

LOSSES FROM FOLIAGE DISEASES OF FORAGE CROPS IN CENTRAL AND NORTHERN ALBERTA IN 1971

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Abstract

An extensive survey of foliar diseases of alfalfa, clover (red, alsike, sweet, and white), brome, timothy, and fescue was made in central and northern Alberta in 1971, using methods similar to those followed in a 1970 survey. The estimated avg loss was 6.8% or \$5.9 million in 1971.

Introduction

Until 1970, no extensive survey of forage crop diseases had been conducted in Canada with an objective of estimating disease losses. In order to estimate losses, it was essential to determine the species composition of the hay grown and the intensity of diseases on each species. A survey was conducted in central and northern Alberta in 1971, using the same methods as in 1970 (1) to allow comparison of disease prevalence and intensity from year to year.

Materials and methods

Fields in Census Divisions (C.D.) 8-15 in central and northern Alberta were surveyed between July 8 and August 24. CD 9 was not sampled because of limited cultivation of forage crops. Shoots of 4,850 forage plants from 315 fields were examined and the severity of diseases estimated. Methods of sampling, estimation of disease severity, and estimation of losses have been described (1). The Disease Index was based on percent area of the plant affected and was multiplied by 0.25 to give percent loss.

Results

Four diseases found in 1971 but not in 1970 were assessed as follows: pepper spot of red clover and sooty blotch of white clover were estimated as percentage of foliage area affected, gray stem canker of sweet clover as percentage of stem area affected, and whitehead (silver top) of brome as percentage of heads killed. One disease reported in 1970, downy mildew of sweet clover, was not found in 1971.

The intensity and distribution of diseases on the various species are shown in Table 1. The number of fields affected and the disease index, which is an average of all

fields sampled, are shown by CD. The number of fields sampled and the estimated acreage in each CD is indicative of the prevalence of each forage species.

The largest increases in disease intensity over 1970 were found in three Census Divisions: CD 11, primarily on red and alsike clovers; CD 14, in which a limited number of samples were collected; and CD 15, which experienced a very wet season and high disease levels in most species.

A comparison of the percentage loss for each disease and species in 1970 and 1971 for the entire area surveyed is shown in Table 2. Some of the diseases remained relatively constant, especially those of brome and timothy, but most showed an increase. Losses from *Stagonospora* of red and alsike clovers were greatly increased, as were losses from some other diseases of clovers. A tenfold increase was found in diseases of fescue, probably due to a very wet year in the fescue area (southern CD 15). Some areas in CD 15 were also found showing flooding injury.

Losses by CD and total for the area surveyed are shown in Table 3. Data for yield, production, and farm value of forage was supplied by the Alberta Marketing and Statistics Branch (H.H. Bryce, personal communication). The estimated average loss was up from 5.65% in 1970 (1) to 6.8% in 1971.

Forage yields in 1971 were estimated at 1.81 tons/acre compared with 1.85 tons/acre in 1970, and the total loss was 369.3 and 258.3 thousand tons for 1971 and 1970 respectively. Acreage was up 117 thousand in 1971, and although the value of hay decreased from \$18.00 to \$16.00 per ton, the estimated disease loss value increased from \$4.66 to \$5.91 million.

Literature cited

1. Berkenkamp, B. 1971. Losses from foliage diseases of forage crops in central and northern Alberta in 1970. *Can. Plant Dis. Surv.* 51:96-100.

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Table 1. Incidence and severity of foliage diseases of forage crops in central and northern Alberta, 1971

1. ALFALFA (*Medicago sativa* L.)

census Division	Acres grown ('000)	No. fields sampled	Diseases* assessed**					
			Yellow leaf blotch	Black stem	Stagon- ospora	Pepper spot	Downy mildew	Common leaf spot
8	141.0	25	23/ 9.03	18/2.63	13/0.23	2/0.28	4/0.23	22/ 3.57
10	133.4	38	32/ 8.41	33/1.84	12/0.11	8/0.71	2/0.02	32/ 3.34
11	237.6	37	37/14.38	31/2.29	17/0.19	7/0.64	0/0	34/ 8.62
12	130.9	22	11/ 3.17	14/1.86	17/1.50	0/0	1/0.01	22/11.15
13	120.5	21	18/11.10	19/5.84	12/0.54	1/0	0/0	20/19.90
14	14.0	3	3/13.97	3/4.47	0/0	1/0.33	0/0	1/ 1.50
15	158.5	16	15/24.89	15/8.69	3/0.02	1/0.03	0/0	13/10.99
Total	935.9	162	139/11.24	133/3.31	74/0.38	20/0.36	7/0.04	144/ 8.51

* Causal fungi: Yellow leaf blotch, *Leptotrochila medicaginis* (Fckl.) Schuepp; black stem, *Ascochyta imperfecta* Pk.; stagonospora, *Leptosphaeria pratensis* Sacc. and Briard; pepper spot, *Pseudoplea trifolii* (Rostr.) Petr.; downy mildew, *Peronospora trifoliorum* de Bary; common leaf spot, *Pseudopeziza trifolii* f. sp. *medicaginis-sativae* Schmiedeknecht.

