II. DISEASES OF FORAGE AND FIBRE CROPS

ALFALFA

BLACK STEM (Ascochyta imperfecta). Leaf and stem infection estimated as 26-tr. 24-sl. 2-mod./87 fields in Alta. The greatest infection occurred in the Lethbridge district (J.E.J. Thomson). Whereas infection was sl.-sev. in 3 fields in central Alta., it was heavier in the Peace River district, being 5-tr. 6-sl. 11-mod. 2-sev./80 fields (J.B. Lebeau, D.A. McTavish). Infection was light in all areas in Sask., being mod. in only 2 fields and tr.-sl. in the other 48 examined. The disease began to develop rather rapidly on leaves and stems in May, but it was then checked by drought and several severe frosts in the latter half of May. In spite of frequent showers and cool weather in June, disease development was slow. The early growth of alfalfa had been killed back severely and the new growth remained almost free from infection until mid-August, defoliation being much less than usual when the crop was cut (H.W.M.).

Mature pycnidia were present on old stems collected 17 May from the affected field at Hespeler, Ont., reported in P.D.S. 48:16. A survey of the O.A.C. plots, Guelph, in October revealed mature pycnidia on all old stems of several plantings and much blackening of the new stem growth, believed to be due to this organism (J.D. MacLachlan). A few plants were affected in a field at the C.E.F., Ottawa (V.R. Wallen).

WINTER CROWN ROT (low-temperature basidiomycete). Damage from winter crown rot was estimated as follows:

District	Fields Examined	Fields Damaged				
		Tr.	Sl.	Mod.	Sev.	Total
		%	%	%	%	%
Peace River	80	19	18	1	-	38
Central Alta.	77	12	40	30	1	83
Clover Bar	83	6	37	22	8	73
Southern Alta.	87	15	46	26	3	90
All Districts	327	12	35	20	3	70

Damage was slightly less in southern Alta. than usual, although partial rotting of the crowns caused a weakening of the plants in most fields examined (J.E.J. Thomson). Damage in the Clover Bar district and central Alta. was considerably less than last year. Tr.-sl. infection was found in several fields in the Peace River district (J.B. Lebeau, D.A. McTavish).

Winter crown rot caused less damage in Sask. than in 1948. Out of 50 fields examined infection was a trace in 21%, sl. in 68%, and mod. in 3%. The disease occurred mostly on single plants or in small patches. Two important seed-producing districts, Mistatim and Erwood, were surveyed for the first time. That they had suffered considerable reduction in stand in previous years from winter crown rot

was indicated by a characteristic patchiness and weed infestation. A common observation of the growers in these districts was that patches killed out by the disease remained barren of all growth for most of a season and then became infested with weeds (H.W.M.).

BACTERIAL WILT (Corynebacterium insidiosum). A sl.-mod. infection was found in 2 fields near Creston, B.C. (W.R. Foster). In 6 non-irrigated fields examined in the same area infection was 2-mod. 3-severe (J.E.J. Thomson). The disease is causing fields of alfalfa in Grand Forks area to die out in 3-4 years after seeding (G.E. Woolliams).

Damage from bacterial wilt in Alta. was estimated as follows:

District	Fields Examined	Fields Damaged Tr.	Sl.	Mod.	Sev.	Total
		%	%	%	%	%
Peace River	80	4	1	-	-	5
Central Alta.	77	5	4	-	-	9
Clover Bar	83	8	11	6	4	29
Southern Alta.	87	21	14	21	14	70
All Districts	327	10	8	7	5	30

Bacterial wilt was found in all irrigated fields inspected 3 years old or older, in southern Alta. (J.E.J. Thomson). In central Alta. and the Clover Bar district infection seemed to be much less than last year. Trace infection was suspected in a few fields examined near Falher, in the Peace River district (J.B. Lebeau, D.A. McTavish). No new infestations were found in Sask. The variety plots at Melfort are all infected and have been for several years, but the stand is still good and growth is moderately good. The disease has persisted in clones tested at Edmonton, planted in the field at Saskatoon, and transplanted to pots in the greenhouse; a considerable number of these clones were lost. Bacterial wilt is also present in the plots at Snowden; it was apparently introduced there in roots brought from Edmonton for breeding purposes (H.W.M.).

The presence of bacterial wilt in eastern Ontario, previously suspected, has now been established. During July, August and September several surveys were made of alfalfa stands in the Ottawa Valley. Over 100 fields were examined in 7 counties, and 56 samples taken for identification. Of these, all but 12 samples yielded C. insidiosum in plate cultures. Although no critical estimate of individual infections was made on this initial survey, it was noted that damage varied according to age of the plants. The disease was not evident in fields under 3 years old, but in stands of 3 years and older, it was estimated that 5-20% or more of the plants were severely affected. In general, stands of alfalfa over 5 years from seeding were greatly reduced in vigour, which was apparent from the large number of plants killed or stunted by the disease.

By the use of Reed's gram-stain technique as developed for the identification of bacterial ring rot of potato, a quick method was available for determining the presence of C. insidiosum in root tissues. Small pieces of discoloured vascular tissue were macerated in 5 cc. sterile water and allowed to stand for 30 min. A loopful of the resulting suspension was then flamed on a clean slide and stained by Reed's method. This technique is simple and permits positive identification in a matter of minutes (R.J. Baylis).

ROOT ROT (Fusarium sp.). Infection was light in a field at Brooks and a trace in one near Lethbridge, Alta. (J.E.J. Thomson).

LEAF SPOT (Leptosphaeria pratensis (Stagonospora Meliloti). Infection in southern Alta. was estimated as 6-tr. 1-sl./87 fields, the disease appearing about mid-July (J.E.J. Thomson). This leaf spot was common in fields about White Fox, Sask.; damage was slight (H.W.M.).

DOWNY MILDEW (Peronospora aestivalis). In a survey of 87 fields in southern Alta. infection was 6-tr. 3-sl., mostly in the Brooks district (M.W.C.).

