## II. DISEASES OF FORAGE AND FIBRE CROPS

### ALFALFA

BLACK STEM (Ascochyta imperfecta) was not observed early in the season in Alta., but was found in 8 fields out of 10 examined in August. Infection was estimated to be a trace in one field, slight in 4 and moderate in 3. Infection was slight to moderate in the plots at Lacombe and Lethbridge and slight to severe at Edmonton.

BACTERIAL WILT (Corynebacterium insidiosum (McCull.) Jensen, Proc. Linn. Soc. N.S.W. 59:41. 1934; Aplanobacter insidiosum McCulloch, Phytopath. 15: 497. 1925; cf. Dowson, Trans. Brit. Myc. Soc. 25:313. 1942, Starr & Burkh. Phytopath. 32:603. 1942) was again quite general in old alfalfa fields at the Experimental Station, Summerland, B.C.; affected plants were dying rapidly (G.E. Woolliams). Bacterial wilt was found in 81 out of 114 stands of alfalfa examined in the irrigated districts of southern Alta. in early June. It was present in all of the 75 stands three years old or older, and the damage occurring in 1942 was estimated to be a trace in 6 fields, slight in 29, moderate in 24, and severe in 16. In addition, a few plants were found dying in 3 two-year-old stands in the Brooks district and in one at Lethbridge. Damage in young stands has not been observed previously in Alta. and apparently occurs infrequently in the United States (M.W. Cormack).

ROOT ROT (Cylindrocarpon Ehrenbergi, etc.). Damage mainly caused by C. Ehrenbergi was found in 4 fields out of 114 examined in southern Alta. and 3 out of 30 in the central and northern sections of the province. Severe damage was present in one field near Westlock, moderate injury in 2, slight in 3 and a trace in one (M.W. Cormack).

M.W. Cormack (Sci. Agric. 22: 775-786. 1942) finds that the "pathogens attacking alfalfa and sweet clover during the early spring rank, in order of the destruction caused, as follows: the low-temperature basidiomycete, Cylindrocarpon Ehrenbergi, Sclerotinia sativa and Fusarium avenaceum". With growing sweet clover the fungi occupy the following order: Phytophthora Cactorum, F. culmorum, F. avenaceum and S. sativa. Alfalfa is more resistant than sweet clover. Some differences in resistance were noted in the different varieties and the behaviour differed also depending on the pathogen.

In a stand of alfalfa at Macdonald College, Que., crown rot affected 20% of the plants and apparently caused the death of some. The diseased tissue, when plated, yielded mainly a Cylindrocarpon, which appeared to be C. Ehrenbergi (R.A. Ludwig).

DOWNY MILDEW (Peronospora aestivalis) caused moderate damage in a field near Sidney, B.C. (W. Jones). It was quite generally distributed through the interior districts of B.C., although it did not appear to cause much injury (G.E. Woolliams). A slight infection was present in a field at Okotoks, Alta., and in the plots at Edmonton (M.W. Cormack).

ROOT ROT (Plenodomus Meliloti). Moderate rotting and abundant pycnidium production was observed on the lower portions of the roots of a few plants in the plots at Saskatoon, Sask. (M.W. Cormack).

YELLOW LEAF BLOTCH (Pseudopeziza Jonesii). A slight infection was found in the plots at Edmonton, Alta.

COMMON LEAF SPOT (Pseudopeziza Medicaginis) was quite general throughout the interior districts of B.C., where it usually was found on uncut plants. In the drier regions, it was usually located along irrigation flumes, where there is more moisture. This leaf spot was found in all 10 fields examined in Aug. in Alta. Infection was a trace in one field, slight in 6 and moderate in 3. Infection was slight in the plots at Lacombe and Lethbridge, but it ranged from a trace to severe at Edmonton, where there was considerable defoliation. The disease was severe on Hardigan, Ladak and other varieties at Morden, Man.; slightly infected the second crop at Ste. Anne de la Pocatière, Que.; and infection varied from trace to 35% throughout P.E.I.

LEAF SPOT (Pseudoplea Trifolii (Rostr.) Petrak) was fairly general in the University plots, Vancouver, B.C. on July 24 and caused slight damage (W. Jones). Perithecia were scarce on material submitted, but one was found with fairly mature spores. J.H. Miller (Am. Jour. Bot. 12: 224-237. 1925) is of the opinion that the fungus is a saprophyte, which develops following injury of the plant from some other cause including insect injury. This fungus was collected on alfalfa at Brandon, Man., in 1923 (P.D.S. 4: 28) and on alsike clover at Canora, Sask. (Bisby, Fungi Man. & Sask. p. 53, 1938)(I.L. Conners).