2. RED CLOVER (*Trifolium pratense* L.)

Census Division	Acres grown ('000)	No. fields sampled	Diseases* assessed**					
			Powdery mildew	Northern anthracnose	Black stem	Black-stem leaf spot	Stagon- ospora	Pepper spot
8	72.6	15	2/0.37	9/ 4.79	9/1.73	0/0	14/20.16	0/0
10	2.2	1	0/0	1/ 0.10	1/0.90	0/0	0/0	0/0
11	56.9	11	6/9.70	6/11.66	8/3.05	2/ 0.85	11/29.13	2/1.93
12	17.6	5	2/3.22	4/ 8.12	5/1.28	0/0	5/46.68	0/0
13	61.8	12	0/0	9/10.31	10/1.35	2/11.42	10/39.97	1/0.26
14	8.0	2	0/0	2/28.45	2/3.80	0/0	2/26.90	0/0
15	133.8	14	3/6.25	8/15.06	13/4.61	0/0	13/41.92	0/0
Total	354.9	60	13/4.01	39/10.54	48/2.59	4/ 2.44	55/32.94	3/0.40

* Causal fungi: Powdery mildew, *Erysiphe polygoni* DC. ex Mérat; northern anthracnose, *Kabatella caulivora* (Kirchn.) Karak.; black stem, *Ascochyta meliloti* (Trel.) Davis; stagonospora, *Stagonospora recedens* (O.Massal.) Jones and Weimer; pepper spot, *Pseudoplea trifolii* (Rostr.) Petr.

3. AISIKE CLOVER (*Trifolium hybridum* L.)

Census Division	Acres grown ('000)	NO. fields sampled	Diseases* assessed**					
			Powdery mildew	Black stem	Stagon- ospora	Pepper spot	Rust	sooty blotch
8	63.1	18	4/ 7.22	5/0.09	17/23.49	4/1.78	0/0	6/4.72
10	1.2	1	1/18.30	0/0	1/31.70	0/0	0/0	0/0
11	72.9	16	8/24.78	4/0.44	16/33.51	1/1.64	2/0.38	2/3.85
12	6.3	1	0/0	1/0.70	1/72.60	0/0	0/0	0/0
13	65.0	15	5/ 8.20	7/1.05	15/27.46	1/1.80	0/0	6/2.61
14	10.0	3	0/0	1/0.37	3/56.43	0/0	0/0	0/0
15	102.9	15	8/15.15	3/0.10	15/34.21	1/1.44	0/0	0/0
Total	321.4	69	26/12.97	21/0.40	68/31.27	7/1.55	2/0.09	14/2.69

* Causal fungi: Powdery mildew, *Erysiphe polygoni* DC. ex Mérat; black stem, *Ascochyta meliloti* (Trel.) Davis; stagonospora, *Leptosphaeria pratensis* Sacc. and Briard; pepper spot, *Pseudoplea trifolii* (Rostr.) Petr.; rust, *Uromyces trifolii* (Hedw. f. ex DC.) Lbv.; sooty blotch, *Cymadothea trifolii* (Pers. ex Fr.) Wolf.

** Number of fields affected/disease index.

Table 1 (Cont'd.)

4. SWEET CLOVER (*Melilotus alba* and *M. officinalis* L.)

Diseases* assessed**

C.D.	Acres grown ('000)	No. fields sampled	Black stem	Downy mildew	Stagon-ospora	Gray stem canker
8	1.6	2	0/0	0/0	2/0.11	0/0
10	8.4	3	2/0.33	0/0	3/1.17	0/0.10
11	0	0	0/0	0/0	0/0	0/0
12	12.7	2	1/0.45	0/0	2/6.10	0/0
13	7.6	1	0/0	0/0	0/0	0/0
14	0	0	0/0	0/0	0/0	0/0
15	29.5	3	2/0.10	0/0	2/0.77	0/0
Total	59.8	11	5/0.20	0/0	9/1.66	1/0.03

* Causal fungi: Black stem, *Ascochyta meliloti* (Træl.) Davis; downy mildew, *Peronospora trifoliorum* de Bary; stagonospora, *Leptosphaeria pratensis* Sacc. and Briard; gray stem canker, *Ascochyta caulicola* Laub.

