

## II. DISEASES OF FORAGE AND FIBRE CROPS

### ALFALFA

BLACK STEM (*Ascochyta imperfecta*) did not appear in Alta. until July, but by mid-August it was present in all fields examined prior to the second cutting. Leaf and stem infection was estimated as slight in 25 fields and moderate in 5 out of 30 examined in central Alta. (M.W. Cormack).

During the week of July 8 a survey was made, in company with J.L. Bolton, Dominion Forage Crops Laboratory, Saskatoon, of the alfalfa seed-growing areas of northern Sask. Observations were made in 77 alfalfa fields in the districts centering on Hudson Bay Junction, White Fox, Big River, and Loon Lake. The diseases encountered are reported under their respective headings. Black stem was prevalent on the stems and leaves in many of the fields examined. Infection was a trace in one field, slight in 36, moderate in 22 and severe in 8. The beneficial effect of burning the old plant remains before growth started was strikingly demonstrated in a few fields, where infection was only a trace in burned areas, compared with slight to moderate in nearby unburned areas (M.W. Cormack, H.W. Mead). Infection was moderate to severe in the alfalfa breeding and seed plots at Saskatoon; some inbred lines appear to have some resistance (H.W.M.).

A trace of a leaf spot (*Ascochyta* sp.) was found in all 5 fields examined in the Montreal district, Que. (T. Simard).

WINTER CROWN ROT (low-temperature Basidiomycete). The damage from winter crown rot in fields examined in Alta. in 1946 was estimated as follows:

District	Fields Examined	Percentage of Fields Examined				Total
		Tr.	Sl.	Mod.	Sev.	
Southern Alta.	51	8	37	10	0	47
West-central Alta.	109	3	21	23	25	72
Clover Bar	97	4	55	15	1	75
All Alberta	257	3	38	17	11	69

Damage was particularly severe in the west-central areas about Thorsby, Oerhill and Sangudo. About 50% of the plants were killed or seriously weakened in several fields. The pathogen also caused extensive killing of alsike clover, timothy, and various cultivated and native grasses in the same areas. In the old variety plots at Brooks and Lethbridge most of the plants were weakened by partial rotting of the crowns, and this type of damage was also fairly common throughout the irrigated southern areas. True winter-killing was not observed in hardy varieties. (M.W. Cormack).

Winter crown rot was prevalent in the Hudson Bay Junction and White Fox districts, Sask., and there was unmistakable evidence of previous damage in many fields of all districts visited during the survey. Damage caused by this pathogen during the early spring of 1946 was found in 40 of the 77 fields examined; damage was a trace in 3 fields, slight in 30, moderate in 4 and severe in 3 (M.W. Cormack, H.W. Mead). The disease also caused moderate damage in the breeding plots at Saskatoon (H.W.M.).

**BACTERIAL WILT (*Corynebacterium insidiosum*).** The estimated damage from bacterial wilt in alfalfa fields examined in Alta. in 1946 was as follows:

District	Fields Examined	Percentage of Fields Damaged				Total
		Tr.	Sl.	Mod.	Sev.	
		%	%	%	%	%
Southern Alta. (irrigated)	51	10	23	31	10	74
West-central Alta.	109	3	6	0	0	9
Clover Bar	97	25	20	10	0	55
All Alberta	257					39

Bacterial wilt was found in all except the youngest stands examined in the irrigated districts. In the first survey of the relatively new irrigation district at Rolling Hills slight to moderate damage was found in several of the older fields. The disease was found for the first time causing slight damage in a few fields in the seed growing districts at Cherrhill, Sangudo, and Westlock. The detailed survey conducted in the Clover Bar district, east of Edmonton, for 3 years has disclosed the disease in 55% of the fields in 1946 compared with 32% in 1945 and 24% in 1944; there was also a marked increase in the degree of damage in several of these fields (M.W. Cormack).

Bacterial wilt was found for the first time in 4 plantings near Weirsdale and Snowden in the White Fox district, Sask.; only a few plants were as yet affected. No trace of the disease was found in any other of the seed growing areas of northern Sask. Later, Mr. R.E. McKenzie, Dom. Experimental Station, Swift Current, who had assisted in the wilt survey in southern Alta. in July reported that bacterial wilt was very prevalent in the irrigated areas of southwestern Sask. Of the 18 fields, mainly in the Val Marie, East End and Maple Creek projects, damage was estimated as slight in 4, moderate in 4 and severe in 7. Wilt was also causing moderate damage to alfalfa under irrigation on the river flats at North Battleford (M.W. Cormack, H.W. Mead). Bacterial wilt was first reported in Man. in 1945. This year it was observed in several widely scattered localities. It seems probable that the disease has been here for several years, but had escaped notice. The pathogen was isolated,

identified and typical symptoms of wilt were produced by inoculating Grimm alfalfa plants in the greenhouse. Severe damage was confined to fields 7 or more years old (W.A.F. Hagborg).