WILT (Sclerotinia ?Trifoliorum) slightly infected Ladak, Autogamous, Hardiston and Maesal at the Station, Sidney, B.C. (W. Jones).

CROWN ROT (a low-temperature basidiomycete). Early spring killing of alfalfa by the crown-rot pathogen was found in all principal alfalfa-growing areas of Alta. in 1942. In Table 2, the estimated damage by fields is given for each district.

Table 2. Estimated damage caused by crown rot in alfalfa fields examined in Alberta in 1942.

| District | Fields Examined | Fields Damaged | Fields according to estimated damage | | | |
|---|---|---|---|---|---|---|
| | | | Tr. | Sl. | Mod. | Sev. |
| Cherhill-Sangudo | 20 | 19 | 4 | 3 | 4 | 8 |
| Westlock | 16 | 13 | 0 | 3 | 5 | 5 |
| Edmonton-Lacombe | 14 | 13 | 2 | 6 | 4 | 1 |
| Brooks | 79 | 27 | 3 | 8 | 14 | 2 |
| Lethbridge | 35 | 13 | 0 | 6 | 4 | 3 |
| ALL | 164 | 85 | 9 | 26 | 31 | 19 |
| Percentage of fields damaged: | | | | | | |
| in Northern & Central Alta. | | 90% | 12% | 24% | 26% | 28% |
| Southern Alta. | | 35 | 3 | 12 | 16 | 4 |
| All Alta. | | 52 | 5 | 16 | 19 | 12 |

The most severe damage found was 75% in a field north of Westlock. Crown rot was again most prevalent in the Cherhill-Sangudo district, but the killing was in general less extensive than in 1941. It consisted mainly in the

extension of the patches previously killed out and in the killing of scattered individual plants or small patches. In southern Alta., there was much less crown rot than in the northern and central areas, but it occurred in many intances in the same fields as bacterial wilt and undoubtedly aggravated the damage. True winter killing of alfalfa by frost action was not observed (M.W. Cormack).

A survey was made in June of the extensive killing which occurred at White Fox and the alfalfa seed-growing areas of northeastern Sask. Both crown rot and true winter-killing occurred. Severe crown-rot damage was found in 16 fields of the 21 examined, but in 14 of these typical winter-killing was also present. Counts made in these fields, however, indicated that crown rot was the more prevalent. Damage of both types was markedly reduced or absent in those portions of fields which had retained a good snow cover. A few alfalfa plants killed by crown rot were also found in the plots at Saskatoon (M.W. Cormack). Of the 21 fields, 14 were considered worthless and several others in the districts had already been ploughed up before the survey was made (P.M. Simmonds).

MOSAIC (Medicago virus 2). A trace was found in a plot at the Station, Fredericton, N.B. (D.J. MacLeod).

WITCHES' BROOM (virus). Attention is called to the occurrence in south-central B.C. of witches' broom of alfalfa and other legumes as described by Heald and Menzies in Washington State. In the course of studies on longevity of alfalfa stands in B.C., notably in the Nicola and Cariboo Valleys, typically affected plants have been noted and the condition was associated with the killing out of the stands. "Boron-tested plots in 1941-42 have failed to display any recovery or difference in rate of killing".

After being shown the disease as it occurs at Prosser, Wash., by Mr. Menzies, there is little doubt that the trouble in B.C. is identical with that in Washington. The disease so far is local, but in the Nicola Valley there are one or two fields, where alfalfa stands last for only 3 or 4 years as a result of the disease (V.C. Brink).

According to F.D. Heald and J.D. Menzies (51st Ann. Rept. Wash. Agr. Exp. Sta. Bull. 410: 83-84. 1941) witches' broom is present in 4 counties in Washington but is only serious in the Methow Valley area of Okanagan County. They consider the trouble to be identical with that found in Australia by E.T. Edwards (Dept. Agr. N.S.W. Sci. Bull. 52. 1936). Experiments so far indicate that varieties resistant to bacterial wilt are susceptible to witches' broom. However two selections free from both were to be tested in Methow Valley in 1942. Witches' broom was first reported on alfalfa in B.C. in 1932 (P.D.S. 12:25) and in Alta. in 1940 (P.D.S. 20: 20). It has been reported on sweet clover from Alta. (P.D.S. 20: 22 and 41: 19) and a specimen collected by Mr. H. Groh at Dawson City, B.C., Sept. 3, 1934 is in the Mycological Herbarium (I.L. Conners).