6. BROME (*Bromus inermis* Leyss.)

Diseases* assessed**

C.D.	Acres grown ('000)	No. fields sampled	Brown leaf spot	Selen-ophoma	Scald	White-head
8	19.7	8	8/ 5.60	1/0.01	0/0	1/1.25
10	86.9	26	26/ 8.01	18/0.56	3/0.05	1/0.38
11	38.7	12	10/ 6.97	3/0.07	2/0.02	1/0.83
12	16.5	3	3/ 9.83	2/0.73	1/0.03	0/0
13	69.8	15	15/10.86	5/0.91	5/0.11	1/0.67
14	12.8	2	2/ 8.65	0/0	0/0	0/0
15	110.4	12	12/ 8.21	8/0.55	7/0.33	0/0
Total	354.8	78	76/ 8.27	37/0.49	18/0.09	4/0.51

* Causal fungi: Brown leaf spot, *Drechslera bromi* (Died.) Shoem.; selenophoma, *Selenophoma bromigena* (Sacc.) Sprague and Johnson; scald, *Rhynchosporium secalis* (Oud.) J.J. Davis.; whitehead, *Fusarium poae* (Pk.) Wr.

5. WHITE CLOVER (*Trifolium repens* L.)

Diseases* assessed**

C.D.	Acres grown ('000)	No. fields sampled	Pepper spot	Stagon-ospora	Rust	sooty blotch
8	2.5	2	1/30.0	1/1.0	2/ 9.0	1/ 8.0
10	0	0	0/0	0/0	0/0	0/0
11	0	0	0/0	0/0	0/0	0/0
12	0	0	0/0	0/0	0/0	0/0
13	9.6	2	1/ 3.0	2/9.0	1/27.0	1/24.0
14	0	0	0/0	0/0	0/0	0/0
15	0	0	0/0	0/0	0/0	0/0
Total	12.1	4	2/16.5	3/5.0	3/18.0	2/16.0

* Causal fungi: Pepper spot, *Pseudoplea trifolii* (Rostr.) Petr.; stagonospora, *Leptosphaeria pratensis* Sacc. and Briard; rust, *Uromyces trifolii* (Hedw. f. ex DC.) Lév.; sooty blotch, *Cymadothea trifolii* (Pers. ex Fr.) Wolf.

7. TIMOTHY (*Phleum pratense* L.)

Diseases* assessed**

C.D.	Acres grown ('000)	No. fields sampled	Eyespot	Leaf streak
8	109.5	33	32/0.39	33/ 3.60
10	5.8	2	1/0.02	2/ 2.10
11	36.4	15	15/0.29	15/ 6.21
12	5.7	2	2/0.35	2/21.00
13	63.0	19	19/0.66	19/10.37
14	19.2	4	4/0.29	4/ 3.92
15	54.9	9	9/0.23	9/ 5.77
Total	294.5	84	82/0.40	84/ 6.22

* Causal fungi: Eyespot, *Heterosporium phlei* Gregory; leaf streak, *Drechslera phlei* (Graham) Shoem.

8. FESCUE (*Festuca rubra* L.)

Diseases* assessed**

Census Division	Acres grown ('000)	No. fields sampled	Brown stripe	Stem eyespot
8	0	0	0/0	0/0
10	1.0	1	1/ 5.00	0/0
11	3.1	1	1/ 5.00	0/0
12	0	0	0/0	0/0
13	0	0	0/0	0/0
14	0	0	0/0	0/0
15	80.3	9	9/28.36	9/36.29
Total	84.4	11	11/24.11	9/29.69

* Causal fungi: Brown stripe, *Passalora graminis* (Fckl.) Höhn; stem eyespot, *Phleospora idahoensis* Sprague.