YELLOW LEAF BLOTCH (Pseudopezim Jonesii). Infection was estimated to be 27-tr. 16-sl. 1-mod./87 fields in southern Alta. Early in July considerable defoliation was evident in the Brooks district. In the variety plots at the Station, Lethbridge, the variety Buffalo showed the greatest infection (M.W. Cormack). The disease was found in 20 out of 50 fields examined in Sask.; it was late in appearing, much less prevalent than in 1949, and defoliation was much less severe (H.W.M.). Leaves on specimens collected near Forest, Ont., on 16 June bore an abundance of the imperfect stage, Sporonema phacidioides (J.D. Gilpatrick, D.B.O. Savile). A slight infection was present in a field at C.E.F., Ottawa (V.R. Wallen).

COMMON LEAF SPOT (Pseudopeziza Medicaginis) infection was general on Rhizoma in the plots at Point Grey, B.C.; damage was slight (W. Jones). Infection was 13-tr. 11-sl./87 fields in southern Alta., tr.-sl. in the variety plots at Lethbridge (M.W. Cormack); 12-tr. 17-sl. 18-mod. 6-sev./80 fields in the Peace River district and 8-tr. 6-sl./160 fields in central Alta. (J.B. Lebeau, D.A. McTavish). Infection was 12-sl. 25-mod. 3-sev./50 fields in Sask.; it was more prevalent than in previous years. The disease does not appear to cause as much defoliation as black stem or yellow leaf blotch (H.W.M.).

Common leaf spot was, in general, moderate in Ont., and was more prevalent than in 1948. A survey of the plots at O.A.C. and several fields about Guelph in October revealed all plants infected with sl.-mod damage (J.D. Gilpatrick). Moderately affected specimens were received from Ste. Anne de Bellevue and St. Hyacinthe; the disease was apparently more prevalent in the late fall in Que. than usual (I.L.C.). Current year plants of all varieties were heavily infected at Ste. Anne de la Pocatiere. Plants one or more years old carried only a slight infection (A. Payette). Average infection was slight in Queens Co., P.E.I., varying from trace to heavy with some defoliation (R.R. Hurst).

WILT (Sclerotinia Trifoliorum). Damage was rather severe in the nursery rows at Agassiz, B.C. (W. Jones, M. Clarke).

RUST (Uromyces Medicaginis) was generally prevalent in the plots, O.A.C., Guelph, Ont., in September although damage was slight (J.D. Gilpatrick).

WITCHES' BROOM (virus). Infection was 5-tr. 3-sl./240 fields in central Alta. and the Peace River district (J.B. Lebeau). A few affected plants were seen in an old field at Hudson Bay Junction, Sask.

YELLOWS (undetermined virus). A trace was found in 4 fields in York Co., N.B.; for a description of the disease see P.D.S. 28:18 (D.J. MacLeod).

ROOT ROT (cause undetermined) slightly affected 2 fields in the Peace River district, Alta. (J.B. Lebeau, D.A. McTavish).

YELLOWS (boron deficiency). A few plants showing chlorotic foliage were brought to the laboratory from Ste. Rose, Laval Co., Que. The histological abnormalities present were in every way comparable to those observed earlier in other Leguminosae suffering from boron deficiency (A. Payette, R.O. Lachance).

YELLOWS (cause undetermined) was recorded as 11-tr. 4-sl./ 87 fields in southern Alta. (J.E.J. Thomson) and 2-tr. 1-sl. 1-mod/ 240 fields in central Alta. and the Peace River district (J.E. Lebeau, D.A. McTavish). In September the second growth was severely dwarfed and yellowed in most plots at O.A.C., Guelph, Ont. It may have been caused by a mineral deficiency accentuated by the dry weather (J.D. Gilpatrick).

SWEET CLOVER

STEM CANKER (Ascochyta caulicola). Infection was trace to light in 3 stands in southern Alta.; a light infection was also found in roadside stands near Scandia (J.E.J. Thomson).

BLACK STEM (Ascochyta Meliloti). A trace infection was seen in one field in the Peace River district, Alta. (J.B. Lebeau). Black stem was common on sweet clover in sheltered spots in Sask. (H.W. Mead).

PHYTOPHTHORA ROOT ROT (P. Cactorum) caused slight damage in one field near Magrath, Alta. (M.W. Cormack).

ROOT ROT (cause undetermined) caused moderate damage in a field in the Peace River district, Alta. (J.B. Lebeau).

SEEDLING BLIGHT (cause undetermined). Over 70% of the seedlings were destroyed in a large experimental plot at Saskatoon, Sask. Fusarium oxysporum sensu Snyder & Hansen (= F. redolens Wr.) was isolated consistently, but this fungus failed to produce seedling blight in greenhouse tests (H.W.M.).

COMMON CLOVER

WINTER CROWN ROT (low-temperature basidiomycete). Infection was 4-sl. 1-mod. 1-sev./6 fields examined in the Sangudo district, northwest of Edmonton, Alta. (J.B. Lebeau, D.A. McTavish).

SOOTY BLOTCH (Cymadothea Trifolii) moderately affected a small field of alsike clover in the Torch River district, N.E. of Nipawin, Sask. (H.W.M.). Infection was very heavy in the low part of a meadow in Queens Co., P.E.I. (R.R. Hurst).

POWDERY MILDEW (Erysiphe Polygoni) was quite common on both red and alsike clover through much of the semi-arid B.C. Interior (G.E. Woolliams). Infection was sl.-mod. in most roadside stands of red clover in the Brooks district, Alta. (J.E.J. Thomson) and 5-sl. 4-mod. 1-sev./58 fields of red clover in the Peace River district and central Alta. (J.B. Lebeau, D.A. McTavish). In general, powdery mildew was very light on red clover during spring and early summer in Ont., but it was quite prevalent in the fall. All the foliage was affected in the plots at Guelph and in a field at Brampton in Sept.-Oct. (J.D. MacLachlan). Infection was tr.-mod. on red clover at the Station, Charlottetown, P.E.I. (R.R. Hurst).