Damage from witches' broom again increased in plots under observation at Edmonton, Alta. The symptoms also appeared in many of the plants grown from cuttings taken from a plant which was very slightly affected (M.W. Cormack).

## COMMON CLOVER

ROOT ROT (Cylindrocarpon Ehrenbergi, etc.) damage was severe in a field of alsike at Westlock, Alta., and slight to moderate in all varieties of alsike and red clover in the plots at Lacombe (M.W. Cormack).

SOOTY BLOTCH (Cymadothea Trifolii) moderately infected alsike clover at Scandia, Alta. (M.W. Cormack). Traces were present in many fields of red clover in P.E.I. (R.R. Hurst).

POWDERY MILDEW (Erysiphe Polygoni). Slight to moderate infection on red clover at Edmonton (M.W. Cormack); moderate infection on the leaves in the red clover plots at Fredericton, N.B., on July 17, 1936 (I.L. Conners); slight infection in Queens Co., P.E.I. (R. Bognall).

ROOT ROT (Fusarium spp.) was present in red clover at Guelph, Ont.

ANTHRACNOSE (Kabatiella caulivora) must have been rather prevalent in the red clover plots at Fredericton, N.B., in 1936, judging by specimens collected. On some of the older lesions Fusarium sp. and Stemphylium sp. indet. fide J.W. Groves were present. Anthracnose has been reported from Alta., Ont., Que., and P.E.I. and specimens are in the herbarium from the first two provinces (I.L. Conners).

MID-VEIN SPOT (Mycosphaerella carinthiaca). Only a few spots were present on leaves of red clover collected in the plots at Fredericton in 1936, but the fungus was well developed in the spots examined. Material collected at Woodstock in the same year has already been reported (P.D.S. 17: 15) (I.L. Conners).

COMMON LEAF SPOT (Pseudopeziza Trifolii). Infection was slight at Ste. Anne de la Pocatière, Que. (R.O. Lachance); moderate in the plots on red clover at Fredericton, N.B., in 1936 (I.L. Conners); heavy in a field in P.E.I. (R. Bognall).

ROOT ROT (Sclerotinia Trifoliorum) was present on red clover in some areas about Guelph, Ont. (J.D. MacLachlan) and caused extensive killing in the plots at Macdonald College, Que. (R.A. Ludwig).

LEAF SPOT (Stemphylium sarcinaeforme) infection was general and damage was moderate on red clover at Aldergrove, B.C. in August (W. Jones).

RUST (Uromyces Trifolii). Common in the lower mainland, B.C., on red clover and occasionally causing much damage (W. Jones); slight infection general on Ottawa 189 at Morden, Man. (W.L. Gordon); slight infection on the second crop of alsike and red clover at Ste. Anne de la Pocatière, Que. (R.O. Lachance); fairly heavy on the lower side of the leaves, on petioles and stems of red clover in the plots at Fredericton, N.B., in 1936 (I.L. Conners); general infection on second growth of red clover at Halls Harbor, N.S. (J.F. Hockey); traces to heavy on red clover at Charlottetown, P.E.I. (B. McLaren).

CROWN ROT (a low-temperature basidiomycete) was found for the first time on alsike clover. The damage was moderate in one field and severe on volunteer plants at the edge of an alfalfa field at Cherhill, Alta. (M.W. Cormack).

MOSAIC (virus). Found on red clover in the Dominion Forage Crops greenhouse, Saskatoon, Sask. on Feb. 13 (T.C. Vanterpool); of common occurrence about Guelph, Ont. (J.D. MacLachlan). A trace of mosaic (Trifolium virus 1) was found on white clover at Sackville, N.B.; a trace of mosaic (Pisum virus 2) in a patch of alsike in York Co. and in a field of red clover in Kings Co. (D.J. MacLeod).

GENETIC CHIMERA. Two plants of red clover were found at the Station, Fredericton, N.B., where sectors of the leaf or whole leaves were almost white while the other portions or leaves were a normal green (D.J. MacLeod).