** Number of fields affected/disease index.

Table 2. Percentage losses from diseases of forage crops in central and northern Alberta, 1970-71

Forage species	% of forage crops grown		Disease	Causal fungus	Loss (%)	
	1970	1971			1970	1971
Alfalfa (<i>Medicago sativa</i>)	45.5	38.3	Yellow leaf blotch	<i>Leptotrochila medicaginis</i>	2.87	2.81
			Black stem	<i>Ascochyta imperfecta</i>	1.45	0.83
			Stagonospora	<i>Leptosphaeria pratensis</i>	0.11	0.10
			Pepper spot	<i>Pseudoplea trifolii</i>	0.06	0.09
			Downy mildew	<i>Peronospora trifoliorum</i>	0.02	0.01
			Common leaf spot	<i>Pseudopeziza trifolii</i> f. sp. <i>medicaginis-sativae</i>	1.30	2.13
			TOTAL	5.81	5.97	
Red clover (<i>Trifolium pratense</i>)	16.5	14.5	Powdery mildew	<i>Erysiphe polygoni</i>	3.04	1.00
			Northern anthracnose	<i>Kabatella caulivora</i>	1.11	2.63
			Black stem	<i>Ascochyta meliloti</i>	0.64	0.65
			Stagonospora	<i>Stagonospora recedens</i>	2.17	8.23
			Black stem leaf spot	<i>Ascochyta meliloti</i>	0.32	0.61
			Pepper spot	<i>Pseudoplea trifolii</i>		0.10
			TOTAL	7.28	13.22	
Alsike clover (<i>Trifolium hybridum</i>)	8.7	13.1	Powdery mildew	<i>Erysiphe polygoni</i>	3.54	3.24
			Black stem	<i>Ascochyta meliloti</i>	0.18	0.10
			Stagonospora	<i>Leptosphaeria pratensis</i>	2.83	7.82
			Pepper spot	<i>Pseudoplea trifolii</i>	0.06	0.39
			Rust	<i>Uromyces trifolii</i>	0.24	0.02
			Sooty blotch	<i>Cymadothea trifolii</i>	0.18	0.67
			TOTAL	7.03	12.24	
Sweet clover (<i>Melilotus alba</i> and <i>M. officinalis</i>)	3.0	2.4	Black stem	<i>Ascochyta meliloti</i>	0.28	0.05
			Downy mildew	<i>Peronospora trifoliorum</i>	0.01	
			Stagonospora	<i>Leptosphaeria pratensis</i>	0.06	0.41
			Grey stem canker	<i>Ascochyta caulicola</i>		0.01
			TOTAL	0.35	0.47	
White clover (<i>Trifolium repens</i>)	0.2	0.5	Pepper spot	<i>Pseudoplea trifolii</i>		4.12
			Stagonospora	<i>Leptosphaeria pratensis</i>	0.01	1.25
			Rust	<i>Uromyces trifolii</i>	0.01	4.50
			Sooty blotch	<i>Cymadothea trifolii</i>		4.00
			TOTAL	0.02	13.87	

Table 2 (Cont'd.)

Forage species	% of forage crops grown		Disease	Causal fungus	Loss (%)	
	1970	1971			1970	1971
Brome (<i>Bromus inermis</i>)	11.0	14.5	Brown leaf blotch	<i>Drechslera bromi</i>	2.56	2.07
			Selenophoma leaf spot	<i>Selenophoma bromigena</i>	0.02	0.12
			Scald	<i>Rhynchosporium secalis</i>	0.02	0.02
			Whitehead	<i>Fusarium poae</i>		0.13
			TOTAL		2.60	2.34
Timothy (<i>Phleum pratense</i>)	9.5	12.0	Purple spot	<i>Heterosporium phlei</i>	0.11	0.10
			Leaf streak	<i>Drechslera phlei</i>	1.46	1.55
			TOTAL		1.57	1.65
Fescue (<i>Festuca rubra</i>)	3.2	3.4	Brown stripe	<i>Passalora graminis</i>	0.24	6.03
			Stem eyespot	<i>Phleospora idahoensis</i>	0.91	7.42
			TOTAL		1.15	13.45
Other	23	11				

Table 3. Losses from foliage diseases of forage crops in Alberta Census Divisions 8 to 15, 1971

Census Division	No. of fields sampled	Acreage of forage crops ('000)	Yield (tons/acre)	Loss (%)	Actual production ('000 tons)	Potential production ('000 tons)	Loss ('000 tons)	Loss* (\$'000)
8	41	410	1.91	4.55	783.1	820.4	37.3	596.8
10	54	240	1.60	2.59	384.0	394.2	10.2	163.2
11	61	450	1.91	8.72	859.5	941.6	82.1	1313.6
12	31	196	1.80	5.45	352.8	373.1	20.3	324.8
13	53	399	1.80	7.97	718.2	780.4	62.2	995.2
14	8	64	1.80	5.77	115.2	122.3	7.1	113.6
15	61	686	1.86	10.52	1276.0	1426.1	150.1	2401.6
Total	315	2445	1.81	6.80	4488.8	4858.1	369.3	5908.8

* Based on a farm value of \$16 per ton of forage.