II. DISEASES OF FORAGE AND FIBRE CROPS

ALFALFA

CROWN GALL (Agrobacterium tumefaciens). A single creeping-rooted plant of Medicago falcata growing in the plots at Saskatoon, Sask., was found severely affected by crown gall (H.W. Mead, I.L. Conners).

BLACK STEM (Ascochyta imperfecta). Leaf and stem infection was slight in most stands of alfalfa examined in Alta. before the first cutting. In July, infection was estimated as 4-tr. 13-sl. 9-mod./26 fields in central Alta. It ranged from slight to severe in the variety plots at Edmonton and Lethbridge (J.D.G.). Black stem infection was moderate in the moist, cool areas of Sask; elsewhere it was slight. Dry hot weather effectively checked its development over much of central and northern Sask. The disease developed rapidly following the August rains and cooler weather, but it caused much less defoliation than in 1946. Black stem is relatively rare in the warmer south, even where the crop is under irrigation. Burning for insect control destroys much of the inoculum and reduces the severity of infection (H.W.M.).

WINTER CROWN ROT (low-temperature basidiomycete). Damage from winter crown rot in the fields examined in northern and central Alta. was estimated as follows:

District	Fields Examined	Fields Damaged				
		Tr.	Sl.	Mod.	Sev.	Total
		%	%	%	%	%
Northern Alta.	37	30	46	10	-	86
West-central Alta.	50	8	56	12	12	88
Clover Bar	83	5	38	5	-	48
All Districts	170	11	45	8	4	68

Infection was found in most of the fields examined in central and northern Alta., including the Peace River District. The damage, however, was not as severe as in 1946, except in a few fields in the Cherhill and Thorsby districts. It was estimated as slight to severe in the variety plots at Lacombe. In southern Alta. damage from winter crown rot was for the most part obscured by true winter-killing, which was prevalent and severe at Brooks, and present, although to a lesser extent, at Lethbridge (M.W. Cormack).

Winter crown rot damage was moderate in the moist wooded areas in northeast Sask., whereas it was a trace to slight in areas on the open prairie. Infection was general in the Prince Albert - White Fox area and damage moderate in 40% of the fields examined and slight in another 40%.

In the Hudson Bay Junction, Meadow Lake, and Goodsoil areas damage was severe in 4% of the fields, moderate in 56% and slight in 20%. At Saskatoon and Melfort, damage was slight (H.W.M.).

BACTERIAL WILT (Corynebacterium insidiosum) was found in one field of Grimm at Grand Forks, B.C. Infection was so severe that most of the plants were dead. According to the owner alfalfa is largely killed out in fields on his farm three years after sowing (G.E. Woolliams).

The estimated damage from bacterial wilt in alfalfa fields in northern and central Alta. in 1947 was as follows:-

District	Fields Examined	Fields Damaged				
		Tr.	Sl.	Mod.	Sev.	Total
		%	%	%	%	%
Northern Alta.	37	5	-	-	-	5
West-central Alta.	50	10	2	-	-	12
Clover Bar	83	16	20	11	-	47
All Districts	170	12	11	5	-	28

Bacterial wilt was found for the first time in fields at Falher and Hines Creek in the Peace River District and at Barrhead and Rocky Mountain House. The percentage of diseased fields in the Clover Bar district was slightly reduced this year, apparently because several of the older, most severely diseased ones had been ploughed up. There was no evidence of rapid spread of the disease in the other fields under observation in this district. A detailed survey was not made in southern Alta., this year, but observations made in several irrigation districts indicated that there was more damage than usual due to weakening of the plants through winter injury (M.W. Cormack).

A careful survey of the principal alfalfa-growing districts in Sask. revealed bacterial wilt present as follows: In the irrigated areas (1) Val Marie, infection general and severe, damage 3-mod. 12-sev./15 fields; (2) East End, infection general but less severe than at Val Marie, damage 5-mod. 5-sev./10 fields; (3) Maple Creek, damage 2-mod. 6-sev./8 fields; (4) North Battleford, one large field with a general moderate infection. In the unirrigated areas (1) Prince Albert - White Fox, a few affected plants in 12 fields; (2) Melfort, moderate infection in alfalfa plots at the Station and trace on 2 nearby farms; (3) Hudson Bay Junction, Meadow Lake, Goodsoil, no wilt found. (H.W.M.).

Bacterial wilt was found throughout Man., but there was no apparent increase in its prevalence (W.J. Cherewick).

ROOT ROT (Cylindrocarpon Ehrenbergi and Fusarium spp.). Damage was 4-sl. 2-mod./37 fields in the Peace River District, Alta. (M.W. Cormack).

WILT (Fusarium Scirpi var. acuminatum). Slight infection and damage were observed at Saskatoon, Sask., during hot weather, when wilting was evident. Badly rotted plants were not difficult to find in September. The pathogen was isolated (H.W.M.).

STAGONOSPORA LEAF SPOT (Leptosphaeria pratensis (Stagonospora Meliloti). Infection was slight in 2 fields near Edmonton, Alta. (J.D.G.). A slight to moderate infection was present in the plots at Melfort, Sask. (H.W.M.).

DOWNY MILDEW (Peronospora aestivalis). Affected specimens were received from the Station, Prince George, B.C., 15 July 1946 (W. Jones). Downy mildew was general on the lower leaves on second growth Grimm in a field at Grand Forks, B.C. (G.E. Woolliams). Infection was slight in 4 fields and moderate to severe on occasional plants in other fields in central Alta.; it ranged from a trace to severe on individual plants in a plot at Edmonton (J.D.G.).