POTASH DEFICIENCY was common in many fields of red clover throughout P.E.I. (R.R. Hurst).

## SWEET CLOVER

ROOT ROT (Fusarium avenaceum) caused slight damage in the plots at Saskatoon, Sask. F. avenaceum was isolated from the diseased roots (M.W. Cormack).

LEAF SPOT and STEM BLIGHT (Leptosphaeria pratensis(Stagonospora Meliloti) was a trace in one field and slight in 2 out of 10 examined in Alta. (M.W. Cormack). It was present on sweet clover between rows of Royal flax in University seed plots, Saskatoon, Sask. (T.C. Vanterpool).

ROOT ROT (Phytophthora Cactorum) caused the death of a few to about 5% of the plants found in 6 out of 10 fields examined in southern Alta. It also caused slight damage in the plots at Saskatoon, Sask. (M.W. Cormack).

LEAF SPOT (Pseudopeziza Meliloti). A moderate infection was found in the lower leaves of most of the plants in a field at Rosemary, Alta. (M.W. Cormack).

FOOT ROT (Rhizoctonia Solani). Some varieties were almost wiped out at Brandon, Man. (W. Cherewick).

## BROOM-CORN MILLET

ROOT ROT (Pythium arrhenomanes and P. spp.) was found causing moderate damage in the field at Ardath, Saskatoon, and Outlook, Sask. It caused a pronounced yellowing especially of the outer leaves and stunting of the entire plant in large areas. Necrotic lesions were formed on the roots. Although the susceptibility of millet to Pythium had been demonstrated experimentally in the greenhouse, this is the first report of its occurrence in the field in Sask. (T.C. Vanterpool).

SMUT (Sphacelotheca Panici-miliacei). An estimated infection of 10% of the heads was found in a field at Ardath, Sask., 50% at Outlook, and "19% were affected in my own plots at Saskatoon" (T.C. Vanterpool). This smut was sent in from Assiniboia; it was suspected as the cause of sickness in horses (H.W. Mead). In a field at Oak Bluff, Man., 25% of the heads were affected (W. Popp).

## BUCKWHEAT

YELLOWS (Callistephus virus 1) was common in York, Sunbury, Queens, Carleton, Westmorland and Kings Counties, N.B. Infection ranged from one to 20%

in the rough Fagopyron tataricum varieties and a trace in the smooth ones of F. esculentum (D.J. MacLeod). An occasional plant was affected in a field of Silver Hull in Queens Co., P.E.I. (R.R. Hurst).

## CORN

EAR, STALK and ROOT ROTS (Diplodia Zeae, Fusarium moniliforme, Gibberella Saubinetii, Nigrospora sphaerica). On open-pollinated varieties, D. Zeae was the only important ear-rot pathogen in seed corn in Essex and Kent Counties, Ont. Damage was most severe in fields where air circulation was poor. Damage from the 3 other fungi mentioned above was localized in both open-pollinated and hybrid varieties. Root rots were unusually widespread and destructive on hybrid varieties in 1942. Damage was almost invariably associated with excessive soil moisture or poor drainage (L.W. Koch).

SMUT (Ustilago Zeae) was reported in Sunbury Co., N.B. and in various parts of P.E.I. Although only traces were present, smut seems to be on the increase in P.E.I.

## FLAX

The following account on the "Flax Diseases in Saskatchewan in 1942" was prepared by Professor T.C. Vanterpool, University of Saskatchewan, Saskatoon, Sask.

Flax suffered severely from disease in Saskatchewan in 1942. Several factors appear to be responsible for the rise in severity. Flax growing has expanded to meet the increasing demand on account of the war and production was further stimulated by a Government bonus of two dollars an acre for flax sown on summer-fallowed land. The result has been a sudden substantial increase in the flax acreage. Many farmers with little or no experience in flax growing were induced to sow the crop. In many instances, seed of inferior quality and carrying pathogenic organisms was sown without first being treated with a suitable fungicide. Sometimes the crop was sown on land not sufficiently suited to its culture or on land which had borne a crop attacked by rust or the browning and stem-break disease the previous year. Severe late spring frosts and early fall frosts, both of which were general, resulted in reduced yields. The abnormally high rainfall favoured some diseases, e.g., the browning phase of the browning and stem-break disease, but in general it was favourable for plant growth. Yields of up to 30 bu. per acre on summer-fallow and 22 bu. on stubble were reported for the variety Royal.