ANTHRACNOSE (Kabatiella caulivora). Infection was 4-tr. 8-sl. 4-mod./37 fields of red clover in central Alta. and 6-tr. 1-mod./21 examined in the Peace River district (J.B. Lebeau, D.A. McTavish). A moderate infection was also observed in a field of Altaswede at Rimbey (A.W. Henry).

RUST (Uromyces Trifolii) slightly affected roadside stands of white Dutch clover in the Brooks district, Alta. (J.E.J. Thomson). Rust (U. fallens) was general in several plots of red clover at O.A.C., Guelph, Ont., in the early fall, but damage was slight (J.D. Gilpatrick). A few fields of red clover were severely rusted at St. Eugene, L'Islet Co., Que., whereas traces were rarely found on white clover, wild or cultivated, including the variety Ladino. Pycnia and aecia were found along with telia on white clover at St. Roch in November (A. Payette). Infection was a trace to severe, average slight, in a field of red clover at the Station, Charlottetown, P.E.I.; rust was also reported from Prince and King Counties (R.R. Hurst).

SCLEROTINIA WILT (S. Trifoliorum) affected 5-10% of the plants of Ladino white clover in the plots, C.E.F., Ottawa, Ont., in April. Apothecia were abundant in the same plots this fall from 27 Sept. to

10 Nov. when there was a killing frost. It also affected about 2% of the red clover plants in the plots, and 15% of plants in a field of red clover, C.E.F.; in the latter field clover root borer destroyed a further 75% of the plants during the summer. Wilt affected occasional plants of sainfoin (Onobrychis viciaefolia) in the introductory nursery, C.E.F., but no wilt was found in red clover fields elsewhere in the Ottawa district (R.J. Baylis, V.R. Wallen).

MOSAIC (virus) was severe on plants selected from a winter crown rot test at Edmonton, Alta., and held in a greenhouse at Saskatoon, Sask. since 1946 (H.W.M.). A trace of mosaic (Trifolium virus 1) was found in 2 fields of red clover in York Co., N.B. (D.J. MacLeod).

WITCHES' BROOM (?virus) was observed for the second year in a 1/10 acre plot of alsike clover at the Station, Prince George, B.C.; about 15% of the plants were affected. It also affected 25% of the plants of birdsfoot trefoil (Lotus corniculatus) in two 25 foot rows at the Station. Witches' broom was also found affecting at least 10% of the wild lupin plants (Lupinus sp. indet.), which grow on uncultivated land about Prince George. Only 3-4 plants of red clover growing wild were found affected at Quesnel, in the Cariboo district (N.S. Wright).

In some plots of Ladino white clover at the Station, Ste. Anne de la Pocatiere, Que., plants failed to flower, but instead numerous little leaves developed giving the appearance of witches' broom. The same trouble was observed in all stands of Ladino clover over one year old inspected in L'Islet Co. (A. Payette). Five red clover plants showing symptoms resembling witches' broom were found in a field in York Co., N.B. (D.J. MacLeod).

YELLOWS (?virus) affected a trace to 2% of the plants in 3 fields of red clover in York Co., N.B. (cf. P.D.S. 28:21) (D.J. MacLeod).

VETCH

LEAF and POD SPOT (Ascochyta Pisi) caused slight damage to leaves and pods in a field of hairy vetch (Vicia villosa) near Simcoe, Ont., when it was surveyed in early July. The pathogen was isolated and determined by comparison with known cultures of A. Pisi. (J.D. Gilpatrick).

BUCKWHEAT

YELLOWS (Callistephus virus 1) was common and severe on tartarian buckwheat in York, Carleton and Sunbury Counties, N.B. A trace was also found in 2 fields of Silver Hull in the latter county (D.J. MacLeod).

CORN

STALK and EAR ROT (Diplodia Zeae). A trace infection of stalk rot was found in spots in the plots of hybrid corn at the Station, Harrow, Ont.; infection was severe on infected plants and pycnidia were abundant about the nodes. Ear rot was at a very low ebb in Essex and Kent Counties in the fall of 1949, infection being a trace (W.E. McKeen).

BACTERIAL STALK ROT (Erwinia dissolvens (Rosen) Burkh.) affected 10% of the plants causing their death in a planting of one inbred corn in Essex Co., Ont., on 15 July following an extremely hot wet period. Infection took place just above the ground level. Bacterial ooze could be detected and the parenchymatous tissue was completely destroyed (W.E. McKeen).

EAR ROT (Fusarium moniliforme) slightly infected all varieties in southern Ont. in the fall (W.E. McKeen).

SEEDLING BLIGHT, STALK ROT and EAR ROT (Gibberella Zeae (Fusarium graminearum). Seedling blight was severe in low, wet spots in one field of hybrid corn in June in Kent Co., Ont., following a cold period. Gibberella stalk rot was present in every field in southern Ont. this fall and in some fields the yield was reduced by 75%. Some hybrids were more severely affected than others and the disease was present on virgin soil. The roots of infected plants become pink. Such plants are easily pushed over and are frequently lodged. Ear rot, on the other hand, was exceptionally scarce in the area, infection being light and damage negligible (W.E. McKeen).

Perithecia of Gibberella Zeae were collected on overwintered corn stalks at the University farm, Fort Garry, Man., on 2 and 19 Aug. Even on the later date many perithecia were still immature. It appears that ascospore discharge occurs too late in this area to cause appreciable head blight of cereals. Single ascospores taken from the two collections mentioned above yielded only the usual "wild type" cultures of this species (W.L. Gordon).

RUST (Puccinia Sorghi). A trace infection was observed on a field of commercial hybrid corn in Essex Co., Ont. (W.E. McKeen). A slight infection was seen in one field of fodder corn in Kings Co., P.E.I. (R.R. Hurst).

SMUT (Ustilago Maydis). Two reports with specimens were received, one from Wetaskiwin and one from Streamstown, Alta. (A.W. Henry). Abundant tassel infection occurred in field corn at O.A.C., Guelph, Ont. (J.D. MacLachlan). Smut was exceptionally abundant in southern Ont. and caused considerable damage. Infection averaged 15% and reached as high as 50%; average damage was about 2% (W.E. McKeen). Of 11 fields of corn examined in Carleton Co., 4 were affected, infection being tr.-20% (V.R. Wallen).