YELLOW LEAF BLOTCH (Pseudopeziza Jonesii). Considerable defoliation was observed in a 10 acre field at Sumas 5 July 1946. Stagonospora leaf spot was also present (W. Jones). Infection was 5-sl. 3-mod. 1-sev./50 fields in west central Alta.; the disease was not as prevalent as usual early in the season in the plots at Edmonton (J.D.G.). Yellow leaf blotch is ordinarily a hot weather (July) disease in Sask., but infection was much lighter this year than in 1946. It caused moderate defoliation in an old field at Saskatoon. In the new plantings in the Goodsoil area the disease was not found. Infection was much lighter on burned than unburned areas in the Torch River area. It appears that burning in the early spring for insect control destroys much of the natural inoculum from previous crops (H.W.M.).

COMMON LEAF SPOT (Pseudopeziza Medicaginis) was much less prevalent than usual in Alta.; only a slight infection was found in the plots at Edmonton in August (J.D.G.). Slight damage was found in the dry northern areas of Sask. during the summer, but a moderate infection developed after late summer rains. Little of the disease was present in the warmer areas in southern Sask. (H.W.M.). This leaf spot caused slight defoliation in a field of Grimm at Beaumont, Que. (R.O. Lachance).

CROWN ROT (Rhizoctonia Solani) continues to be the most destructive disease of alfalfa and sweet clover in Man. In some 3-year old fields of alfalfa, less than 50% of the plants had survived (W.J. Cherewick).

RUST (Uromyces Medicaginis). A few pustules of rust were found on alfalfa at the Station, Melfort, Sask. This report is the first for Sask. (H.W. Mead, M.W. Cormack). A systemic Aecidium, not previously reported in North America, was found 3 June on cypress spurge (Euphorbia Cyparissias) at Braeside, near Arnprior, Ont., by E.G. Anderson. Uredinia were observed on June 17 in fair abundance on seedlings and occasionally on older plants of black medick (Medicago lupulina) in immediate association with affected spurge.

The rust was later found in the area on alfalfa, but early in July the affected shoots of the spurge had dried up and virtually disappeared. Greenhouse inoculations confirmed the observations in the field. It is concluded that the Aecidium on spurge is, at least in part, connected with Uromyces Medicaginis, which occurs sparingly over the United States. Canadian specimens are in the herbarium from about Ottawa and London. The affected spurge plants usually produce several affected shoots and are quite conspicuous when the aecia are mature but they are impossible to find after the collapse of the rusted shoots. The aecia mature about the time the plant flowers and the affected plants are most easily detected immediately before or just after the plant is in full bloom. Search for the rust on the spurge at other centres, where small colonies of this weed occur, was unsuccessful (I.L. Conners, D.B.O. Savile).

CROWN WART (Urophlyctis Alfalfae) was prevalent on one selected strain of the Rhizoma variety at the Farm, Agassiz, B.C. (W. Jones).

WITCHES' BROOM (virus) affected about 20% of the plants in a 1 1/2 acre field of alfalfa which was 8 years old, in the Cariboo district, B.C.; the damage was estimated to be 15%. A much lower percentage of affected plants was seen in more recently seeded stands (N.S. Wright). A few plants were affected in four of the stands examined in central and northern Alta. (J.D.G.).

BLOSSOM DROP (?fungus) was prevalent in Man. early in the blossoming period, but its further development was checked by hot dry weather in July; a good set of seed resulted (W.J. Cherewick).

CHLOROSIS (non-parasitic) was observed in several widely separated fields in Man. and attracted the attention of the growers. Careful examination failed to reveal any pathogen present. The disorder was probably caused by some soil deficiency; it was most prevalent on high lime soils (W.J. Cherewick).

WHITE TIP (physiological). Whitening of the tips of the leaves, apparently due to drought, was severe on 15% of the plants in a field at Peace River, Alta., in July (M.W. Cormack).

YELLOWS (boron deficiency). Symptoms were general throughout one section of the Salmon Arm district, B.C. From 50 to 90% of the plants showed yellows, depending on the field; the growth showed also the characteristic severe dwarfing (G.E. Woolliams).

SWEET CLOVER

ROOT (Cylindrocarpon Ehrenbergi, etc.). Severe damage occurred in the early spring in three fields near Colinton, Alta.; C. Ehrenbergi was the predominant species isolated. In September slight damage was found in young stands of several varieties at Lacombe (M.W. Cormack).

LEAF SPOT and STEM BLIGHT (Leptosphaeria pratensis (Stagonospora Meliloti). Infection was a trace in the 5 fields examined in central Alta. It was also slight on Yellow Blossom at Olds (J.D.G.).

WITCHES' BROOM (?virus) affected a few scattered plants in the Cariboo district, B.C. (N.S. Wright).

COMMON CLOVER

WINTER CROWN ROT (low-temperature basidiomycete). Damage was slight in 4 fields and moderate in 3 of alsike clover, and slight in 2 and moderate in one of red clover examined in northern and central Alta. (M.W. Cormack). Damage from winter crown rot alone or with true winter killing occurred in 5 out of 6 fields of alsike clover which were sown with a nurse crop in 1946, in the Nipawin and Torch River areas, Sask. (H.W.M.).

CERCOSPORA LEAF SPOT (C. zebrina) was moderately heavy in parts of a field of red clover at Westboro, Ont. (D.B.O. Savile).

SOOTY BLOTCH (Cymadothea Trifolii). Infection was slight in a field of alsike clover and in one of red clover near Thorsby, Alta. (M.W.C.). A heavy infection was present in a field of alsike clover in blossom in Carleton Co., Ont. but no defoliation was seen (R.J. Baylis). A slight infection was observed on alsike clover at Ste. Anne de la Pocatiere (R.O. Lachance) and traces on a sample of red clover from Kensington, P.E.I. (R.R. Hurst).

