Forage legumes

CROP: Alfalfa

LOCATION: Saskatchewan

NAME AND AGENCY:
B.D. GOSSEN
Agriculture Canada Research Station
SASKATOON, Saskatchewan S7N 0X2

TITLE: SNOW MOLD OF ALFALFA IN SASKATCHEWAN, 1985-87

METHODS: Thirty-six alfalfa fields in the northern and central portions of the grain belt in Saskatchewan (crop districts 5-9) were examined for winter injury and snow mold damage between April 22 and May 23, 1985. Forty-nine dryland alfalfa fields were surveyed from May 6 to May 28, 1987. Disease severity was assessed on the basis of stem and crown symptoms (Trace <1% of plants affected, Slight = 1-10%, Moderate = 11-25%, Severe >25%). Cottony snow mold (Coprinus psychromorbidus) identification was based on comparison with symptoms in inoculated field plots. Brown root rot (Phoma sclerotioides), characterized by circular, sunken, dark-brown root lesions, was also identified from symptoms. Five fields of red clover and five fields of yellow sweet clover were also examined in 1987.

RESULTS AND COMMENTS: In 1985, traces of cottony snow mold injury could be found in low-lying areas throughout the survey area, but no significant snow mold damage was observed. Low-temperature damage was generally slight, but several fields in the central portion of the grainbelt showed moderate to severe damage. In 1987, snow mold incidence in the northern portion of the grainbelt (Hudson Bay, Melfort and Meadow Lake regions, crop districts 8 and 9) was high, but disease severity was slight. However, in the Nipawin and Carrot River region (crop district 8), 5 of 10 alfalfa fields surveyed were severely damaged by cottony snow mold (Coprinus psychromorbidus), with several fields exhibiting 80-90% damage. Moderate levels of brown root rot (Phoma sclerotioides) damage were observed on alfalfa in the Nipawin area. Brown root rot damage was very severe on red clover and yellow sweet clover fields in that region. P. sclerotioides was also noted on sweet clover near Watrous (crop district 6). No winter injury or snow mold damage on alfalfa was observed in the southern and central portions of the grainbelt. The unusually mild winter of 1986-87 was probably responsible for the severity of the snow mold outbreak on alfalfa, because snow mold fungi requires soil temperatures near 0°C for optimum disease development. No survey of snow molds on forage legumes was made in 1986 because highly susceptible crops e.g. turfgrasses, showed little or no snow mold injury. However, low-temperature damage on alfalfa and other forage legumes was widespread and severe.

This work was supported in part by a grant from the Agriculture Development Fund of the Government of Saskatchewan.

CROP: Irrigated alfalfa

LOCATION: Saskatchewan

NAME AND AGENCY:
B.D. GOSSEN and G. JESPERSON
Agriculture Canada Research Station
SASKATOON, Saskatchewan S7N 0X2; and
Saskatchewan Agriculture, REGINA,
Saskatchewan S4S 0B1

TITLE: SURVEY OF IRRIGATED ALFALFA IN SASKATCHEWAN

METHODS: Fifty irrigated alfalfa fields in the south-western and central portions of the grain belt in Saskatchewan (crop districts 3, 4 and 6) were examined for the presence of Verticillium wilt (*Verticillium albo-atrum*) between July 6 and July 20, 1987. All fields in the survey were used for forage production. Second growth was examined and suspect plants were taken to the laboratory for pathogen identification.

RESULTS AND COMMENTS: Samples were taken from 23 fields. Verticillium infection was confirmed in only two fields; one in the Chesterfield Flats irrigation project on the South Saskatchewan River near the Alberta border in crop district 4, and the other less than 15 km from the first, in a separate irrigation project. Verticillium wilt was previously isolated from alfalfa in the Chesterfield Flats project (A. Frowd, personal communication). This is the first report of Verticillium wilt of alfalfa in Saskatchewan since 1984. Spring black stem (*Phoma medicaninis* var. *medicaninis*) was observed in almost every field examined, and disease severity ranged from slight to moderate. Downy mildew (*Peronospora trifolium*) infection was moderately severe in three fields examined in the Outlook area.