ROOT ROT (Cylindrocarpum Ehrenbergii and Fusarium spp.) caused slight damage to 3 fields in the Sangudo and Thorsby districts, Alta. (M.W. Cormack).

WILT (Fusarium Scirpi var. acuminatum) caused slight damage in the breeding plots, Saskatoon, Sask. (H.W.M.).

ROOT ROT (Fusarium spp.) caused a trace of damage in 2 fields, slight in 5 and moderate in 2 out of 77 examined in northern Sask. F. avenaceum was the predominant species isolated (M.W.C., H.W.M.).

STAGONOSPORA LEAF SPOT (Leptosphaeria pratensis (Stagonospora Meliloti)). Infection was a trace in a field near Hudson Bay Junction and slight in one at Big River, Sask. (M.W.C., H.W.M.).

DOWNY MILDEW (Peronospora aestivalis) was reported as follows: slight infection at Smithers, B.C. (G.E. Woolliams); slight infection in 4 fields in central Alta.; appeared in the current year's seeding at Edmonton in August, becoming moderate to severe on a few plants in early September (M.W.C.); infection trace in 2 fields, slight in 2 and severe on a few plants in 1 out of 77 fields examined in northern Sask. (M.W.C., H.W.M.).

YELLOW LEAF BLOTCH (Pseudopeziza Jonesii). Infection was slight to moderate in 6 of the fields examined in central Alta. It was unusually prevalent in the plots at Edmonton early in the season and caused moderate defoliation prior to the first cutting. Very light infection occurred on the new growth in August (M.W. Cormack). The disease was very prevalent in northern Sask.; infection was slight in 8 fields, moderate in 19 and severe in 15. As with black stem, infection was less in the burned than in the unburned areas (M.W. Cormack, H.W. Mead). It was also abundant in the plots at Saskatoon (H.W.M.).

COMMON LEAF SPOT (Pseudopeziza Medicagoe) was reported as follows: Infection varied considerably with the variety in the University plots, Vancouver, B.C. (I.C. MacSwan); infection slight in only 3 fields in central Alta. in early August, but later becoming general (M.W.C.); relatively scarce in northern Sask. during July survey, infection trace in 3 fields, slight in 3 and moderate in 2 (M.W.C., H.W.M.); infection light at Saskatoon (H.W.M.); infection slight and less than usual at O.A.C., Guelph, Ont. (J.D. MacLachlan), slight in 3 fields and moderate in 2 in the Montreal district, Que., in late June (T. Simard), severe on all varieties in August at Ste. Anne de la Pocatiere (R.O. Lachance), and traces in Queens Co., P.E.I. in September (R.R. Hurst).

CROWN ROT (Rhizoctonia Sereni) caused wilting in a few plants in 2 fields in the Hudson Bay Junction district, Sask. (M.W.C., H.W.M.).

ROOT ROT (Sclerotinia Trifoliorum) affected a trace to about 10% of the plants in one plot of Grimm alfalfa, Division of Forage Crops, C.E.F., Ottawa, Ont., in early June; a few plants in adjacent red clover plots were also infected (D.B.O. Savile, J.W. Groves).

WITCHES' BROOM (virus). A relatively high proportion (10-15%) of infected plants was seen in alfalfa stands, at least 5-6 years old, in the North Okanagan, B.C. A smaller proportion was affected in similar fields in the Cariboo district (N.S. Wright). One plant was severely affected in the plots at Edmonton, Alta. (M.W.C.). Witches' broom affected occasional plants in 2 fields in the White Fox district and in one field near Loon Lake, Sask. (M.W.C., H.W.M.).

YELLOW (boron deficiency). Boron deficiency symptoms were observed in alfalfa in different sections of the Central Interior of B.C. from Prince George to Smithers during a survey in 1946 (G.E. Woolliams). It caused considerable stunting of the plants besides the yellowing of the tips in a cover crop of Grimm in a 10-acre block at West Creston, B.C. (M.F. Welsh).

#### COMMON CLOVER

WINTER CROWN ROT (low-temperature basidiomycete) was very prevalent in the early spring in the clover-growing areas of west-central Alta. It was found in all 17 fields of alsike clover examined, the damage being a trace in 1 field, slight in 7, moderate in 5 and severe in 4. Red clover was less severely affected with damage estimated as slight in 4 and moderate in 2 of the 7 fields examined. The pathogen was isolated for the first time from White Dutch clover plants which had been killed in a severely damaged field and in a natural pasture. Severe damage was reported in the early spring from a field at Nipawin, Sask.; the pathogen was isolated from diseased specimens (M.W. Cormack). Slight damage to Mammoth Red Clover was observed at Melfort (H.W. Mead).

A crown rot of undetermined cause was found at Prince George, B.C.; there were indications that it may become an important factor in fields intended for seed (G.E. Woolliams).