POWDERY MILDEW (Erysiphe Polygoni). Infection was 5-sl. 6-mod. 1-sev./12 fields of red clover examined in central Alta. in late August. It was found on all varieties in the plots at Lacombe and Edmonton (J.D.G.). A slight infection was present on red clover at Ste. Anne de la Pocatiere, Que. (R.O. Lachance).

GLOEOSPORIUM LEAF SPOT (G. spadiceum). A slight infection was found in 2 fields of red clover in west-central Alta. (J.D.G.). A heavy, destructive infection was seen in a small isolated clump of red clover growing in the shade along a woodland road near Danford Lake, Que. Little or no cultivated clover occurs in the district. This collection appears to be the first record for Eastern Canada (D.B.O. Savile).

ANTHRACNOSE (Kabatiella caulivora). Infection was a trace to slight in 13 fields and moderate in 4 out of 22 of Altaswede red clover examined in central Alta. It was also slight on Siberian Red and a trace on Altaswede and other varieties at Lacombe and Olds (J.D.G.).

STAGONOSPORA LEAF SPOT (Leptosphaeria pratenis (Stagonospora Meliloti). Infection was 14-sl. 5-mod./20 fields of alsike clover in central Alta. (J.D.G.).

ROOT ROT (Plenodomus Meliloti, etc.). Extensive rotting of the lower portions of the tap roots occurred in a field of red clover near Thorsby, Alta.; P. Meliloti was isolated. Slight damage was found in a field in the Peace River district (M.W. Cormack).

COMMON LEAF SPOT (Pseudopeziza Trifolii). A 25% infection was found on red clover plants in a low-lying area of a field on the Caldwell farm, C.E.F., Ottawa, Ont. The plants were in full bloom and no defoliation had yet taken place (R.J. Baylis). A heavy infection was observed in parts of a red clover field at Westboro (D.B.O. Savile). A specimen of red clover affected by this leaf spot was received from Prince Co., P.E.I. (R.R. Hurst).

CROWN ROT (Sclerotinia Trifoliorum) infected 21% of the plants of "Ottawa" selection of red clover in the plots of the Division of Forage Plants, C.E.F., Ottawa, Ont., and caused severe damage. In the alsike clover and alfalfa ranges the disease was also common but less than 10% of the plants were affected. Isolations of the pathogen were identified by J.W. Groves (R.J. Baylis).

STAGONOSPORA LEAF SPOT (S. recedens). Infection was 3-tr. 4-sl. 1-mod./22 fields of red clover in central Alta. A light infection occurred on all varieties in the plots at Lacombe (J.D.G.).

RUST (Uromyces spp.). Rust (U. Trifolii) was common on alsike clover along the roadsides at Fanny Bay, B.C. In the same locations U. minor was common on Trifolium dubium, a weedy species very abundant on the Pacific Coast. This rust may not have been reported previously in the Survey, but it has been recorded by Arthur from B.C. and is represented in the Herbarium by specimens on T. microdon collected by Macoun, some as early as 1887. (W. Jones, I.L. Conners). Infection (U. fallens) was light but general in a field of red clover in Carleton Co., Ont. (R.J. Baylis). A trace was present on red clover from Winslow, P.E.I. (R.R. Hurst).

MOSAIC (Trifolium virus 1). A trace of mosaic was found in 3 fields of red clover in York Co., N.B. (D.J. MacLeod).

WITCHES' BROOM (virus). A few plants of Altaswede red clover were severely affected at Edmonton, Alta. (J.D.G.).

BUCKWHEAT

YELLOWS (Callistephus virus 1) was general and severe on tartarian buckwheat in York, Sunbury and Carleton Counties, N.B. A trace was found on Silver Hull at the Station, Fredericton (D.J. MacLeod).

CORN

EAR ROT (Fusarium sp.). An occasional ear was infected in a field at Bradley, P.E.I. (R.R. Hurst).

RUST (Puccinia Sorghi). A trace was observed in a field at Kensington, P.E.I. (R.R. Hurst).

SMUT (Ustilago Maydis). Specimens were received from Charlottetown and Royalty, P.E.I. (R.R. Hurst).

FLAX

Prof. T.C. Vanterpool, University of Saskatchewan, Saskatoon, Sask. has summarized his observations in an account entitled: "Flax Diseases in Saskatchewan in 1947".

Flax diseases were of little consequence in the drier parts of Sask., but a hot dry spell, July 7-15, with the daily maximum temperature above 90°F. caused a die-back of the upper third, or, in extreme cases, a scorching of the whole plants. Yields were adversely affected depending on the severeity of the injury. Yields were high in the eastern half of the province where moisture conditions were favourable and were apparently little affected by the various diseases which developed late in the season.

SEEDLING BLIGHT (Rhizoctonia Solani, etc.) caused a slight thinning of the stands in Sask. In the early isolations, Pythium spp. (de Baryanum-ultinum type) predominated, followed by Fusarium spp., whereas Rhizoctonia Solani was present in small amounts in some samples only. By July 7, R. Solani was the most common fungus, Fusarium spp. next and Pythium spp. only occasionally isolated. Different sequences in the prevalence of these fungi have been recorded before (T.C. Vanterpool, Proc. World's Grain Exhib. & Conf. 2: 300-302, 1933) depending on the temperature and moisture. See also the results obtained by L.F. Roth and A.J. Riker, (Jour. Agr. Res. 67(7): 273-293, 1943) in their studies of damping off in red pine seedlings. The weather remained continuously dry, but after a long cool spring it turned suddenly very warm.