FLAX

Prof. T.C. Vanterpool, University of Saskatchewan, Saskatoon, Sask., has prepared the following notes, "Flax Diseases in Saskatchewan in 1949".

The acreage sown to flax in 1949 in Sask. was 132,000 acres, or less than one quarter of the previous year's. This acreage, as is usual in the province, was so spread over widely separated areas that a detailed disease survey was not attempted. The following notes are based on trips in central and northeastern sections, and on information on conditions in the southeast supplied by J.A. Paterson, a graduate student well acquainted with flax diseases, who is conducting investigations on hail damage to flax.

The common flax diseases were all encountered, but the damage was generally slight. Few disease enquiries were received from growers. The impression was gained that the absence of large acreages in close proximity prevented a build up of inoculum of any one disease over wide areas. Thus single, isolated fields were found occasionally showing a moderate infection of either rust, browning and stem-break, or pasmo, but the next field, which was usually miles away, would usually present an entirely different disease picture.

RUST (Melampsora Lini) was generally light and damage negligible except in a few instances where flax was sown on flax stubble. In one field rusted Royal again showed a tendency to lodge. (Early spread from rusted stubble "spread" among the plots in the Irrigation Nursery at Saskatoon was poor; a moderate infection developed, but relatively late in the summer, due probably to May and much of June being dry. In the Wilt Nursery, however, where flax follows flax each year on fall-ploughed land and sowing is purposely delayed, the rust infection was moderate and well ahead of its development in the Irrigation Nursery). Field observations revealed infection moderate on pedicels and calyces, with lesser amounts on lower parts of the plants in a field at White Fox on 9 Aug.; slight rust on Redwing, trace on Royal and none on the other licensed varieties in the Line Elevator plots at Pontrilas; virtually no rust on both oil and fibre varieties at the Station, Melfort, and slight amounts on late tillers or plants at Wadena. Stem Canker (Fusarium spp. and Alternaria in association with rust lesions) was conspicuous in one thick stand at Saskatoon, but it occurred in traces only elsewhere. Examination of large samples collected from the plots at Alameda on 18 Sept. revealed light infection on Dakota, light to moderate on Redwing and mod.-sev. on Royal; infection came late and the seed showed no signs of shrivelling.

BROWNING and STEM BREAK (Polyspora Lini). A trace to trace plus was present in the Irrigation Nursery and plots at Saskatoon. Slight browning was also found on volunteer flax plants in a barley field on flax stubble. Moderate (8%) stem break with slight browning was present in a field at Wadena and both browning and stem break were sl.-mod. at Elfros. These fields were in localities where the disease was severe in 1948.

PASMO (Mycosphaerella Linorum (Wr.) Garcia Rada (Septoria linicola) developed late in the Irrigation Nursery at Saskatoon from scattered infected stubble. The disease was first noticed on 3 Aug. and some lines were heavily infected by harvest, though not as severely as in 1948. In mid-August a field of Viking on Viking stubble was heavily infected at Marysburg; infection probably occurred early as the seed was moderately to severely shrunken. On samples from Alameda on 18 Sept. pasmo was sl.-mod. on Dakota, mod. on Redwing and sl. on Royal. Pycnidia were most abundant on Dakota. No shrivelling of the grain was evident.

SEEDLING BLIGHT (mostly Rhizoctonia Solani). Observations, mainly from the flax plots at the Station, Melfort, and at the University, Saskatoon, again revealed damping-off caused by R. Solani to be most severe on land in barley the previous year. The trouble was mod.-sev. in a field sown 14 May following crested wheat grass. Some 8-10% of the seedlings were blighted; 59% of the blighted seedlings yielded R. Solani on culturing. At Melfort, the incidence of post-emergence blight was higher than 1948; 19% of specimens, when cultured, yielded R. Solani (E.J. Hawn, T.C.V.).

LATE ROOT ROT (miscellaneous fungi) was not as common as in 1948. One field at Elfros, which showed a slight amount, yielded mostly Rhizoctonia Solani. Isolations from 100 plants from a field affected with root rot at the University yielded Alternaria spp. 21%, Fusarium spp. 18% and R. Solani 8%. Pythium ultimum was also occasionally present (E.J. Hawn, T.C.V.).

BROWN STEM ROT (Alternaria linicola, etc., not associated with rust lesions). Conspicuous brown, smooth lesions, one to several centimetres in length and usually encircling the stem, were present in moderate amounts in fields nearing maturity at Love and Wadena. Some lesions appeared to originate at the base of the leaves. Stem rot associated with die-back of the tops was found at Delisle. Isolations from plants from these localities yielded A. linicola and A. tenuis. Only an occasional isolate of Fusarium was obtained. For the second year A. linicola has been isolated from brown stem rot lesions. Greenhouse inoculation experiments to date indicate that stem infection of flax by A. linicola rarely occurs until the plants are in the late flowering or boll stage and even then not with any great regularity. It is believed that a slight setback of the plants in the field encourages infection by A. linicola and may be essential. The fungus was found sporulating in dark, slightly roughened lesions on some specimens collected. When plants in the early boll stage were sprayed with spores of A. linicola in field experiments, heavy stem, leaf and boll infections developed whereas infections were few on control plants sprayed with water. Seed size was apparently unaffected. Field inoculation of seed with oat-hull inoculum caused very slight seedling blight under the dry conditions prevailing in the spring. After the late June rains, some slight lesioning appeared on the lower leaves in these plots. A. linicola was found occasionally sporulating in some of these lesions and was readily isolated. No varietal difference has been detected experimentally among the licensed flax varieties.

HEAT CANKER (physiologic). Slight amounts were found at Vonda and Wadena, and in one plot at the University. It appears that the condition of the soil and succulence of the seedlings are important predetermining factors, as no heat canker was detected in the numerous other plots sown about the same time at the University. Samples of the late type of heat canker (swollen base and constriction or break at ground level) were received from Kindersley and Eatonia.