LEAF SPOT (Cercospora zebrina). Infection was slight in a field of alsike clover at Nipawin and moderate in one at Big River, Sask. (M.W.C. and H.W.M.). Trace was recorded in one field of red clover in the Montreal district, Que. (T. Simard).

SOOTY BLOTCH (Cymadothea Trifolii). A slight infection was found in 3 out of 8 fields of alsike clover examined in west-central Alta. (M.W.C.).

POWDERY MILDEW (Erysiphe Polygoni) was reported as follows: on red clover throughout the Prince George district, and general at Smithers, B.C.; also affected an occasional plant of alsike in the latter district (G.E. Woolliams); infection slight in 6 and moderate in 2 out of 8 fields of red clover and slight in 4 out of 8 fields of

alsike examined in west-central Alta.; infection slight on alsike and moderate on red clover in the plots at Edmonton (M.W. Cormack); slight on Redon red clover in the plots, O.A.C., Guelph, Ont. (J.D. MacLachlan).

ROOT ROT (Fusarium avenaceum). The pathogen was isolated from rotted roots of a moderately damaged old stand at Sangudo and from those of a young stand which had also suffered outworm damage at Legal, Alta. (M.W. Cormack).

LEAF SPOT (Gloeosporium spadiceum). Infection was slight in 3 out of 8 fields of red clover examined in west-central Alta. (M.W.C.); and 2 fields of red clover near White Fox, Sask. (M.W.C. and H.W.M.).

ANTHRACNOSE (Kabatiella caulivora). Infection was slight in 2 fields of red clover at Westlock, Alta. It was moderate on Siberian Red and a trace to slight on other varieties in the plots at Lacombe and Olds (M.W. Cormack). Infection was a trace to slight on Redon (Elite) at O.A.C., Guelph, Ont. (J.D. MacLachlan).

LEAF SPOT (Leptosphaeria pratensis (Stagonospora Meliloti)). Infection was a trace in 3 and slight in 5 out of 8 fields of alsike clover examined in west-central Alta. in August (M.W. Cormack). A trace was also found in 1 field of alsike at Nipawin, Sask. (M.W.C., H.W.M.).

COMMON LEAF SPOT (Pseudopeziza Trifolii). Traces were found in 6 fields of red clover out of 8 examined in the Montreal district, Que. (T. Simard).

LEAF SPOT (Stagonospora recondens). Infection was slight in 3 of the 8 fields of red clover examined in west-central Alta. The pathogen was also isolated from a stem canker found on a few plants in one of the fields (M.W. Cormack). A trace of presumably the same leaf spot was found in 5 fields in the Montreal district, Que. (T. Simard).

LEAF SPOT (Stemphylium sarcinaeforme). Traces were found in 5 fields in the Montreal district, Que. (T. Simard).

RUST (Uromyces spp.). A slight infection (U. Trifolii) was found in 2 fields of alsike clover in west-central Alta. (M.W. Cormack); traces were present on alsike at Nipawin and White Dutch clover at Big River, Sask. (M.W.C., H.W.M.). Infection was moderate to severe on Alon alsike clover at O.A.C., Guelph, Ont. (J.D. MacLachlan). Traces (U. fallens) were present on red clover in Queens Co., P.E.I. (R.R. Hurst).

A severe infection of a leaf spot, suspected of being bacterial, caused much defoliation in a field of red clover north of Montreal, Que. (T. Simard).

#### SWEET CLOVER

STEM CANKER (Ascochyta caulicola). A moderate infection was observed in 2 fields near Edmonton, Alta. (M.W. Cormack).

BLACK STEM (Asochyta Meliloti (Trel.) Davis). Infection was moderate in a roadside stand near Edmonton, Alta. (M.W. Cormack). As pointed out by Dr. Cormack, F.R. Jones (Trans. Wisc. Acad. Sci. & Letters 35: 137-138. 1944) now considers that the imperfect stage of Mycosphaerella lethalis Stone is A. Meliloti (Trel.) Davis, not A. lethalis Ell. & Barth., which is properly a synonym of A. caulicola Laub. Both A. Meliloti and A. caulicola on Melilotus alba and M. officinalis are represented in the herbarium by specimens from Alta. (I.L. Connors).

Coniothyrium olivaceum Bon. was isolated twice from the same sample of sweet clover seed obtained from the Dominion Forage Crops Laboratory, Saskatoon, Sask. The fungus has been shown to be pathogenic on flax, q.v. (T.C. Vanterpool).

LEAF SPOT and STEM BLIGHT (Leptosphaeria pratensis (Stagonospora Meliloti)). A slight infection was found in several stands in central and northern Alta. (M.W. Cormack).

ROOT ROT (Phytophthora Cactorum). A few plants were killed in a roadside stand near Turtleford, Sask. (M.W.C. and H.W.M.).