RUST (Melampsora Lini) was again very light in Sask. On a survey in late August, rust infection was a trace to slight in crop district 1 and in adjacent areas of districts 2 and 3. Damage was negligible. A moderate infection was present on a sample of late-sown Royal received in September.

STEM BREAK and BROWNING (Polyspora Lini). Traces were found on the open prairie only in the southeast where moisture conditions were favourable. Further north, especially in the Elfros-Mozart district, the browning phase was developing rapidly after August rains. It probably did not reduce yields, but appreciable seed infection would likely result.

On June 18, a field near Asquith sown with 1943 seed showed severe cotyledonary lesioning caused by P. Lini (confirmed by plating). On account

of the hot, dry weather during most of the season, no trace of the disease could be found in this field on August 25. Similar observations have been recorded previously.

DIE-BACK and SCORCH (heat and drought) was severe in the dry central and western parts of Sask. and caused heavy losses, following a heat wave July 7-15.

A type of injury not previously encountered was found in 2 fields near Elbow and one at Dundurn, where scorch was unusually severe. It was later found in less severe form around Saskatoon. The affected plants showed a trace to severe scorch and they always occurred in scorched areas. In addition the individual plants were surrounded at 3/4 to 1 in. below soil level with a grey-black sclerotium-like ring having a metallic lustre, up to 1/16 in. thick and 3/16 to 1/4 in. broad. The soil was dry and hard and an air space usually was present around the base of each plant indicating subjection of the plants to strong winds. In some areas 75% or more of the plants were affected. The sclerotium-like masses proved to be compacted soil. The portion of the roots under these masses was usually unblemished and only rarely were present small reddish-brown lesions. This type of injury was first observed a few days after a heavy wind and rainstorm, which ended a long hot dry spell.

PASMO (Septoria linicola). Pasmo was first found on Aug. 29-30 on flax in crop district 1 and in parts of districts 2 and 3, in southeastern Sask. Again, the disease appeared too late in most fields to do much damage. Even in districts such as Hirsch, Hitchcock, Estevan, and Alameda, where the disease was most prevalent, shrivelling of the seed was slight in the fields examined. Moisture conditions were good in the southeast and the highest yields in the province were obtained there. Pasmo, however, was more generally distributed throughout the area than in 1946. It was also found at Saskatoon on late-sown flax on Sept. 5.

Mature pycnidia of a species of Phoma were found on a few plants in a field near Weyburn. The upper half of the affected plants was conspicuously blackened. A Phoma has not previously been observed in the field although Phoma spp. have been isolated from flax seeds several times in the last few years. Most isolates are only moderately pathogenic, but one of them identified as P. exigua proved to be a virulent pathogen. In preliminary trials the Weyburn isolate was only slightly pathogenic.

BUNCHY TOP (cause unknown) was a new trouble observed at several, widely scattered localities in Sask. The upper branches were reduced in length and bunched together at the top. The leaves remained green, but the bolls usually failed to develop. The trouble was most common near the edges of fields and in individual plants or groups, which were late in maturing. Insect sweepings were not conclusive.

BOLL SHEDDING. Specimens received from Moose Jaw and Colville showed that the bolls had separated neatly from the ends of the pedicels. Usually a piece of the pedicel remains attached when a boll falls off. Plating trials gave no clue to the cause.

SELENOPHOMA BRANCH SPOT (S. linicola), which was quite prevalent in 1946, caused very light infections this year although found in widely scattered areas. Specimens of Coniothyrium olvaceum, Colletotrichum Lini and the true WILT organism, Fusarium oxysporum f. Lini, were not collected. HEAT CANKER on seedlings was not found probably on account of uniformily cool early season. LATE ROOT ROT was not differentiated from heat and drought injury.

"Flax Diseases in Manitoba in 1947" is the subject of a report by W.E. Sackston, Dominion Laboratory of Plant Pathology, Winnipeg, Man.

Flax acreage in Man. in 1947 was 180% of that sown in 1946 and the production of linseed was similarly increased. The heavy demand for seed immediately prior to seeding time resulted in the use of much seed that was inadequately cleaned, of poor quality, and not treated before seeding.

Crop development was delayed during cool weather and above-normal rainfall in June. July and August temperatures were above normal whereas precipitation was normal in July and higher than usual in August. The intense mid-summer heat hastened the maturity of the crop appreciably. Most crops ripened at about the normal time except some late-sown fields.

Two main surveys were made to determine the diseases present in flax: an early survey covering more than 100 fields, July 14-19, and a late one covering over 140 fields in Man. and 32 fields in southeastern Sask., Aug. 27-Sept. 5.

PASMO (Septoria linicola) was recorded in early July on plants experimentally inoculated in June. The first natural infection was found on Aug. 14 in the variety plots, at the University, Winnipeg. Plants of Victory flax were severely diseased and numerous mature pycnidia of S. linicola were present on the pasmo lesions. Although stem lesions were found in farm fields somewhat earlier (Aug. 9) in 1946, heavy infections with the pathogen in fruit were later than in 1947. High temperatures in July and August and traces of precipitation on many days in July may have been responsible for the early development of pasmo in 1947, its wide distribution and severity. It was present in every field of flax seen in Man. in the late survey and was much more severe than in any previous year. Infection was a trace in 20 fields, light (5-10% of stem area affected) in 34, moderate (15-30%) in 18 and heavy (40-100%) in 69 fields.

A type of pasmo injury not previously observed on a large scale was noticed in experimental plots and farm fields in 1947. Pedicels weakened by pasmo lesions broke off during periods of heavy rains and strong winds. Stripping of bolls from this cause accounted for the complete loss of seed from heavily infected plots of Redwing at Morden, for a 50% loss in a field of Royal near Morden, a 10% loss in Royal near Deloraine and various amounts elsewhere.