This work was supported in part by a grant from the Agriculture Development Fund of the Government of Saskatchewan.

CROP: Alfalfa

NAME AND AGENCY:
B. BERKENKAMP and C. KIRKHAM

LOCATION: Saskatchewan

Agriculture Canada Research Station
MELFORT, Saskatchewan SOE 1A0

TITLE: FOLIAR DISEASES OF ALFALFA IN NORTHEASTERN SASKATCHEWAN

INTRODUCTION: Fourteen alfalfa fields in crop districts 5b, 8a, 8b and 9a were surveyed between June 29 and July 22, 1987. Ten plants from each field were rated for percentage of leaf, or stem, area affected (Disease index) and losses calculated by the method of Berkenkamp 1971. Diseases listed as trace (T) were found in the field, but not in the sampled plants.

RESULTS AND COMMENTS: The table below shows that there were low levels of disease found in northeastern Saskatchewan this year, probably due to a very dry spring and the early survey. Common Leaf Spot (Pseudopeziza medicaginis) was the most widespread and severe, followed by Black Stem (Ascochyta imperfecta) and Yellow Leaf Blotch (Leptotrochila medicaginis). Stagonospora Leaf Spot (Leptosphaeria pratensis) was present in about half the fields, and with Pepper Spot (Leptosphaerulina briosiana) and Downy Mildew (Peronospora trifoliorum) caused essentially no loss.

Table. Prevalence, intensity and losses of foliar diseases of alfalfa in northeastern Saskatchewan.

Disease	% fields affected	Disease index	% loss
Common leaf spot	100	13.46	3.36
Black stem	79	5.60	1.40
Yellow leaf blotch	71	1.61	0.40
Stagonospora leaf spot	43	<0.1	
Pepper spot	7	<0.1	
Downey mildew	7	T	

Reference: Berkenkamp, B. 1971. Losses from foliage diseases of forage crops in central and northern Alberta in 1'970. Can. Plant Dis. Surv. 51: 96–100.

CROP: Alfalfa

LOCATION: Southern Alberta

NAME AND AGENCY:
H.C. HUANG[1], L.M. PHILLIPPE[1], R.J. HOWARD and E.R. MOSKALUK[2]
[1]Agriculture Canada Research Station LETHBRIDGE, Alberta T1J 4B1
[2]Alberta Special Crops and Horticultural Research Center, BROOKS, Alberta TOJ 0J0

TITLE: SURVEY OF VERTICILLIUM WILT OF ALFALFA IN SOUTHERN ALBERTA

METHODS: In July and August 1987, 111 fields of alfalfa in southern Alberta were surveyed for Verticillium wilt in the counties of Forty Mile, Newell, Letnbridge, Warner, Wheatland, and Vulcan, in the municipal districts of Taber, Cardston, Pincher Creek, Willow Creek, and Foothills, and in the improvement district no. 1 (Figure 1). The disease was identified by visual symptoms of wilt and V-shaped lesions on leaves of the plants. The fields were surveyed by entering the field at one corner, walking 200 paces towards the center of the field, and then exiting at 90° to the side of the field on which you came in (Figure 2). Suspect plants were noted on the entry transect and counted and collected at twenty-pace intervals on the exit transect. The suspect plants collected were brought back to the laboratory for isolation and identification of the pathogen.

RESULTS AND COMMENTS: Verticillium wilt of alfalfa caused by *Verticillium albo-atrum* was found in 8 of the 111 fields surveyed (Table). The 8 positive fields were all irrigated alfalfa distributed in the counties of Forty Mile, Newell, and Wheatland, and the municipal district of Taber (Figure 1). These positive fields are new in addition to those found in the 1986 survey of the Verticillium wilt of alfalfa.

Table. Survey of Verticillium wilt (VW) of alfalfa in southern Alberta, 1987.