SEEDLING BLIGHT and BROWN STELE (Rhizoctonia Solani isolated). Seedling blight caused a marked reduction in the stand of sweet clover in the variety plots, Dominion Forage Crops Laboratory, Saskatoon, Sask., but infection was patchy. Seedling emergence ranged from 1 to 85% in 14 varieties or lines and from 5 to 75% in the 6 replicates of one variety. Plants continued to wilt and die through June and July and even into August. The latter plants had a brown stele (H.W. Mead, T.C. Vanterpool).

#### CORN

BASAL STALK ROT (Gibberella Saubinetii). For the first time in 5 years, some open-pollinated varieties, viz. Bailey and Wisc. 7 (Silver King), were found affected by a root and basal stalk rot in southwestern Ont. Also, all plants in one inbred line in the test plots at the Harrow Station were affected. Its occurrence was probably occasioned by an extended period of very dry weather. The symptoms tally almost exactly with those of a root and basal stalk rot described from Australia (E.T. Edwards, Agr. Gaz. of N.S.W. 47(5): 259-261. 1936) (A.A. Hildebrand).

RUST (Puccinia Sorghi). A trace was present on fodder corn in Queens Co., P.E.I., in Aug. (R.R. Hurst).

SMUT (Ustilago Maydis) was less prevalent in the Guelph district, Ont., than in 1945 (J.D. MacLachlan).

# FLAX

Prof. T.C. Vanterpool, University of Saskatchewan, Saskatoon, Sask., has again prepared a summary of his observations, entitled "Flax Diseases in Saskatchewan in 1946".

The weather during the growing season had considerable effect on the incidence of disease in flax. In the second half, the crop suffered severe heat damage, further aggravated by root rot in some instances. Leaf and stem diseases, such as rust and browning (*Rhynchospora Lini*) were very light. The period during which young flax plants were affected by seedling blight was unusually prolonged. The disease was apparently favoured by low moisture and relatively low temperatures (cf. L.F. Roth and A.J. Riker, Jour. Agr. Res. 67(11): 417-432, 1943).

SEEDLING BLIGHT (*Rhizoctonia Solani*, etc.) was more conspicuous in 1946 than usual, as it continued active longer, causing the death of seedlings up to 6 inches in height at Elrose, Saskatoon, and White Fox. *Rhizoctonia Solani* and *Fusarium Sclerotii* var. *semitumescens* were the principal fungi isolated, the two fungi occurring in the ratio of 3:1 from the Elrose sample and 5:1 from the White Fox collection. At Saskatoon, *Pythium* spp. of the *de Baryanum* type were present. The low soil moisture and below-average temperatures apparently favoured the *Rhizoctonia* and *Fusarium*.

CONIOTHYRIUM SEEDLING BLIGHT and LEAF SPOT (*Coniothyrium olivaceum* Bonard.). A damping-off and seedling blight, with symptoms indistinguishable from those of the preceding disease, was first found in Saskatchewan in 1945. It has since been described and illustrated (T.C. Vanterpool, Can. Journ. Res. Sect. C. 25(1): 54-58, 1947). The organism was isolated, along with *Rhizoctonia Solani*, from blighted flax seedlings from the Experimental Station, Scott, in the spring of 1945. It proved to be slightly to moderately parasitic to flax in artificial inoculations. The same species was later isolated from 12 out of 32 flax-seed samples of the 1945 crop, the germination of which was low at the Seed Laboratory, Plant Products Division, Saskatoon. In the spring of 1946 it was again obtained from blighted seedlings from Saskatoon and Hudson Bay Junction and from lesioned cotyledons from Nipawin. In August the pathogen was causing a leaf spot with defoliation on Crystal flax in a plot at the University. The dry weather of late summer probably prevented its further spread and the formation of stem lesions (cf. H.W. Wollenweber and H. Hochapfel, Zeitschr. f. Parasitenkunde 9: 600-637, 1937). The sudden appearance of this pathogen on flax seed in 1945 cannot be explained, but the season was undoubtedly favourable for its development. A strain of the same organism was isolated from 1% of the seed in a sample of sweet clover seed from the 1945 crop.

RUST (*Melampsora Lini*) was very light, even on Redwing.

WILT (*Fusarium oxysporum* f. *lini*). No typical wilt was seen. The fungus is sometimes isolated along with several other parasitic species from plants affected by late root rot.

STEM BREAK and BROWNING (*Rhynchospora Lini*). Infection by this disease was the lightest in the experience of the author. Only a small percentage of

the 1945 seed samples yielded the organism when tested. In the field lesions on the cotyledons were present in trace amounts. No reports of this disease were received, and only traces of stem break and browning were observed in August or September.