SEEDLING BLIGHT (Rhizoctonia Solani, etc.). Although seedling blight is present in Man. in most seasons, it usually reduces stands very little. However, in 1947 the disease caused severe losses. Reports of destruction of flax stands at Clearwater late in June were investigated. It was found that 95% of the seedlings on 300 acres of flax had been killed

shortly after emergence and 75% were killed in another 300 acres. The loss was placed at 25% in more than 1,000 additional acres of flax in the district and similar losses were reported from large acreages elsewhere. Rhizoctonia Solani was isolated from the dead seedlings.

Blighted seedlings are usually very difficult to find when rain follows their death. For this reason it was not always possible to determine the cause of the gaps seend in flax fields in July. The general appearance of such fields, however, was very similar to those where seedling blight was found. Damage, as the result of thinning in the 110 fields examined was estimated to be nil in 10 fields, trace to 10% in 58, 11-25% in 19, 26-50% in 15, 51-75% in 7 and 95% in one field. Weeds replaced the dead flax plants in most of the fields.

STEM BREAK and BROWNING (Polyspora Lini). Although the disease has been reported previously in Man., the stem break phase was only found for the first time on 15 July 1947. Stem break occurred with heat canker in 4 fields in southwest Man. Unlike in the latter disease the break in the stem occurred at the level of the cotyledons, about an inch above the soil line.

WILT and ROOT ROT (Fusarium oxysporum f. Lini and Rhizoctonia Solani). Wilt was a trace in 16 fields and up to 15% in 4 out of 110 fields examined on the early survey. Isolations yielded Alternaria sp. (tenuis type) from most specimens; F. oxysporum and F. Scirpi var. acuminatum from roots and crowns and occasionally from the lower part of the stem; and R. Solani from roots and crowns only.

Wilt was found in 3 of the 32 fields examined in Sask. Traces of wilt were seen near Bienfait, 5% near Heward, and 10% near Carlyle. F. oxysporum f. Lini was isolated from diseased plants collected in each of these fields.

RUST (Melampsora Lini). Very little rust was seen on flax in Man. in 1947. Traces were present in some fields by mid-July. Infection increased slightly as the season advanced. By 31 Aug. rust was in the telial stage, with few telia per plant in most cases. No rust was seen in half the fields and in only 7 of the 140 examined were 75-100% of the plants affected. Rust infection was heavy in one field and moderate in two others examined by W.J. Cherewick at Winnipeg Beach in July.

Rust was also observed in Sask. but was of little importance except in two fields where telial infection was severe.

Rust on wild Linum Lewisii was extremely heavy in southwest Man., killing the plants in some locations in mid-July.

ANTHRACNOSE (Colletotrichum Lini). Dead seedlings from the variety plots at Winnipeg, for which the seed came from Ottawa, yielded C. Lini and other organisms when plated. C. Lini was also isolated from leaf spots on plants grown from Ottawa seed in the plots at Brandon and Morden. Little disease developed except on the susceptible variety Bombay when 150 varieties and selections of flax were inoculated with C. Lini in the field at Winnipeg. Treatment, with Ceresan, of seed known to be infected greatly reduced the number of seedlings killed by the organism, but it failed to give complete control in a field experiment at Winnipeg.

HEAT CANKER (non-parasitic) was unusually prevalent and severe in Man. in 1947. The intense heat during July affected flax throughout the province and on all soil types, but the worst injury occurred on the lighter soils in the western part of the province. In the fields examined in July, heat canker was absent in 48; it affected a trace to 5% of the plants in 47, 6-10% in 7, 11-20% in 2 and 50% in one field. In most of the fields where damage was heavy, the rows were sown from east to west in light or sandy soil. In several instances adjacent fields were seen with thin stands and considerable heat canker in one and thicker stands with little or no heat canker in the other. In some fields heavy weed growth protected the thin stand of flax and heat canker was light.

BOLL BLIGHT (cause unknown) was less severe than in 1946, although it was conspicuous in mid-August. From 10 to 60% of the bolls were blighted on individual plants, but the percentage of affected plants varied greatly from field to field. In the late survey boll blight was absent in 20 fields, a trace in 27, 5% in 17, 10-15% in 50, and 20-30% in 28 fields. In about 10 fields in the last group pasmo lesions were numerous on the bolls and may have caused the blighting.

All the fields seen in Sask. had some boll blight. There were traces in 13 fields, 5% in 5, 10-15% in 11, and 20-45% in 5.

BOLL DISCOLORATION (cause unknown). Black or brown discolorations were seen on bolls and occasionally on flax seeds. Isolations from discoloured tissues yielded mainly Alternaria sp. of the tenuis type.

MINOR OBSERVATIONS. Wind damage was considerable in scattered localities in Man. as a result of strong winds and drifting soil early in the growing season. Heavy rains early in the season flooded the low parts of fields in some districts. Standing water drowned out the flax completely or greatly retarded the subsequent growth. Hail damage, reputedly severe in some districts, was seen in trace amounts in one field. Drought injury due to the hot dry weather that followed a cool wet June caused plants to be stunted in some areas and evidently reduced yields appreciably. Alkali injury was also observed in several fields, the flax being stunted in patches. Chlorosis was conspicuous in several of the flax plots at the Flax Pilot Plant at Portage la Prairie on July 19. It apparently was due to some feature of the soil, from which the plants later recovered. Die-back of the upper third or half of flax plants was observed in 3 of 16 fields examined in mid-August. Only a few plants were affected in each field. Later it was difficult to distinguish the trouble from pasmo. Severe injury caused by spraying with Sinox was seen in plots of flax at the Flax Pilot Plant, Portage la Prairie. Rains prevented spraying at the date planned and induced rapid succulent growth. The Sinox was applied later on plants 10-12 in. high on a very hot day.