Census division	County or municipality	No. fields	
		Surveyed	With VW
1	Improvement district no. 1	4	0
2	Co. Forty Mile	3	1
2	Co. Newell	27	3
2	Co. Lethbridge	4	0
2	MD Taber	5	1
2	Co. Warner	4	0
3	MD Cardston	6	0
3	MD Pincher Creek	3	0
3	MD Willow Creek	3	0
5	Co. Wheatland	42	3
5	Co. Vulcan	3	0
6	MD Foothills	7	0
Totals		111	8

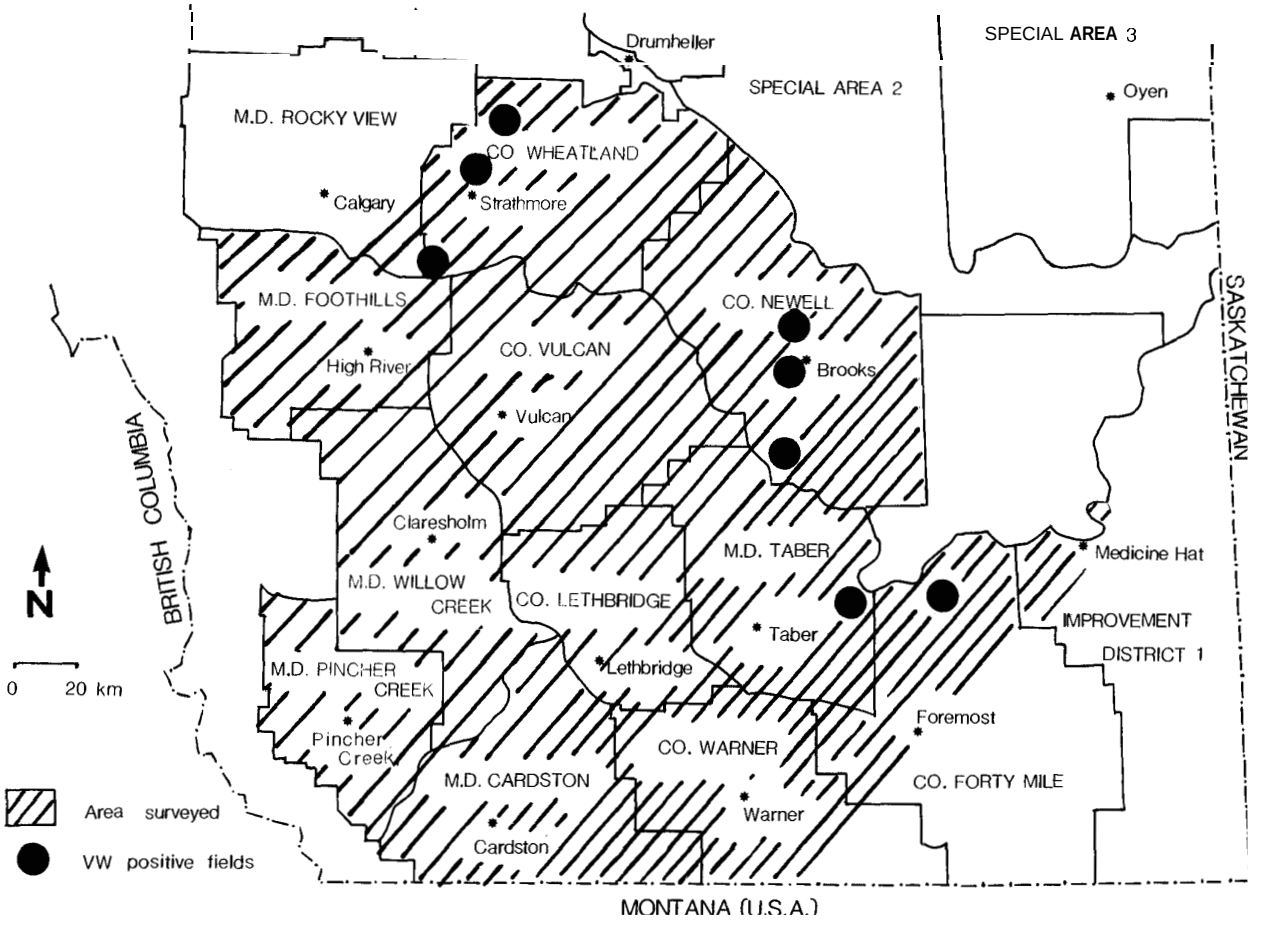

Figure 1. Area surveyed for Verticillium wilt of alfalfa and location of disease positive fields in southern Alberta, 1987.

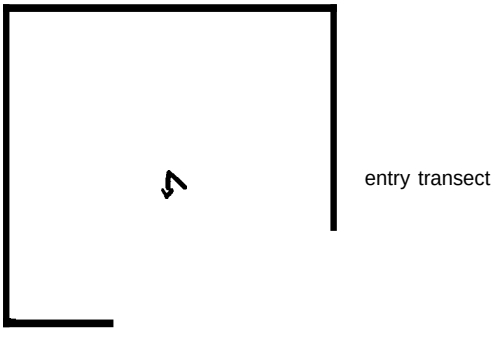

Figure 2. A diagram showing the method of conducting the survey in each field.

CROP: Alfalfa

LOCATION: Manitoba

NAME AND AGENCY:
R.G. PLATFORD
Manitoba Agriculture, Plant Pathology Laboratory, Agricultural Services Complex, 201-545 University Crescent, WINNIPEG, Manitoba R3T 2N2

TITLE: INCIDENCE OF PLANT DISEASES IN ALFALFA IN MANITOBA

METHODS: Results are based on samples of alfalfa submitted to the Plant Pathology Laboratory and field examinations.

RESULTS AND COMMENTS: Winter injury of alfalfa was very low in 1987 because of the early snowfall in November 1986 that persisted until spring. There were a few samples of alfalfa sent into the laboratory infected with brown root rot caused by Plenodomus meliloti. Spring black stem and common leaf spot of alfalfa were not a problem in the first spring cut in most areas of Manitoba because of the very dry spring conditions but samples were received from alfalfa fields in the Eastern, Interlake and Northwest regions in August and September following periods of moist weather that showed a high amount of leaf disease. A sample of alfalfa infected with Sclerotinia sp. was received from the Portage la Prairie area in the Central region. There was no verticillium wilt of alfalfa detected in 1987 from samples submitted. There was no special survey of alfalfa carried out in Manitoba in 1987.