MISCELLANEOUS. Water Blister (unbalanced water relations) common this year on flax stems in many fields where growth was thick or the plants were succulent. The spots are small, raised and watery, giving to the stem a pimpled appearance.

Freckle or Brown Fleck, a stippled, brown spotting on all leaves except the youngest, is frequently encountered on Royal flax in the greenhouse, where it appears to be worst in the spring. It has not been observed in the field. Preliminary experiments indicate that it is found on plants in steam-sterilized soil only. It has been observed on other varieties.

Fused Leaf appeared in July in one experimental plot at Saskatoon, but in all varieties. These leaves were located about half-way up the stem.

The observations of W.E. Sackston were also summarized in a special report, "Flax Diseases in Manitoba in 1949".

Flax acreage in Man. in 1949 was approximately one eighth of the 1948 figure. Temperatures were above average for much of the growing season and precipitation was below normal. The adverse growing conditions resulted in low average yields per acre particularly where seeding was late. In some areas, however, flax yields were reduced proportionately less than those of wheat, and early-seeded flax yielded almost as many bushels per acre as late-seeded wheat.

One survey was made in late July and early August, when late flax was in bloom and early flax was beginning to ripen, and another survey in early September just as flax harvesting was started. Both surveys covered the main flax-growing areas in Man. and extended into southeastern Sask. Forty-four fields were examined in the earlier survey and 34 in the late one.

Diseases generally were not severe on flax in Man. in 1949. Two observations were however, of particular interest. First was the occurrence of rust on Dakota flax in uninoculated plots at Winnipeg and Mordon, and in farm fields throughout the province. In no case was the infection heavy. The absence of rust in farm fields of Dakota in Man. in 1948 and the wide distribution of races attacking it in 1949 indicate how rapidly inoculum can build up, and the danger of severe damage in future if weather conditions are favourable. Second was the occurrence of severe loss from wilt in one farm field. The grower had insufficient Dakota seed in the spring and sowed some old, unidentified seed in a 20-acre portion of a field. Almost all the plants of the unknown variety were killed by wilt in July, whereas only traces of wilt occurred in the Dakota. The unknown variety was later identified as Crown.

WILT and ROOT ROT (Fusarium oxysporum f. Lini, Rhizoctonia Solani). Flax wilt killed almost all the plants in 20 acres of Crown flax near Strathclair, Man., but affected only scattered plants of Dakota in the same field. Pure cultures of F. oxysporum f. Lini were isolated from all affected plants plated. The identity of the susceptible variety was established in greenhouse experiments using soil samples from the farm field. Traces of wilt were found in 12 fields, and 2-5% in 2 of the 78 examined. F. oxysporum f. Lini was isolated from two collections, R. Solani from one, Fusarium spp., Alternaria (tenuis type), and miscellaneous fungi from the rest. Nematodes were present in most cultures.

RUST (Melampsora Lini). Estimates of rust infection were based largely on stem area showing telial infection. No rust was found in 20 fields, traces in 37, 1-5% in 10, 10% in 5, and 15-25% in 6 fields. In only 2 or 3 fields did infection approach the severity of rust on Royal in 1948. The flax variety was determined in only a few of the fields examined. Rust was present in 15 fields of Dakota flax, located throughout Manitoba.

STEM ROT (Fusarium spp. and Alternaria spp.). Stem rot was present in 12 of the 24 fields in which rust was seen in the late-season survey. Discoloration spreading from rust telia affected traces of stem area in 4 fields, 5-10% in 5, 20% in 2 and 50% in 1 field. Affected tissues from five localities were plated. Alternaria (tenuis type) was isolated from all tissues, and Fusarium spp. (mostly F. avenaceum and E. Equiseti) from 10 to 20% of the tissues. A. tenuis, but no Fusarium spp., was isolated when apparently clean telial infections were plated. A. linicola was isolated repeatedly from stem rot lesions in 1948, but infrequently in 1949. Repeated attempts to inoculate telial infections on flax stems in the greenhouse with various organisms isolated from stem rot in 1948 indicated that only Fusarium spp. were pathogenic under the conditions of the experiments. These results suggest that the sporadic occurrence of A. linicola in diseased flax tissue may be a result of environmental conditions favourable to it rather than to its pathogenicity. The presence of A. tenuis in clean telial infections as well as in most other lesions on flax and other crops, and its repeated failure to cause infection in inoculation experiments, indicates that in stem rot as in some other diseases it is a saprophytic invader.

PASMO (Septoria linicola). Traces of pasmo, with mature pycnidia on the lesions, were found in 5 flax fields between 4 and 6 Aug. This period is the earliest that the disease has been seen in farm fields in Man., perhaps due to the fact that surveys have not previously been made at just this time. Five of the 34 fields examined late in the season were free of pasmo. There were traces in 11 fields; 1-5% in 6; 10-20% in 7; and 35%, 50%, 60%, and 80% in 1 each. S. linicola was recovered from a small proportion of the lesions when lightly-diseased tissues were plated, but from most of the lesions when samples were plated from heavily-diseased fields. The field with 80% infection was late-seeded Victory, with large quantities of combine

straw from the 1948 flax crop still present throughout the field. With the exception of this one field, it is believed that pasmo caused relatively little reduction in yield in 1949.

BOLL BLIGHT (cause unknown). Only one field examined in the late survey was free of boll blight. There were traces to 10% in 7, 15-25% in 10, 30-40% in 13, and 45-55% in 3 fields. In the three worst fields, grasshoppers had caused much of the damage in two, and pasmo in the third.