Other Observations

ANTHRACNOSE (Colletotrichum Lini). A trace of anthracnose was seen on Stormont Cirrus about Ste. Anne de la Pocatiere, Que.; repeated seed treatment appears to have controlled the disease (R.O. Lachance).

WILT (Fusarium oxysporum f. Lini) reduced the stands in some plots of Cirrus at the Station, Ste. Anne de la Pocatiere, Que. (R.O. Lachance).

RUST (Melampsora Lini). Infection was slight in 8 of the 12 fields examined in Alta. It was a trace in the plots at Lethbridge and Olds and a trace to slight at Lacombe and Edmonton (J.D.G.). Rust was recorded for the first time in Kamouraska Co., Que. in 1947. Fields of Cirrus, almost without exception, in several parishes showed at least a trace of rust. In a few fields, infection was slight to moderate (A. Payette).

BROWNING (Polyspora Lini) was reported from the Peace River district, Alta. (A.W. Henry).

DIE-BACK (cause undetermined) slightly affected Stormont Cirrus in a field at Ste. Anne de la Pocatiere, Que.; the disease was more prevalent in the drier sections of the field (R.O. Lachance).

HEAT CANKER caused slight damage in one field at Blackie, Alta. (J.D.G.).

SPRING FROST RESISTANCE. This spring afforded an opportunity to record the frost resistance of the leading varieties in the plots at Saskatoon, Sask. Counts were made in two-foot lengths at the opposite ends of two adjoining rows in two plots. Each count was thus based on an 8-foot length. The percentage of seedlings killed varied from 8.7% for Redwing to 48.6% for Victory. In decreasing order of resistance the varieties were Redwing, Prince, Royal, Viking, Dakota, Rocket, and Victory (T.C. Vanterpool).

MANGEL

LEAF SPOT (Cercospora beticola). Infection was slight on a few seed plants at Agassiz, B.C. (W. Jones) and in a field at Waterville, N.S. (J.F. Hockey).

LEAF SPOT (Phoma Betae). A slight infection was observed in a field of Frontenac in Kings Co., P.E.I. (R.R. Hurst).

CROWN and DRY ROT (boron deficiency) was found in some fields of roots being grown for stecklings at Grand Forks, B.C.; severe injury was found in a sample of roots received earlier for diagnosis (G.E. Woolliams).

CULTIVATED MUSTARD

WHITE RUST (Cystopus candidus) caused a trace of damage in commercial fields of black mustard in the Lethbridge area, Alta. (J.D. Gilpatrick). All plants of black mustard (Brassica nigra) were severely affected at the Botanical Garden, Montreal, Que. (J.E. Jacques).

SOYBEAN

The principal observations on soybean diseases are given in a special report, "Soybean Diseases in Southwestern Ontario in 1947" by L.W. Koch and A.A. Hildebrand.

The following observations are based, as in previous years, on periodic examinations of test and experimental plots at Chatham, Ridgetown and Harrow as well as on surveys of commercial stands in Essex, Kent and Middlesex Counties.

DOWNY MILDEW (Peronospora manshurica) was first noted about 26 June and from then on continued to be active throughout the summer on susceptible varieties such as Capital, A.K. Harrow, and Richland. In the light of the meteorological data for the season, this activity of a downy mildew is especially interesting. On 13 June there was a fairly heavy rainfall (0.70 in.), but from then until 14 Aug., when 1.93 in. of rain fell, the weather was extremely dry. Within the 62-day period indicated, a total of only 1.65 in. of rain fell on 11 different days and no shower exceeded 0.33 in. Within this period, the maximum temperature ranged from 80° to 90°F. on 37 days and from 90° to 97°F. on 18 days. Despite these hot dry conditions the disease persisted throughout the season on the varieties mentioned. It would appear that, physiologically, P. manshurica resembles very closely Pseudoperonospora cubensis, the organism causing downy mildew of cucurbits, which according to Plakidas (U.S.D.A. Plant Dis. Reptr. 31(11): 422-425. 1947) flourishes under environmental conditions corresponding to those described above. As in previous seasons, systemically infected plants were in many instances foci for current season infection.

BROWN STEM ROT (Cephalosporium sp.). On 25 Sept., while examining a stand of Lincoln soybeans in the test at the Ont. Experimental Station, Ridgetown, attention was attracted to plants, many of which had lodged and most of which showed a browning of the lower part of the stem. When stems of affected plants were cut open, they showed symptoms identical with those described by Wm. B. Allington (Phytopath. 36(5): 394. 1946) for brown stem rot. Isolations from the interior of diseased stems yielded almost invariably a fungus which when cultured later on certain media, employing the technique described by Vernon (Ann. Bot. 45: 733. 1931), was identified tentatively as a species of Cephalosporium. In certain of its morphological characters this Cephalosporium is indistinguishable from

that recently described by J.T. Presley and W.B. Allington (Phytopath. 37(9): 681-682. 1947) as the cause of brown stem rot of soybean.

This new disease has proved to be a very destructive one in the important soybean-producing states of Illinois, Indiana and Iowa.

BUD BLIGHT (virus of tobacco ring-spot group) occurred sporadically except for a stand of Capital, in which the number of infected plants (about 12%) was the highest ever observed. This stand was located near Chatham.

In current-season experiments at Harrow, 1824 seeds, obtained in the autumn of 1946 from bud-blight-infected plants, were planted in outdoor plots. Throughout the season not an infected plant was detected among the almost 1500 plants that comprised the stand. These results indicate strongly that bud blight is not a seed-borne disease and confirm those obtained in previous experiments.