LATE ROOT ROT (miscellaneous fungi), like common root rot of wheat, may be found in every flax field, but it is difficult to assess the damage because affected plants are more likely to be killed prematurely in a season when scorching winds are common. On several occasions in 1946 much premature killing followed drying winds even though sub-soil moisture was fair; much of the damage could be attributed to an impaired root system caused by rot.

DIE-BACK and SCORCH (heat). Prolonged high temperature from July 26 to 30, with maxima ranging from 89° to 102° F., not only caused severe die-back (cf. P.D.S. 25: 31, 1946), but killed or scorched entire plants over large areas. In several fields north of Estevan the tops of the scorched plants were bent over, presumably away from the scorching wind. Any seed in such plants was badly shrivelled. Scorch was most common in flax on grave soil where moisture was likely to be a limiting factor, but the trouble was present in some fields in which root damage interfered with the absorption of water although subsoil moisture was reported to be fair. Flax in Saskatchewan suffered severely from die-back and scorch especially in the southeast, from Macoun to Estevan and Alameda, and north to Kisbey. Other badly affected areas were Assiniboia, Elbow, Asquith and Valparaiso. Because the seed bed was too dry in mid-May, many fields were sown late and were not sufficiently advanced to withstand hot weather. This fact explained in part the occurrence of and slightly damaged and heavily damaged fields in the same district.

HEAT-CANKER. Only 3 reports of heat canker were received. Although rainfall was below average in June, the temperature was also low.

SELENOPHOMA BRANCH SPOT (*Selenophoma linicola*) was first encountered in Saskatchewan in 1944 and again in 1945 (P.D.S. 25: 32). The fungus was found on the branches and pedicels of flax in late August and early September, lightly distributed in the eastern half of Saskatchewan from White Fox to Estevan and from the south Saskatchewan river to the Manitoba boundary. No survey was made in the western part of the province. It has been found on the linseed varieties Arrow, Bison, Bolley's Golden, Buda, Crystal, Custer, Dakota, Malabrigo, Redson, Redwing, Rocket, Royal, Sheyenne, and Victory, and on the fibre flax Stormont Girrus. In preliminary cross-inoculation experiments no infection was obtained on brome grass, crested wheat grass or slender wheat grass, when they were inoculated with the *Selenophoma* from flax, nor did flax become infected when it was inoculated with *S. bromigera*. No previous report of a *Selenophoma* on flax has been seen. The organism has been described as a new species, *Selenophoma linicola*, in *Mycologia* 39: 341-348. 1947.

PASMO (*Septoria linicola*). A collection of pasmo with the fungus sporulating freely was made on flax in the Irrigation Nursery at Saskatoon on Aug. 7, 1946. This collection appears to be the first made in Saskatchewan. In previous years several collections of suspected



pasmo have been made, but spores of the fungus could not be found. On Aug. 28 pasmo was fairly prevalent in an area in the southeast of the province including Macoun, Estevan, Alameda, and Kisbey. Stem infections, with pycnidia well formed, were moderate in fields of Royal and Victory at Macoun, Hitchcock, and Bienfait, but the damage was estimated to be slight as no definite shrivelling of the seed was apparent. Similar, but sterile, lesions were also common and could be found with diminishing frequency to near Yorkton. On Sept. 13, lesions of the same type but also without spores were found at Armley and White Fox.

These findings suggest that moist conditions following infection are not sufficiently prolonged to permit pycnidium formation in most districts of Saskatchewan. It is also probable that the suspected cases were genuine pasmo. Dry atmospheric conditions in August may be an important factor in the slow spread of pasmo in Saskatchewan in spite of its presence for several years in Manitoba and in adjoining states to the south.

ANTHRACNOSE (Colletotrichum Lini) has not been seen in the field during any of the surveys in Saskatchewan. Colletotrichum Lini has, however, been isolated from lesioned cotyledons of fibre flax at the Melfort Station; the seed was from Ottawa. C. Lini was also present in the University plots and seed farm, Saskatoon, in 1942, but it has not been encountered since.

A similar report on "Flax Diseases in Manitoba in 1946" was prepared by W.E. Sackston, Dominion Laboratory of Plant Pathology, Winnipeg, Man.

More land was sown to flax in Man. in 1946 than any year previously. The yield per acre was good and a record crop was harvested. The soil was dry at seeding time and dry weather continued until late June. In consequence emergence was very irregular. Early plants were in bud by the time the late ones emerged, but because of favourable weather later in the season and an open fall even the late plants matured satisfactorily.

PASMO (Septoria linicola). PasmO was observed on the stems of flax in a field on Aug. 9, about 3 weeks earlier than in 1945. The disease was also more severe than the previous year. In a survey of 60 fields in late August infection was a trace in 13, light in 20, moderate in 5, and severe in 6. The heaviest infections were seen at Morden, Brandon, Elm Creek and Gladstone.