MISCELLANEOUS. Seedling Blight was seen in trace amounts in two farm fields, and in plots at Portage la Prairie and Winnipeg. In one farm field, 10% of the plants had been killed as seedlings, but part of the injury may have been caused by heat or drought. Rhizoctonia Solani was the dominant fungus in cultures from blighted seedlings in plots and it developed from several of the specimens collected in farm fields. Traces of Leaf Spots were seen in 7, 10% in 1, and 50% in 2 fields. Alkaline soil and drought were apparently responsible in the last two cases. Isolations from spotted leaves from the 10% field yielded only Alternaria tenuis and miscellaneous fungi. Traces of Heat Canker were seen in 7, and 5-10% in 3 fields. Traces of Top Browning were seen in 5 fields, 10-15% in 4, 30% in 1, and 75% in 1 field. No Stem Break or Browning was recognized.

Other Observations

WILT (Fusarium oxysporum f. Lini) caused mod.-sev. damage in some plots at O.A.C., Guelph (A.A. Wellwood). Wilt affected 10% of plants of Liral Prince in a field at C.E.F., Ottawa, Ont. (V.R. Wallen). A trace occurred in Cirrus at Ste. Anne de la Pocatiere, Que. Flax was sown on new land this year and not in the field on which flax was severely wilted in 1948 (R.O. Lachance).

RUST (Melampsora Lini). A moderate but late infection was observed in the plots at Lethbridge, Alta. (M.N. Grant). A trace was found in one field near Castor (A.W. Henry). A trace to moderate damage occurred in some test plots at Guelph (A.A. Wellwood). A trace was present on Liral at Ste. Anne de la Pocatiere, Que. (R.O. Lachance). Infection was heavy on some phanerogamic collections of Linum Lewisii from Yukon in 1949. It has also been found, from Man. and Ont., on L. Lepagei, a species from the shores of Hudson Bay (D.B.O.S.).

BROWNING (Polyspora Lini). A moderately affected crop was found south of Castor, Alta. (A.W. Henry).

PASMO (Mycosphaerella Linorum). Five plants in the fibre flax breeding plots at Guelph were found affected on 6 Sept. 1948. Each plant bore several lesions completely encircling the stem. The organism was identified by W.E. Sackston. In 1949, infection was fairly heavy on fibre varieties in these plots. Although the disease was widely distributed, some breeding lines were affected much more severely than others. Mature pycnidia were very abundant (A.A. Wellwood).

MANGEL

CROWN GALL (Agrobacterium tumefaciens). One affected root was brought in from Queens Co., P.E.I., for examination (R.R. Hurst).

LEAF SPOT (Cercospora beticola) moderately affected a field of Frontenac in Queens Co., P.E.I. (R.R. Hurst).

BLACK LEG (Phoma Betae) caused considerable damage as a seedling blight in a field crop near Victoria, B.C. (W. Jones).

DORMANCY and CROWN ROT (boron deficiency) were general on steckling roots planted in the field for seed production in the Grand Forks area, B.C. In many fields roots grew so poorly that they were replanted to other crops. Although the fields in which the roots were grown in 1948 had been treated adequately with boric acid and chemical analysis indicated that the roots contained ample boron, it is thought that the roots were suffering from a boron deficiency induced by allowing the fields to dry out in the fall before the roots were lifted. Irrigation water is usually cut off early in September and the fields become dried out before the roots are lifted in late October (G.E. Woolliams). Crown rot affected an occasional root in a field of Frontenac in Queens Co., P.E.I. (R.R. Hurst).

RAPE

SEEDLING BLIGHT and LEAF SPOT (Alternaria Brassicae). A. Brassicae is the only seed-borne pathogen isolated from scores of samples of rape seed produced in Sask. Seed from 12 samples of the 1948 crop was treated with Ceresan; the average germination of the treated seed was increased 11% over the untreated, when the seed was germinated in flats in the greenhouse (T.C. Vanterpool).

SAFFLOWER

RUST (Puccinia Carthami). Infection was sl.-sev. in the variety test plots at Lethbridge, Alta. (M.W. Cormack).

WILT (cause unknown) caused the death of up to 60% of the plants in a test of 15 varieties at Lethbridge, Alta. Several of the strains recently developed in Nebraska were immune or highly resistant in all replicates. An unidentified phycomycete was consistently isolated from the diseased tissues (M.W. Cormack).

SOYBEAN

Most of the observations on diseases of soybeans were supplied by A.A. Hildebrand in his report "Soybean Diseases in Southwestern Ontario in 1949".

This year, soybeans in southwestern Ontario were threatened more seriously by disease than at any time since 1941. POD and STEM BLIGHT (Diaporthe Phaseolorum var. Sojae) was not only of general occurrence on many varieties and selections, but it became epidemic on Hawkeye and Lincoln in sections of Kent Co. In Hawkeye loss of plants in some stands exceeded 50%; in Lincoln, 10%. The presence of perithecia (DAOM 23353) on some of the stems was confirmed by J.W. Groves; the Phomopsis stage was also present (DAOM 23352). The other disease of outstanding importance was BROWN STEM ROT, (Cephalosporium gregatum), to which Hawkeye was also especially susceptible, the disease having been observed in many fields of the variety in Kent and Essex Counties and on specimens of diseased plants submitted from Pelee Island. Of 9 commonly-grown, commercial varieties under test in the Laboratory disease garden, all showed virtually complete susceptibility to the disease.

Cross-sectional surveys of Kent and Essex Counties revealed that soybeans in general were exhibiting symptoms of MANGANESE DEFICIENCY in varying degrees of severity. In some fields where the plants were severely affected, quality of seed was impaired and yield was reduced. Quick response to manganese sulphate sprays confirmed diagnoses based on foliar symptoms.

Other diseases of sporadic occurrence noted in the course of the surveys included: MOSAIC (Soja virus 1); BUD BLIGHT (virus of tobacco ring-spot group); DOWNY MILDEW (Peronospora manshurica); BROWN SPOT (Septoria Glycines); BACTERIAL BLIGHT (Pseudomonas glycinea); FUSARIUM BLIGHT (F. oxysporum f. tracheiphilum); and SUN SCALD (non-parasitic).