Other diseases which need only to be mentioned include: BACTERIAL BLIGHT (Pseudomonas glycinea); MOSAIC (Soja virus 1); BROWN SPOT (Septoria glycines); PHYLLOSTICTA LEAF SPOT (P. sojaecola); POD and STEM BLIGHT (Diaporthe Phaseolorum var. Sojae); FUSARIUM BLIGHT (F. oxysporum f. tracheiphilum); and SUN SCALD (non-parasitic).

Other Observations

DOWNY MILDEW (Peronospora manshurica). Infection was severe on Capital; moderate on Richland, Goldsoy and O.A.C. 211; and light on Mandarin, Kabott, Flambeau, Harman, Pagoda, and Earlyana in the plots, O.A.C., Guelph, Ont. (I. Roberts).

BACTERIAL BLIGHT (Pseudomonas glycinea). Infection was severe on Pagoda; moderate on Kabott and Goldsoy; light on Earlyana, O.A.C. 211, Flambeau and Harman; and nil on Mandarin, Richland and Capital in the plots, O.A.C., Guelph, Ont. (I. Roberts). Bacterial blight appeared in the nursery plots of the Division of Forage Plants, C.E.F., Ottawa, in early July. Records were taken 18 July, at which time most varieties were coming into flower. Infection was estimated to be: Trace (less than 5% of the plants affected) on Capital, Mandarin, Kabott, and Pagoda x Mandarin; light (5-15%) on O.A.C. 211; heavy (16-20%) on Pagoda x O.A.C. 211, A.K. Harrow x Pagoda and O.A.C. 211 x Pagoda; and very heavy (over 20%) on Nutter, Pagoda, and Pagoda x A.K. Harrow. Slight fall of the blight-infected leaves occurred in July, but after this month there was no further spread of the disease (R.J. Baylis).

MOSAIC (virus). A slight infection was present through the soybean plots at O.A.C., Guelph, Ont.; no differences in varietal susceptibility were observed (I.Roberts).

SUN SCALD caused considerable injury in the plots of the Division of Forage Plants, C.E.F., Ottawa, Ont., as a result of the prolonged period of dry weather in July and August; defoliation was heavy in the nursery plots, which were located on shallow soil (R.J. Baylis).

SUGAR BEET

LEAF SPOT (Cercospora beticola) was more severe in the Blackwell area, Ont., than for several seasons (A.A. Hildebrand). Infection was slight to moderate on mangels and sugar beets at Guelph, Ont. (J.D. MacLachlan).

ROOT KNOT (Heterodera marioni). Traces of root knot were present on nearly every root of sugar beet in a small planting (1/14 acre) in the Montreal district, Que. The affected beets were growing alongside carrots (q.v.) and parsnips also affected by root knot. (R. Desmarteau).

ROOT ROT (Phoma Betae). Pycnidia of P. Betae were found fruiting on the stem and root of a few affected plants received from the B.C. Sugar Refineries. The pathogen was isolated. It was reported that the disease was causing appreciable damage to seed crops of sugar beet in the Fraser Valley, B.C. The gradual decay of the root caused the seed to ripen prematurely and thus lowered the quality of the seed crop. The same condition has been observed in seed crops of mangels and garden beets (W. Jones).

SUNFLOWER

DOWNY MILDEW (Plasmopara Halstedii) infected 7% of the plants in a field in a 6-year rotation at Ste. Anne de la Pocatiere, Que.; the affected plants were stunted. When sunflower seed was sown in the greenhouse in soil from field plots on which a heavily infected crop was grown 11, 12, 13, and 14 years ago, but on which sunflowers had not been planted since, some of the seedlings became affected by downy mildew (C. Perrault).

RUST (Puccinia Helianthi). Although no survey was made to determine sunflower diseases in 1947, rust was extremely heavy on some plants in several fields visited 13 Sept. near Morden, Man. (W.E. Sacksto n).

DAMPING-OFF (Pythium sp.). A few seedlings were affected in plots in the greenhouse in December. (C. Perrault).

WILT (Sclerotinia sclerotiorum). In the fields examined near Morden, Man., damage was estimated at 5%, but losses were reported amounting to 25% in one or two cases (W.E. Sacksto n). Wilt destroyed about 2% of the plants in a field at Ste. Anne de la Pocatiere, Que. (C. Perrault).

LEAF SPOT (Septoria Helianthi). Numerous pycnidia were present on many leaves in fields near Morden, Man. (W.E. Sacksto n).

DROWNING. Damage from standing water was conspicuous in low parts of fields in the Winkler-Altona district, Man., as a result of heavy rains in August (W.E. Sacksto n).

CULTIVATED GRASSES

AGROPYRON - Wheat Grass

Ergot (Claviceps purpurea). Affected specimens of A. Smithii were collected at Cartwright, Man. in 1946 (H.A. Senn, W.L. Gordon).

Root Gall Nematode (Ditylenchus radicicola). A light infection was found on A. Smithii plants collected from virgin soil at Radisson, Sask. The nematode is therefore probably indigenous to Sask. Infection was also secured experimentally on A. cristatum. A fuller report is given under wheat (T.C. Vanterpool).

Take All (Ophiobolus graminis). About 2% of the wheat-grass hybrid (Vernal emmer x A. elongatum) were found affected in a plot, C.E.F., Ottawa, Ont. (R.J. Baylis).

Smut (Ustilago macrospora). A colony of infected plants of A. trachycaulum var. glaucum was found at Bic, Que. This host is much less severely affected than A. repens (H.A. Senn, D.B.O. Savile).