In the experimental plots, heavier infections resulted from inoculations made on July 11 than from those made June 26. Leaf lesions developed in 12-14 days after the date of inoculation, but the first stem lesions were seen almost simultaneously, about July 25, in both series. As in 1945, heavy infections caused by artificial inoculation hastened the maturity of susceptible varieties and reduced their yield to 35-50% of that of the uninoculated plots of the same varieties.

PasmO was also identified on Viking flax grown in a plot at Moeth Park, Sask. and sent to the Laboratory. For its occurrence in Sask. see Prof. Venterpool's report.

RUST (Melampsora Lini), although general on flax throughout Man., was usually only a trace. The heaviest infections observed occurred in 2 fields at Wawanesa, where infection averaged 2% and 4% respectively, and in one field at Portage la Prairie, where it averaged 5% (B. Peturson).

ANTHRACNOSE (Colletotrichum Lini) was seen in the field only in small plots of flax grown from seed supplied from Ottawa. At Morden, on July 11 it was confined to a two-row plot of a single variety, but by July 18 it had spread to adjacent plots and all plants in the original plot were infected. Anthracnose was found in the same variety at Winnipeg. The pathogen was isolated from the diseased tissue.

Colletotrichum Lini was isolated from 4% of the seed of Viking produced at Brandon in 1944. When seed from the same source was sown in the greenhouse sporulating lesions developed on the cotyledons of some seedlings.

ROOT ROT and WILT. Isolations were made from several wilted plants collected in the flax plots at Winnipeg in July. Green wilted plants yielded Pythium sp. from the distal parts of the roots and Fusarium sp. from the tissues near the crown. Plants, that were partly brown yielded Rhizoctonia Solani from the terminal section of the roots, R. Solani and Pythium sp. from the mid-section and Fusarium sp. from pieces of root near the crown. Wilted and completely brown plants yielded R. Solani from all parts of the roots, with Fusarium sp. also present from the upper sections of the root. No wilt was seen in farmers' fields.

TOP BROWNING. Discoloured plants were present singly or in patches in half of the 60 fields surveyed at the end of August. The amount of discoloration varied from the pedicels to the whole plant. The bolls on discoloured plants were often smaller than those on neighbouring green plants.

BOLL BLIGHT was conspicuous in flax in 1946, but was less severe than in 1945. The trouble was light in 14 fields, moderate in 21 and severe in 15 out of 60 examined. Several fungi, including Alternaria sp. and Penicillium sp., were isolated at random from blighted bolls. The two fungi mentioned did not prove pathogenic.

STEM BREAK and BROWNING (Polyspora Lini) was not observed on cultivated flax in Man. The fungus was found fruiting profusely on year-old stems of wild flax, Linum Lewisii, collected at Boissevain, Man., and Kerrobert, Sask. It was also isolated from seeds of L. Lewisii in Man. in 1945 and 1946. The 1945 isolations were used to inoculate cultivated flax in the greenhouse; the fungus proved pathogenic when the plants were kept under humid conditions.

### Other Observations

**WILT (*Fusarium oxysporum* f. *lini*)** was severe in one plot of Cirrus at the Station, Ste. Anne de la Pocatiere, Que. The pathogen was also isolated from specimens collected in an experimental plot at Maskinonge by L. Cabana, who reported the damage was severe (R.O. Lachance).

**RUST (*Melampsora lini*)**. A trace was present on some varieties in the plots at Lacombe, Alta. (M.W.C.). Late-sown fields of Liral Prince were severely affected by rust at Ste. Martine, Que. The seed had been imported from England from a section where rust is prevalent (R.O. Lachance).

**DIE BACK** slightly affected Cirrus and Gossamer in the plots at Ste. Anne de la Pocatiere and Normandin, Que. Several isolations of *Alternaria* were made, but all were identified as a non-sporulating strain of *A. tenuis* (R.O. Lachance).

### SAFFLOWER

**RUST (*Puccinia Carthami*)**. Infection was slight in the plots at Lethbridge, Alta. (G.B. Sanford).

### SORGHUM

**BACTERIAL LEAF SPOT (*Pseudomonas syringae*)**. Infection was moderate in the plots at Edmonton, Alta. (M.W. Cormack).

### SOYBEAN

The observations below constitute a special report, "Soybean diseases in Southwestern Ontario in 1946" by L.W. Koch and A.A. Hildebrand.

For the third year in succession, soybeans were harvested under ideal weather conditions and the seed entered storage with a low moisture content. Soybean diseases were, therefore, much less prevalent in 1946 than in years when weather-damaged seed is planted. Observations were based on periodic examination of experimental plots at Guelph, Ridgeway and Harrow and surveys of commercial stands in Essex, Kent and Middlesex Counties.