Other Observations

DOWNY MILDEW (Peronospora manshurica). Infection was heavy on 30 Aug. on 2 acres of Pagoda and light on an acre of Capitol growing adjacent to each other in the Cloverdale district, B.C.; the damage was sl.-mod. (I.C. MacSwan). Downy mildew was less prevalent in the O.A.C. plots, Guelph, Ont., than in previous years. All the leaves of Capitol were infected, but the damage was only moderate. Oospores were present in great abundance in the diseased leaves in September. Other varieties were free of mildew (J.D. MacLachlan). A 10% of infection was noted on Capitol near London during an extensive tour of soybean fields in western Ont. in August (F. Dimmock). A moderate infection was present on 28 Aug. on leaves of Pagoda, Capitol and A.K. Harrow in the plots at Ottawa, Ont. (Mary C. Elliott).

SUGAR BEET

LEAF SPOT (Cercospora beticola) was more prevalent than usual on sugar beets and mangels in Ont.; infection was moderate on susceptible varieties (J.D. Maclachlan).

BLACK ROOT (various fungi) was prevalent in the sugar beet growing areas of southern Alta. The damage was estimated as 6-tr. 17-sl. 7-mod. 1-sev./33 fields examined. It was also apparently responsible for at least part of the damage in several fields ploughed up prior to examination although some injury was probably caused by excess soil moisture and possibly by soil deficiencies. Phoma Betae, apparently seed-borne, occurred most commonly among the isolates from diseased seedlings (M.W. Cormack).

Black root, though present as usual this year in the sugar beet fields of southwestern Ont., did not attract as much attention as in certain past seasons, for two reasons. In the first place, the number of infected fields did not increase in proportion to the greatly-increased acreage for 1949. In the second place, areas of infection were smaller and more localized than usual. However, where the disease did occur, destruction of stands was as complete and losses were as severe as in previous years (A.A. Hildebrand).

ROOT ROT (various fungi) occurred mainly in patches in sugar beet fields in southern Alta. The damage was estimated to be 3-tr. 12-sl. 9-mod. 3-sev./38 fields examined shortly before harvest. In November over 5000 beets were examined during the removal of storage piles. A total of 5.4% were infected, and 1.9% were severely rotted. There was little evidence of spread of infection during storage, but the degree of rotting was consistently higher in some piles than in others. Phoma Betae, Aphanomyces, Pythium, Rhizoctonia, and Fusarium spp. were isolated from the several distinct types of rot found in the field and in storage (M.W. Cormack).

SUNFLOWER

Observations in Man. were the subject of a special report, "Sunflower Diseases in Manitoba in 1949" by W.E. Sackston.

The acreage sown to sunflowers in Manitoba increased from 28,000 in 1948 to more than 50,000 in 1949. The increase resulted from more intensive planting in the main sunflower area between Morden and Rosenfeld and from its extension westward and northward. High temperatures and low precipitation depressed yields per acre, but the latter helped to retard the development of foliage diseases. Disease surveys were made when the plants were in bloom in mid-August and as the crop was ripening in mid-September. W.A. Russell, Dominion Experimental Station, Morden, and Eric Putt, Co-operative Vegetable Oils, Ltd., Altona, assisted for part of each survey.

RUST (Puccinia Helianthi) was present in all but one of the commercial fields examined. Rust was a trace in 19 fields, 1-5% in 19, 10-25% in 16, and 50-80% in 6. These estimates are based on average infection on the Advance hybrid plants in each field. Infection was again heavier on the inbred female parent S37-388 than on Sunrise or the Advance hybrid, but, apparently because of the weather conditions, rust caused less damage on S37-388 than in 1948. Although Advance rusted less heavily than S37-388, infection of Advance was much heavier than in 1948, suggesting that there may have been some change in the pathogenicity of the rust. Heaviest infections were found in the centre of the sunflower area. They became progressively lighter with increasing distance north of Rosenfeld and west of Morden. Rust was scarce in a large planting near Clearwater, and only traces were found in fields in the MacGregor-Portage la Prairie area. Development of rust was followed in the crossing blocks throughout the season by T. Johnson. The first pycnia were found on cotyledons of volunteer seedlings 7 June and the first aecium 8 June. Pycnia were numerous and aecia were starting to open on volunteer seedlings 16 June and a few pycnia were present on cotyledons of the current crop. The first uredinial pustules, newly erupted, were found 5 July. Uredinial infections ranged as high as 80% in plots at Morden on 15 August. Rust was most severe later in the season in commercial plantings, in which the earliest infections were found. Traces of rust were found on Helianthus Maximiliani in a few localities in August and it became general and severe in some colonies in September.

WILT (Sclerotinia Sclerotiorum). Thirteen fields were free of wilt; infection was tr.-1% in 40 fields, 5-10% in 2, and 25% in 1. Wilted plants occurred singly and in patches. The field with 25% wilt was seeded to sunflowers in 1947, but the crop was plowed down in the seedling stage and the field reseeded to corn, which was used for hog pasture, then ploughed down late in the fall. Part of the field was fallowed and part seeded to wheat in 1948. Wilt was heavier in the fallowed area, where growth was more vigorous.

LEAF MOTTLE (cause unknown), first observed in 1948 (P.D.S. 28:32), was present in 19 of 61 fields examined in 1949. It was observed particularly during the August survey before the leaves dried out. Mottle was a trace in 15 fields, 1% in 2, 5% in 1, and 50% in 1. The last field was on sandy soil north of MacGregor. Mottling in this case was associated with bronzing of the leaves and seemed to be caused by nutritional or environmental factors. The field with 5% mottle, near Morden, had been seeded to sunflowers in 1946 and 1947, and to oats in 1948. The affected plants occurred singly or, more frequently, in patches, mostly with a few plants or in some cases extending up to 30 feet along the row and involving three or four adjacent rows. In several fields some of the mottled plants were affected by Sclerotinia wilt. Brown discoloration of vascular bundles was observed in most of the mottled plants examined.