Brittle Dwarf (?aphid injury) was more prevalent in the plots of A. cristatum sown in 1947 than those sown in 1946 at the Forage Crops Laboratory, Saskatoon, Sask. It was noted last year that brittle dwarf was prevalent on the plots of the current season (P.D.S. 26:6). If brittle dwarf were due to a virus, one would expect the disease to be not less, but more severe in 1947 than in the fall of 1946. The western wheat aphid was present on affected plants (T.C. Vanterpool).

ARRHENATHERUM ELATIUS - Tall Oat Grass

Brown Stripe (Scoletotrichum graminis) was general in a plot at the Station, Saanichton, B.C. in 1946 (W. Jones).

Smut (Ustilago perennans) affected 10% of the plants in a plot at Saanichton, B.C., in 1946 (W. Jones).

BROMUS - Brome Grass

Ergot (Claviceps purpurea). Infection was slight in two fields of B. inermis near Lacombe, Alta. (S.G. Fushtey).

Leaf Blotch (Helminthosporium Bromi). Infection was severe in several roadside stands of B. inermis near Edmonton and slight in the plots at Lacombe, Alta. (J.D.G.).

Stripe Rust (Puccinia glumarum) was common on the leaves and inflorescence of B. carinatus along the roads at White Rock, B.C., in 1946 (W. Jones).

Leaf Rust (Puccinia Clematidis) was also common on the same host at the same place (W. Jones).

Leaf Spot (Rhynchosporium Secalis). A slight infection was found on B. inermis on the University farm, Winnipeg, Man. (G.J. Green).

Brown Stripe (Scoletotrichum graminis) was common along the roadside at Brentwood, B.C., in 1946 (W. Jones).

Leaf Spot (Selenophoma bromigena). Infection was slight on B. inermis in one field and in the plots at Olds, Alta. (J.D.G.). The disease was common and infection light in Sask. Among the numbered strains and varieties of B. inermis at Saskatoon, some showed considerable resistance (H.W.M.).

CYNOSURUS CRISTATUS - Crested Dogtail

Brown Stripe (Scoletotrichum graminis) affected a few plants in a lawn at North Saanich, B.C., in 1946 (W. Jones).

DACTYLIS GLOMERATA - Orchard Grass

Rathay's Disease (Corynebacterium rathayi) was again observed in the Station orchard, Ste. Anne de la Pocatiere, Que., where it has spread in the orchard from the northeastern part over the whole area. Infection, however, was moderate, being not as heavy as last year. The warm dry weather brought about a rapid drying of the plants or parts infected (A. Payette).

Purple Leaf Spot (Mastigosporium rubricosum) was common and caused slight damage at North Saanich, B.C., in April, 1946 (W. Jones).

Brown Stripe (Scoletotrichum graminis). Infection common and damage slight at North Saanich, B.C., in May, 1946 (W. Jones). The disease was general and infection heavy on clones of orchard grass in the pasture plots at the Agricultural School, Kemptville, Ont. (R.J. Baylis).

ELYMUS

Stripe Rust (Puccinia glumarum). A slight infection on E. glaucus at North Saanich, B.C., in May 1946 (W. Jones).

FESTUCA - Fescue

Ergot (Claviceps purpurea) was present on specimens of F. elatior received from Bedford, Que. (I.L. Conners).

Crown Rust (Puccinia coronata). Nursery plots at C.E.F., Ottawa, Ont., began to show infection by rust in late August and early September. On 30 Sept. infection was severe (over 50% of leaf surface) on lines of Festuca elatior including variety Ensign, and on several lines of foreign origin of F. pratensis, a trace only on a few clones of F. elatior var. arundinacea and nil on F. gigantea (R.J. Baylis).

Snow Mould (low-temperature basidiomycete). The damage was slight in 2 and moderate in one of the 3 fields of F. rubra examined near Beaverlodge, Alta. (M.W. Cormack).

Bacterial Leaf Spot (Corynebacterium agropyri (O'Gara) Murray et al.). Infection was slight in 2 fields of F. rubra near Innisfail, Alta., and a trace in the plots at Olds (J.D.G.).

HORDEUM

Smut (Ustilago bullata (U. Lorentziana) was reported by E.C. Stacey to be very prevalent on H. jubatum at Fort Simpson, N.W.T., and at other places in the north (J.D.G.).

PHLEUM PRATENSE - Timothy

Snow Mould (low-temperature basidiomycete). Moderate damage was found in 2 fields in west-central Alta. (J.D.G.).

Leaf Spot (Heterosporium Phlei). A slight infection was observed in the Cariboo district, B.C., in Sept. 1946 (W. Jones). Infection was slight in 5 fields in west-central Alta. and in the plots at Olds and Edmonton (J.D.G.).

Stem Rust (Puccinia graminis var. Phlei-pratensis). A heavy infection was observed at Milton, P.E.I., 2 Sept. (R.R. Hurst).

Brown Stripe (Scoletotrichum graminis). A slight infection was observed in the Cariboo district, B.C., in 1946 (W. Jones).

POA - Blue Grass

Powdery Mildew (Erysiphe graminis). Infection was moderate in the plots at Lethbridge and slight at Olds and Edmonton, Alta. (J.D.G.).

LAWNS and GOLF COURSES

Snow Mould (low-temperature basidiomycete). Damage was found in many lawns at Edmonton and other points in central Alta., but it was not nearly as severe as in 1946 (M.W. Cormack). Snow Mould was moderately prevalent at Saskatoon and in the University campus, killing the grass in spots. The fungus was also isolated from white clover and dandelion, but it affects these latter plants but little (T.C. Vanterpool).