CROP: Alfalfa

LOCATION: Eastern Ontario

NAME AND AGENCY:
P.K. BASU and N.J. BROWN - Plant Research Centre, OTTAWA, Ontario K1A 0C6; and Members of Ontario Ministry of Agriculture and Food - D. HALEY, G. QUESNEL, P. BEAUDIN, D.C. MILLER, G.J. SMITH, R.A. HUMPHRIES and S. GUY

TITLE: INCIDENCE OF VERTICILLIUM WILT OF ALFALFA IN EASTERN ONTARIO

INTRODUCTION: Since 1981, Verticillium wilt (VW) of alfalfa caused by Verticillium albo-atrum has been reported from most of the western and southwestern counties of Ontario (4). In 1981, this disease was not detected in eastern Ontario (2). However, during 1982–86, sporadic reports of VW were obtained from Dundas and Stormont counties but no systematic surveys were made recently. Hence, this study was initiated in 1987 in order to determine the incidence of this disease in eastern Ontario.

METHODS: At least two alfalfa fields were selected at random from each township of Russell, Prescott, Glengarry, Renfrew, Lanark, Ottawa–Carleton, Dundas, Stormont, Grenville and Leeds in order to distribute the sample fields widely. However, when growers sent alfalfa samples through agricultural representatives for disease diagnosis, these were also included in this study. Fields were inspected during May 12 to

October 5, 1987. Plants, within a 3-m wide W-shape sampling path (2) in each field were examined for symptoms of Verticillium wilt (3) and the pathogen, V. albo-atrum, was isolated from stems to confirm (PKB) disease diagnosis. If there were no visible symptoms or when the pathogen was not recovered, a field was considered negative for Verticillium wilt. When a typically wilted plant was found in a field, it was marked as positive. No attempt was made to quantify the disease incidence or its severity in order to save time.