PREMATURE RIPENING and STALK ROT (cause unknown). Premature ripening was conspicuous in many fields in mid-September; it was found in 8 of 13 fields examined during the late survey. Affected plants were trace in 1 field, 5-10% in 4, 11-20% in 2, and 60% in 1. Premature ripening may have been induced by various causes in the respective fields, but certain characteristics were observed on all affected plants. The heads were always flaccid, whereas the heads of normally ripened plants were firm. All affected plants were infested by stalk borers, and in most cases extensive discoloration and rotting of the internal stem tissues spread from the borer tunnels. Healthy stems also were infested by borers, but there was no internal decay in such stems, and discoloration was confined largely to frass in the borer tunnels. In some fields prematurely ripe plants were appreciably shorter than nearby healthy plants, but in others this difference was not pronounced. Affected plants usually occurred in patches. In some cases such patches appeared to be on low areas in the field. In one such patch there was a visible accumulation of salts just below the soil surface. Ten per cent of the plants were prematurely ripe in the field near Morden in which 5% leaf mottling was found in August. Affected plants showed a distinct mottling of the stems. The discoloration apparently started as dark areas on the stem at the base of leaf petioles, spreading from there until adjacent discolored areas coalesced, in many cases involving the whole stem. The vascular cylinder of such stems was a dark green, the color extending almost to the epidermis. The pith was separate from the outer tissues in many affected plants, and in some of them was black. Affected stems were weak and brittle. Among the organisms isolated from various tissues of plants prematurely ripe and showing stalk rot were A. tenuis, A. cucumerina (identified by J.E. Machacek), Fusarium spp., Verticillium albo-atrum, and bacteria.

MISCELLANEOUS. Stunt (cause unknown) seen in 1948 (P.D.S. 28:33), resembling systemic infection with downy mildew, was found on several plants in plots at Altona, but was not recognized in farm fields. Dwarfed plants were numerous in one field, but their leaves were not chlorotic or rugose. Neck Rot (decay of the lower surface of the head and adjacent stem tissues) was present on one or two plants in a few fields. Cultures of Rhizopus nigricans, A. tenuis, and Fusarium spp. were isolated from diseased tissues. None of the organisms caused rotting when inoculated into sunflower heads in the field early in September, but cultures of R. nigricans and Fusarium were reisolated from the inoculated tissues a month later. Frost on 6 June killed the growing points of plants in three of the fields examined, causing the production of numerous stems from adventitious buds. In one field 50% of the plants bore 3-6 flowering stems. Severe injury from 2,4-D was seen in one field next to a grain crop which had been treated with a volatile form of the chemical. Traces of 2,4-D injury were seen in two other fields. Downy Mildew (Plasmopara Halstedii) was found on one volunteer seedling from the 1948 crop and on several seedlings in plots at Morden. It was present on two plants of Helianthus Maximiliani near Stratholair on 2 Sept. Powdery Mildew (Erysipho Cichoracearum) developed late in the season in plots at Winnipeg and Morden and traces were seen in farm fields. Septoria Leaf Spot (S. Helianthi) was not found.

Other Observations

POWDERY MILDEW (Erysiphe Cichoracearum) and RUST (Puccinia Helianthi) were generally prevalent, but damage was slight, in the plots, O.A.C., Guelph, Ont., in September (J.D. MacLachlan).

WILT (Sclerotinia sclerotiorum). Affected specimens were received from Kamsack, Sask. (T.C. Vanterpool). Wilt caused moderate damage to a small planting at Yorkton (H.W.M.).

CULTIVATED GRASSES

AGROPYRON - Wheat Grass

Powdery Mildew (Erysiphe graminis) was common on A. repens at Agassiz, B.C., on 8 Aug. (W. Jones).

Smut (Ustilago bullata) was severe in one field of A. trachycaulum at Parkside, Sask. (H.W.M.).

BROMUS - Brome Grass

Ergot (Claviceps purpurea). Infection was tr.-sl. in roadside stands of brome grass in the Pincher Creek district, Alta. (J.E.J. Thomson),

Leaf Spot (Selenophoma bromigena). A light infection was found in one field of brome grass at Claresholm, Alta. (M.W. Cormack). Infection was general and moderate in a large seed-producing area of B. inermis at Unity, Sask. (H.W.M.).

DACTYLIS GLOMERATA - Orchard Grass

Bacterial Blight (Corynebacterium rathayi) was much more inconspicuous than in the other years, since it was first observed in 1946, at Ste. Anne de la Pocatiere, Que.; damage was slight (A. Payette).

Purple Leaf Spot (Mastigosporium rubricosum) was common and the fungus was sporulating freely on young foliage in April at North Saanich, B.C. (W. Jones).

Brown Stripe (Scoletotrichum graminis) was also common at North Saanich, B.C. (W. Jones).

FESTUCA - Fescue

Root Rot (Fusarium sp.). A trace infection was observed in one field of creeping red fescue at Beaverlodge, Alta. (J.B. Lebeau).

PHLEUM PRATENSE - Timothy

Ergot (Claviceps purpurea) was observed frequently in Queens and Kings Counties, P.E.I. (R.R. Hurst).

Stem Rust (Puccinia graminis var. Phlei-pratensis). A single plant was severely rusted in a patch of timothy at Comox, B.C.; the other plants were not infected (A.M. Brown). Infection reached a maximum of 50% in a field of Climax timothy on 21 July in Carleton Co., Ont. (V.R. Wallen). A heavy infection was present in a field of timothy in Queens Co., P.E.I. (R.R. Hurst).

LAWNS and TURF

Snow Mould (Fusarium sp.). A severe infection was observed in 2 bowling greens and one lawn about Victoria, B.C., in November (W.R. Foster).

Fairy Rings (Marasmius oreades) are widely distributed on lawns on the B.C. coast; they appear hard to eradicate (W.R. Foster).

Brown Patch (Rhizoctonia, etc.) lightly affected lawns in Charlottetown, P.E.I. Treatment with Semesan has given satisfactory control (D. Robinson).

A slimy green growth developed over 600 sq. ft. of a lawn in Edmonton, Alta., during a 3-week rainy period in July. The growth seemed to erupt from the soil in irregular patches. R.G.H. Cormack, Department of Botany, University of Alberta, identified the alga present as a species of Nostoc (T.R.D.).