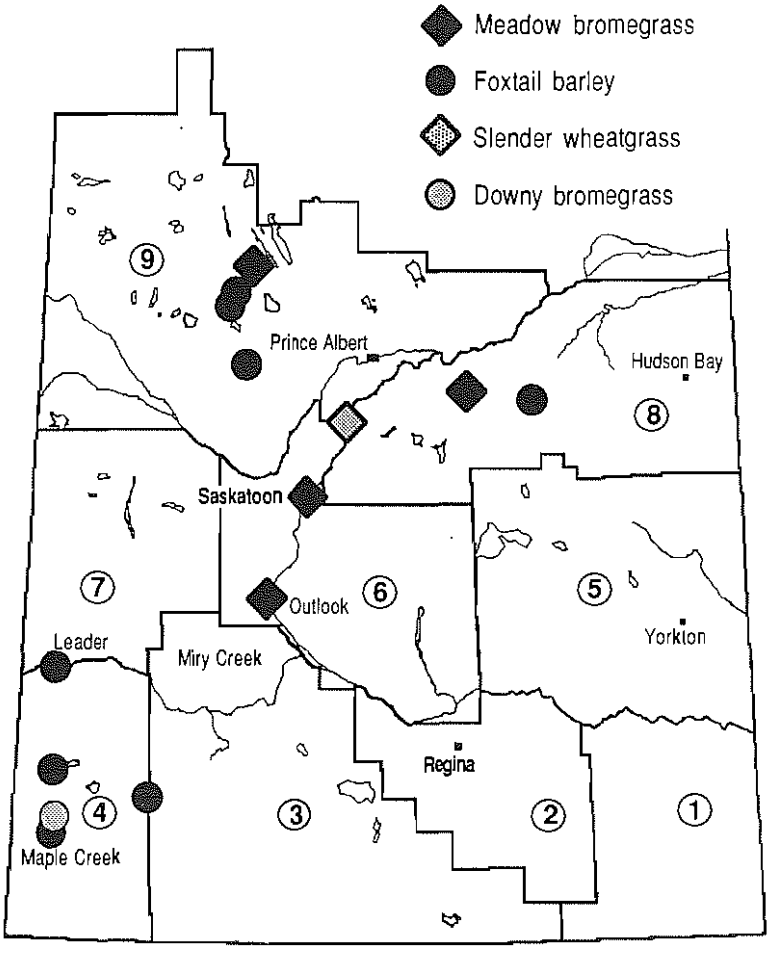

Figure 1. Locations in Saskatchewan where head smut (Ustilago bullata) was observed in 1990.

Crop / Culture: Forage Grasses

Location / Emplacement: Southern Alberta

Name and Agency / Nom et Organisation:

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Title / Titre: SURVEY FOR DISEASES OF FORAGE GRASS SEED CROPS

METHODS: Twenty-three forage grass seed fields in southern Alberta (Fig. 1) were surveyed for diseases between June 26 and July 18, 1990. The survey procedure consisted of walking through each field in a teardrop pattern, stopping every 200 paces to dig up a clump of grass for a total of 10 stops per field. The samples were bagged and returned to the laboratory where disease observations were made on the roots, crowns and foliage. Subsamples of diseased tissue were assayed for fungal pathogens by surface sterilizing in 1% sodium hypochlorite for one minute, rinsing in sterile water, and plating onto assorted agar media. Plates were incubated at 20-24°C for 5-7 days before observation. Prevalent fungal species were subcultured and retained for pathogenicity tests, which are pending. Information on the cultural practices for each crop was obtained from the individual producers.

RESULTS AND COMMENTS: Thirteen kinds of forage grasses were surveyed (Table 1). Nine of the fields were irrigated and 14 were under dryland production. The main diseases observed and their suspected causes were:

1. Crown and root rot (CR): *Fusarium* spp.
2. Leaf and stem spots (LS): *Alternaria*, *Drechslera*, and *Fusarium* species.
3. Nodal discoloration (ND): *Fusarium* spp. and insect damage.
4. Powdery mildew (PM): *Erysiphe graminis*.
5. Scorched leaf tips (SC): Physiological, probably drought stress and/or salinity.
6. Head smut (SM): *Ustilago bullata*.
7. White (sterile) heads (WH): *Fusarium* spp. and insect damage. This disorder was often seen in conjunction with nodal discoloration.

Physiological leaf scorch was the most prevaleut disease. It was seen on all but western wheat grass. Scattered dark brown spots were observed on the leaves and stems of most kinds of grasses. Although various species of fungi were isolated from these spots, their pathogenicity remains to be determined. The overall severity of these leaf and stem spot diseases was rated as slight. Root and crown rots were also minor in incidence and severity. Nodal discoloration, a disorder that was often associated with sterile heads ("whiteheads"), was observed on kentucky blue, meadow brome and northern wheat grasses. Insect-feeding damage, presumably caused by grass-feeding plant bugs, was sometimes observed at or near the affected nodes. *Fusarium* spp. were frequently isolated from the nodes and from the shrivelled, discolored ends of the seed stalks at a point on the stem just above the node. Head smut was the most serious infectious disease. It occurred on ca. 10% of the heads in a stand of 'Regar' meadow brome and on up to 50% of the heads in one field of slender wheat grass.

Table 1. Results from a disease survey of 23 forage grass seed fields in southern Alberta in 1990.

Grass	No. fields surveyed	Production[1] system	Disease[2] symptoms
Altai wild rye	2	D	CR, LS, SC
Crested wheat	5	D	CR, LS, ND, SC, SM
Kentucky blue	1	I	LS, PM, SC, WH
Meadow brome	2	I	LS, ND, SC, SM, WH
Northern wheat	1	I	CR, LS, ND, SC, WH
Orchard	2	I	LS, SC
Perennial rye	1	I	LS, SC
Pubescent wheat	2	D	GR, SC
Russian wild rye	1	D	LS, SC
Slender wheat	1	D	LS, SC, SM
Smooth brome	3	D	CR, LS, ND, SC
Tall fescue	1	I	LS, SC
Western wheat	1	I	LS
	23		

[1] Production system: D = Dryland, I = Irrigated.
[2] Disease symptoms: CR = crown and/or root rot, LS = leaf and/or stem spots, ND = node discoloration, PM = powdery mildew, SC = scorched leaf tips, SM = smutted heads, and WH = white (sterile) heads.

Figure 1. Locations of forage grass seed fields surveyed for diseases in sonthern Alberta in 1990.