RESULTS AND COMMENTS: The distribution of Verticillium affected and non-affected fields is shown in Fig. 1, and the percentage of affected fields is given in Table below. Fields in Russell, Prescott and Renfrew were free of Verticillium wilt this year. The overall incidence for the 10 counties was 21.8. Relatively higher incidence values in Ottawa-Carleton, Stormont and Dundas may be partly attributable to the fact that 27 samples were sent by the growers and these were added to the initial random samples. Consequently, the incidence values in these three counties might have been over-estimated. However, since the disease was present in most counties, it is only a matter of time that it will appear in all. Control strategies (1) and the mode of spread of the disease (4) need to be investigated urgently.

Table. Numbers and percentage of Verticillium wilt affected alfalfa fields in 10 counties of eastern Ontario.

County	Fields sampled	Fields affected	% affected
Russell	5	0	0.0
Prescott	4	0	0.0
Glengarry	11	1	9.1
Renfrew	19	0	0.0
Lanark	16	1	6.3
Ottawa-Carleton	19	6	31.6
Dundas	13	6	46.2
Stormont	28	15	53.6
Grenvi11e	11	1	9.1
Leeds	16	1	6.3
TOTAL	142	31	21.8

References:

1. Atkinson, T.G. 1981. Verticillium wilt of alfalfa: challenge and opportunity. Can. J. Plant Pathol. 3: 266-272.

2. Basu, P.K. 1983. Survey of eastern Ontario alfalfa fields to determine common fungal diseases and predominant soil-borne species of Pythium and Fusarium. Can. Plant Dis. Surv. 62: 51-54.

3. Christen, A.A., and R.N. Peaden. 1981. Verticillium wilt in alfalfa. Plant Dis. 65: 319-321.

4. Christie, B.R., L.V. Busch, and G.J. Boland. 1986. Verticillium wilt of alfalfa. 1986 Annual Report, pages 158-170, Department of Crop Science, University of Guelph, Guelph, Ontario.