**DOWNY MILDEW (*Peronospora manshurica*)** was more prevalent than for several years, even under the extremely dry conditions in Essex Co. in 1946. Infection was heaviest on Capital and its extreme susceptibility may affect its present success as a commercial variety. Infection was also heavier on A.K. Harrow than on the varieties Highland, O.A.C. 211, Goldsoy and Harman. It is always difficult to estimate the loss caused by downy mildew, but it must cause some reduction in yield in view of its widespread occurrence.

In last year's report (P.D.S. 25: 39) it was suggested that seed infected by downy mildew gives rise to systemically infected plants, which not only in turn produce infected seed but also become foci for current season infection. Histologic studies have borne out this assumption. Plants

from seeds encrusted with oospores of P. manshurica become systemically infected and the mycelium, having progressed up the stem, finally invades all parts of the plant including the developing seed. However, the disease can be greatly reduced by seed treatment. In May 1946, treated (Spergon) and untreated, mildew encrusted seed of the varieties A.K. Harrow and Harman were planted in randomized plots at Harrow. Incidence of plants systemically infected was as follows:

	<u>Spergon treated</u>	<u>Untreated</u>
A.K. Harrow	0%	5.4%
Harman	1.0%	12.9%

The effectiveness of seed treatment suggests that infection is not deeply seated in the seed.

STEM ROT (Sclerotinia sclerotiorum), although previously reported on field and snap beans in Canada, appears not to have been noticed on soybeans. On Sept. 11, near Blenheim, Kent Co., in one corner of a field of Lincoln soybeans, protected on two sides by a thick wind break, was found a small area within which most plants were dying from stem rot. By Sept. 27, the disease had spread over and destroyed almost completely  $3\frac{1}{2}$  acres of the 12-acre field. The destruction was the most complete and extensive encountered in 5 years' survey of soybeans. In most descriptions of the disease, the stem is said to be girdled at the point of attack near the soil line, the plant dying above the girdle. In the present instance, the fungus spread in many plants from the stem into the pods where seeds were displaced by sclerotia.

BUD BLIGHT (virus of tobacco ring-spot group) occurred sporadically for the most part. In a stand of Harman, A.K. Harrow, and Lincoln being grown for registration side by side in the same field infected plants occurred with much greater frequency in Lincoln than in the other two varieties. Evidence of 2 years' experimental work at Harrow indicates that the disease, unlike mosaic, is not seed-borne.

Several other diseases were noted now and then throughout the season, but they caused only slight damage and deserve only brief mention. The usual smattering of BACTERIAL BLIGHT (Pseudomonas glycines) resulted in slight defoliation. MOSAIC (Soja virus 1) was virtually absent except in some stands of Richmond; not over 2% of the plants were infected in any stand. BROWN SPOT (Septoria glycines) was present for a short time early in the season on the unifoliate or first true leaves of most varieties. PHYLLOSTICTA LEAF SPOT (P. sojascicola) also produced the typical tattered-leaf symptom for a short time early in the season. POD and STEM BLIGHT (Diaporthe Phaseolorum var. Sojae) occurred very sporadically. FUSARIUM BLIGHT (F. oxysporum f. tracheiphilum) was slightly more prevalent than last year more particularly on A.K. Harrow. SUN SCALD (non-parasitic) first diagnosed on field beans, was later recognized as affecting many stands of soybeans.

SUGAR BEET

LEAF SPOT (Cercospora beticola). Infection was slight to moderate on sugar beets and mangels about Guelph, Ont. (J.D. MacLachlan).

SUNFLOWER

DOWNY MILDEW (Peronospora Helstedii). A moderate infection was observed in a field at Ste. Anne de la Pocatiere, Que. (C. Perrault).

WILT (Sclerotinia sclerotiorum) was present in a garden at Saskatoon, Sask., and a specimen was received from Togo (H.W.M.). Wilt or stem rot was general, but damage was usually slight, in the sunflower area of southern Man. However, at Emerson, in a 100-acre field following sweet clover, an average of 14% of the plants were affected. This disease of sunflowers merits attention (W.L. Gordon). Quite a number of plants were killed in a field at Ste. Anne de la Pocatiere, Que. (C. Perrault).

LEAF SPOT (Septoria Helianthi) was common in the sunflower area of southern Man. and was destructive to the leaves in some fields about mid-August (W.L. Gordon).

CULTIVATED GRASSESAGROPYRON - Wheat Grass

Ergot (Claviceps purpurea). Infection trace on A. trachycaulum in the plots at Edmonton, Alta., and about 10% on A. repens at Innisfail (M.W.C.). Affected A. repens brought in to the Laboratory, Charlottetown, P.E.I. (R.R. Hurst).

Snow Mould (low-temperature basidiomycete) caused slight damage to A. cristatum at Fallis, Alta. (M.W. Cormack).

Leaf Spot (Ocularia pulchella (Ces.) Sacc. var. Agropyri J.J. Davis) collected on A. repens at Highland Park, near Ottawa, Ont. (D.B.O. Savile).