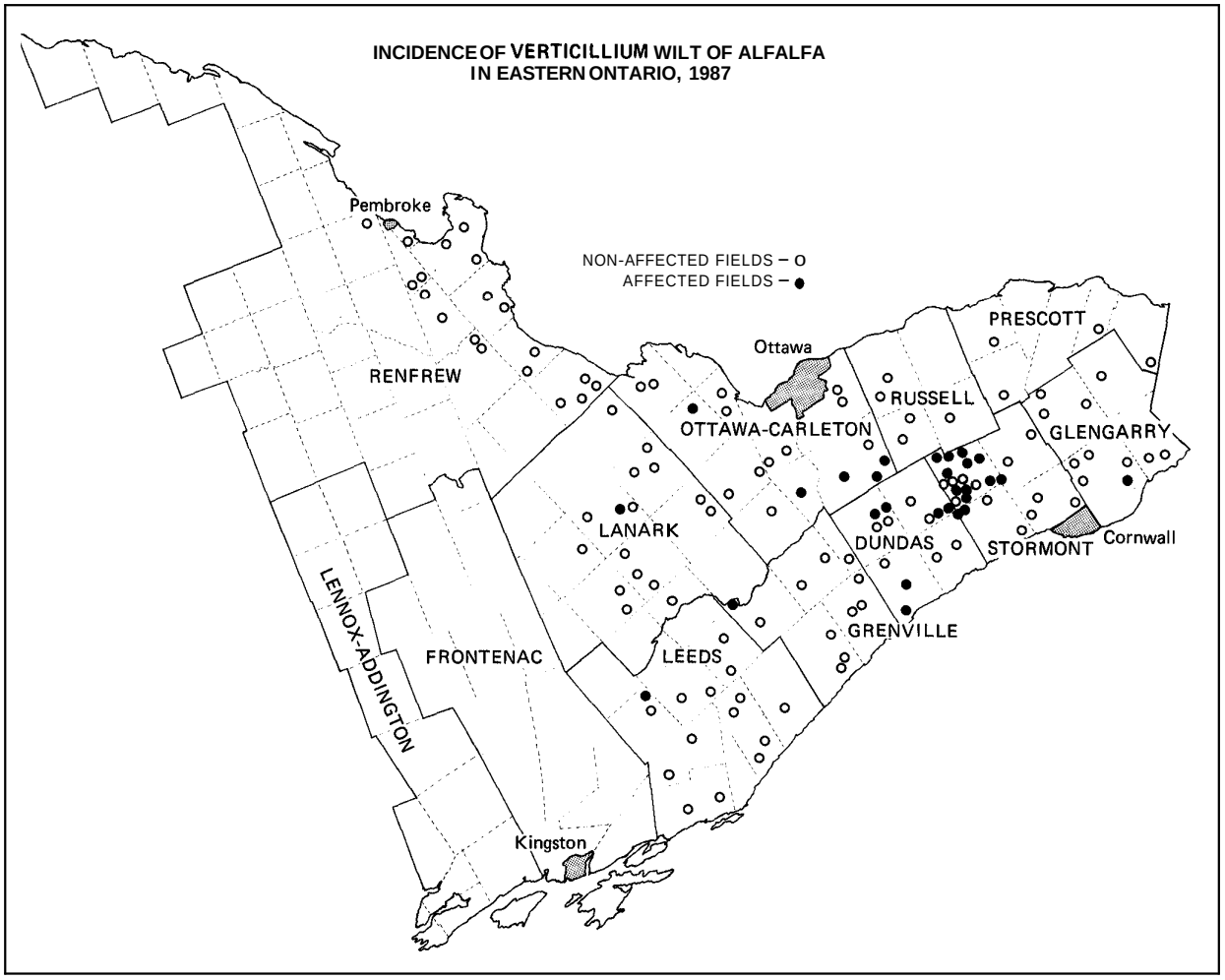

Figure 1. Distribution of *Verticillium* wilt affected alfalfa fields in 10 eastern Ontario counties out of 142 examined; a few fields could not be shown in the map because of their close proximity.

CROP: Alfalfa

LOCATION: Ontario

NAME AND AGENCY:
B.D. SMITH, L.V. BUSCH and G.J. BOLAND
Department of Environmental Biology,
University of Guelph, GUELPH, Ontario
N1G 2W1

TITLE: SURVEY OF VERTICILLIUM WILT OF ALFALFA IN SOUTHERN ONTARIO

METHODS: In 1981-2 L.V. Busch surveyed six counties and collected samples from 33 fields that exhibited typical wilt symptoms. In 1983 field samples were collected from 215 fields representing 25 counties by personnel of the Ontario Ministry of Agriculture and Food (Plant Industry Branch) augmented by the Department of Environmental Biology. Samples were taken only from fields that had typical symptoms of Verticillium wilt and were sent to L.V. Busch, University of Guelph, for laboratory confirmation. Every tonwship in the counties of southern Ontario were surveyed, with the exception of Prescott, Russell, Glengary, Carleton, Leeds, Grenville, Dundas, Stormont, Essex, Kent and Lambton.

RESULTS AND COMMENTS: Verticillium wilt was found only in Perth county in 1981, where 80% of the sampled fields were positively diagnosed (Table). Eighty-three percent of the fields surveyed in Perth were positive in 1982. In 1983, when all the counties in southern Ontario were sampled, 37.6% of the samples were positive for Verticillium wilt. Sixteen additional fields were questionable. Frontenac, Halton, Lambton, Leeds, Peel and Victoria counties were negative. All townships in the following counties of central southwestern Ontario: Perth, Wellington, Waterloo, Oxford, Brant and Hamilton-Wentworth had disease in at least one field. Townships in the counties of Bruce, Grey, Huron, Haldimand-Norfolk and Middlesex, adjacent to those mentioned above, also yielded positive diagnoses of Verticillium wilt.