AGROSTIS ALBA - Red Top

Brown Stripe (Scoletotrichum graminis). Slight infection on Reton (Foundation crop) at O.A.C., Guelph, Ont. (J.D. MacLachlan).

ALOPECURUS PRATENSIS - Meadow Foxtail

Stem Rust (Puccinia graminis). Heavy on a few clumps, but none on most in plot, Division of Forage Crops, C.E.F., Ottawa, Ont. (D.B.O. Savile).

BROMUS - Brome Grass

Ergot (Claviceps purpurea). About 10% of ergot found in B. inermis at Innisfail, Alta. (G.B. Sanford).

Snow Mould (low-temperature basidiomycete). A trace of damage was found in a field of B. inermis at Fallis, Alta. This grass has proved highly resistant in field tests at Edmonton (M.W. Cormack).

Leaf Blotch (Helminthosporium Bromi). Infection was slight in 4 fields in central Alta. and in the plots at Olds (M.W.C.).

Scald (Rhynchosporium Secalis). Infection was slight in the plots at Edmonton, Alta. (M.W.C.).

Leaf Spot (Selenophoma bromigena). Infection lighter than in 1945, but very common at Saskatoon, Sask.; light at Melfort (H.W.M.).

#### DACTYLIS GLOMERATA - Orchard Grass

Rathay's Disease (Corynebacterium rathayi (E.F. Smith) Dowson). An outbreak of Rathay's disease occurred in the northeastern part of the main orchard at the Station, Ste. Anne de la Pocatiere in June. The affected area had been sown recently with seed, very probably of Danish origin. The symptoms on the leaves, stems and pedicels were typical of the disease. Half the plants were affected and the damage to these was severe. This is the first record of its occurrence in Canada (A. Payette).

Brown Stripe (Scoletotrichum graminis) was slight to moderate on seed plots of Oron at O.A.C., Guelph, Ont. (J.D. MacLachlan).

#### ELYMUS

Ergot (Claviceps purpurea) in the honey-dew stage was found in the University plots, Saskatoon, Sask., in July (H.W.M.).

Powdery Mildew (Erysiphe graminis). Infection slight on E. condensatus and moderate on E. junceus in the plots at Edmonton, Alta. (M.W. Cormack).

Leaf Rust (Puccinia Clematidis). Infection was a trace on E. junceus and slight on E. condensatus in the same plots (M.W.C.).

#### FESTUCA - Fescue

Leaf Blotch (Helminthosporium dictyoides). Trace on Mofon (F. pratense) in an O.A.C. seed plot, Guelph, Ont. (J.D. MacLachlan).

Bacterial Leaf Spot (Bacterium Agropyri). A trace of infection was found on F. rubra at Olds, Alta. (M.W. Cormack).

Snow Mould (low-temperature basidiomycete). The damage was severe in fields of F. rubra at Sangudo and Fallis, Alta. (M.W. Cormack).

#### LOLIUM PERENNE - Perennial Rye Grass

Leaf Spot (Helminthosporium siccans). Infection was mild on Peron in a seed plot at O.A.C., Guelph, Ont. (J.D. MacLachlan).

#### PHLEUM PRATENSE - Timothy

Snow Mould (low-temperature basidiomycete). Damage was found in all 16 fields of timothy examined in west central Alta. in the early spring. It was estimated to be slight in 5 fields, moderate in 2, and severe in 9. It was also severe in several mixed stands of timothy and alsike clover (M.W. Cormack).

Leaf Spot (Heterosporium Phlei). Infection was slight in 2 fields in central Alta. and in the plots at Edmonton and Olds (M.W.C.). It was also slight on both Paton and Medon varieties in plots at O.A.C., Guelph, Ont. (J.D. MacLachlan).

Stem Rust (Puccinia graminis var. Phlei-pratensis) was observed at York, P.E.I. (R. Bagnall).

Brown Stripe (Scoletotrichum graminis). Infection was moderate and mostly on the lower leaves of Paton and Medon in the plots at O.A.C., Guelph, Ont. (J.D. MacLachlan).

Cultivated Grasses

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POA - Blue Grass

Powdery Mildew (*Erysiphe graminis*). Infection was moderate in the plots at Edmonton, Alta. (M.W.C.).

Brown Stripe (*Scoletotrichum graminis*). Infection was slight on *P. pratensis* in the plots at Edmonton, Alta. (M.W. Cormack). It was a trace on Kenon (*P. pratensis*) in the plots at C.A.C., Guelph, Ont. (J.D. MacLachlan).

LAWNS and GOLF COURSES

Snow Mould (low-temperature basidiomycete). Damage was prevalent and severe at Edmonton and at other points in central Alta. Lawns and golf greens which had been treated with mercurials suffered little or no damage (M.W.C.). Snow mould was very rarely observed again in 1946 at Saskatoon, Sask. (T.C. Vanterpool).