Table. Number and location of alfalfa fields with Verticillium wilt of alfalfa in southern Ontario in 1981-82 and 1983.

County	No. fields samp1ed	% positive diagnoses	% questionable diagnoses
1981-1982			
Perth	17	87.5	0.0
Bruce	4	0.0	0.0
Grey	4	0.0	0.0
Simcoe North	3	0.0	0.0
Simcoe South	3	0.0	0.0
Wellington	2	0.0	0.0
1983			
	8	87.5	0.0
Bruce	15	13.3	13.3
Dufferin	15	9.9	13.3
Essex	1	0.0	100.0
Frontenac	1	0.0	0.0
Grey	14	21.4	7.1
Haldimand	12	33.3	16.6
Halton	1	0.0	0.0
Hastings	4	0.0	0.0
Huron	19	36.8	0.0
Lambton	1	0.0	0.0
Leeds	1	0.0	0.0
Middlesex	13	38.5	7.7
Niagara North	7	0.0	28.6
Niagara South	4	50.0	25.0
Norfolk	4	25.0	0.0
Northumberland	2	0.0	0.0
Oxford	15	73.3	13.3
Peel	1	0.0	0.0
Perth	12	66.6	0.0
Simcoe North	14	0.0	7.1
Simcoe South	3	0.0	0.0
Waterloo	18	61.1	11.1
Wellington	22	68.2	0.0
Wentworth	3	100.0	0.0
York	4	50.0	0.0
Victoria	1	0.0	0.0

CROP: Alfalfa

LOCATION: Ontario

NAME AND AGENCY:
E.A. SMITH and G.J. BOLAND
Department of Environmental Biology
University of Guelph, GUELPH, Ontario
N1G 2W1

TITLE: FOLIAR DISEASE SURVEY OF ALFALFA IN SOUTHWESTERN ONTARIO

METHODS: Seventy alfalfa fields in 18 counties were surveyed for foliar diseases in September and October 1986. Observations of diseases were made in each field and 50 plants were collected in a V-shaped pattern. Plants were returned to the laboratory for evaluation and pathogen identification.

The presence of all diseases was assessed in each field to determine disease prevalence. Disease severity was determined for most diseases by rating the two lowest mature leaves on each stem for the percentage of leaf area diseased in total, and for each symptom (James 1971). The lower 20 cm of each stem also was rated for the percentage of stem area diseased. Most symptoms were then associated with the causal agents and representative samples were cultured for positive identification.

RESULTS AND COMMENTS: Cool, wet conditions during autumn 1986 resulted in leaf and stem diseases being present in all fields surveyed (Table). Common leaf spot, yellow leaf blotch, Leptosphaerulina leaf spot, spring black stem and anthracnose had the highest disease incidences and/or severities. Verticillium wilt was found on 17% of the farms surveyed. Stem diseases occurred as a complex of pathogens and mean disease severities for individual diseases were not evaluated.

Table. Incidence and severity of foliar diseases of alfalfa in south-western Ontario during September and October 1986

Disease	# fields with disease	% fields with disease	Mean disease severity (all fields)
Foliar diseases (total)	70	100.0	11.8
Common leaf spot	59	84.3	7.7
Yellow leaf blotch	32	45.7	3.8
Leptosphaerulina leaf spot	27	38.6	4.3
Rust	22	31.4	-
Spring black stem	7	10.0	5.2
Downey mildew	17	24.3	-
Verticillium wilt	12	17.1	-
Stemphylium leaf spot	13	18.6	0.04
Alfalfa mosaic virus (symptoms)	4	5.7	-
Unidentified	51	72.9	1.8
Stem diseases (total)	70	100.0	9.4
Spring black stem	48	68.6	-
Anthracnose	41	58.6	-
Summer black stem	16	22.9	-
Rhizoctonia	10	14.3	-
Stemphyliwn leaf spot	3	4.3	-

James, C. 1971. A manual of assessment keys for plant diseases. Can. Dept. Agric., Pub. 1458.

CROP: Alfalfa

LOCATION: Quebec

NAME AND AGENCY:
C. RICHARD
Agriculture Canada Research Station
SAINTE-FOY, Quebec G1V 2J3

TITLE: OBSERVATIONS ON DISEASES OF ALFALFA

METHODS: Results are based upon observations made sporadically on the occasion of visits to producers or upon examination of samples received from agronomists.

RESULTS AND COMMENTS: Leaf spot diseases were general throughout the growing season. More specifically, Common Leaf Spot (*Pseudopeziza trifolii* f.sp. *medicaginis-sativae*) was observed in Lévis county, Lepto Leaf Spot (*Leptosphaerulina briosiana*) and Spring Black Stem (*Phoma medicaginis* var. *medicaginis*) in Saint-Hyacinthe, Yellow Leaf Blotch (*Leptotrochila medicaginis*) and Lepto Leaf Spot in Lac-Saint-Jean-Ouest, Sclerotinia Crown and Stem Rot in Kamouraska, and Downy Mildew (*Perenospora trifoliorum*) in Sherbrooke. Fusarium Crown and Root Rot is general while Phytophthora Root Rot was observed in Portneuf.

CROP: Alfalfa

NAME AND AGENCY:
C. RICHARD and H. NICHOLLS
Agriculture Canada Research Station
SAINTE-FOY, Qudbec G1V 2J3; and Plant
Health and Plant Products Division,
Agricultural Inspection, MONTREAL,
Qudbec H2Z 1Y3

TITLE: SURVEY OF VERTICILLIUM WILT OF ALFALFA IN QUEBEC, 1986-87

INTRODUCTION: Verticillium wilt of alfalfa caused by Verticillium albo-atrum was found at ten locations in Qudbec in 1986. It was the first report of the disease in Quebec since it had been discovered in North America in 1976. The purpose of this survey is to determine the extent of the disease in the province.

METHODS: Sixty-six alfalfa fields were surveyed in September 1987 in 46 municipalities over 26 counties. Sampling, isolation and identification of the pathogen were done by the Plant Health Division. Plants, within a 2-m wide, 100-pace long sampling path were examined for symptoms of Verticillium wilt and samples were taken to confirm the presence of the disease. A field was considered positive only when the presence of V. albo-atrum was confirmed in samples. Alfalfa samples received from growers through agronomists in 1986 and 1987 and examined by the Laboratoire de diagnostic, ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Quebec, are also included in the survey.

RESULTS AND COMMENTS: See Table below. Verticillium wilt was detected in eight counties in 1986 and sixteen counties in 1987. Of the 66 surveyed fields in 1987, only 12 samples were positive because of the long delay between sampling and isolation. Seventeen samples received from agronomists were positive. Although spread over the agronomic area of Qudbec, the disease is concentrated in the Eastern townships where most of the positive counties are located.

Reference: Nicholls, H., C. Richard, and J.-G. Martin. 1987. Verticillium wilt of alfalfa in Quebec. Can. Plant Dis. Surv. 67: 17-21.

Tgble. Counties of Québec where Verticillium wilt was found in 1986 and 1987.

County	1986	1987
Bagot	x	x
Beauce		x
Bellechasse	x	
Chicoutimi		x
Compton	x	x
Frontenac		x
Ile-de-Montrdal	x	
Labelle		x
Lac Saint-Jean est	x	
Lac Saint-Jean ouest		x
Missisquoi		x
Napierville		x
Richmond		x
Rouvi1le	x	x
Sherbrooke	x	x
Stanstead	x	x
Tdmiscamingue		x
Yamaska		x