Since an increase in the severity and number of diseases affecting flax in the province was anticipated early in the season, progress of the various diseases was followed rather closely and some study was given to the more important phases of their development.

SEEDLING BLIGHT (Rhizoctonia Solani, Pythium de Baryanum, P. megalacanthum and Fusarium Lini) (P.D.S. 12 (1932): 29). Damping-off and seedling blight due to parasitic organisms was not conspicuous this year. Their absence may be attributed to the moderately cool temperatures which prevailed during the early stages of growth and which were probably optimum for flax. Destructive spring

frosts may also have masked seedling blight. Large fields were reported to have been ploughed up because of frost damage and in most localities many thin stands could be attributed to this cause.

RUST (Melampsora Lini) was general over the province. It was most severe on Bison, the most extensively grown variety, but in any one district, the severity of infection on the variety ranged from slight to severe. This was probably due to several factors, such as the presence or absence of bits of rusted straw mixed with the seed, whether overwintered rusted flax straw was present in nearby fields or not, date of sowing, density of stand, soil fertility (H.G. Heggeness, Pl. Physiol. 17: 143-4. 1942), etc. Usually no rust or only a trace was found on Royal. Occasionally in low places or where the stand was thick a moderate infection occurred. When Bison was heavily rusted the sides of the seed were flat or slightly concave instead of convex. Severely rusted fields of Bison near Dalisle yielded 9 bu. per acre as compared with fields of Royal, on a farm two miles distant, which yielded 22 and 30 bu. per acre on stubble and fallowed land respectively. On account of susceptibility of Bison to rust, Dominion, Provincial and University agriculturalists have recommended that it be replaced by Royal, in so far as seed of the latter is available, in all parts of the province except in the northern section, where Redwing, on account of its earliness, is still recommended. In September, many samples of Bison attacked by Melampsora Lini revealed a white growth due to a species of Fusarium (cf. A.A. Jaczewski, R.A.M. 8: 381. 1929) on the black telia.

WILT (Fusarium Lini). Early to mid-season wilt was negligible under farm conditions. Only one authentic case of wilt was reported where there was considerable damage; this was a field of Crown on which flax had been grown some years previously. It was very severe on certain varieties in the wilt nursery at Saskatoon, especially in the lower areas.

ROOT ROT (cf. H.H. Flor, Phytopath. 30: 749-760. 1940 and L.W. Boyle, U.S.D.A. Techn. Bull. 458. 1934) appeared as a premature ripening of the plant with shrivelling of the grain and was common in fields of the wilt-resistant varieties Bison and Royal. The disease was a trace to moderate in most fields examined, but it was severe, over 50% of the plants affected, in one field of Bison near Saskatoon and in one near Tessier. Seed from affected plants weighed but 76.6% of that of seed from normal plants in the same field. Fusarium spp., Rhizoctonia Solani, Pythium de Baryanum and Alternaria spp. were the principal organisms isolated. Undoubtedly much of the reduction in yield attributed to rust was due to root rot. The disease is considered next to rust in importance in reducing yields in 1942, with browning and stem-break a close third.

BROWNING and STEM BREAK (Polyspora Lini) in one or both of its phases, was present in severe form on the variety Bison at Delisle, Elbow, Conquest, Bounty, Cudworth and Zelma. Royal was also attacked at Conquest. Letters of inquiry, accompanied by plant samples, were received from these districts; all except Zelma were visited and seed of the 1942 crop was secured later. The disease is much more widespread in the province than was generally realized. It presents a serious problem requiring prompt attention as the causal organism occurs in, as well as on, the seed. While Bison was most frequently affected in the field, probably because it was the most commonly grown variety, the browning phase of the disease in moderately severe form was found here and there on both Redwing and Royal in the University plots. The fibre variety Stormont Cirrus was the one most heavily attacked in the experimental plots. Polyspora Lini was

readily isolated from stem lesions and seed of the four varieties. The organism has also been obtained from all the 1942 seed samples gathered in the districts listed above. The considerable loss caused by this disease has possibly been attributed in part to rust.

ANTHRACNOSE or SEEDLING BLIGHT (Colletotrichum Lini). Light infections of anthracnose were found on the leaves of Bison, Redwing and Royal in the University plots, but later the seed-bolls did not become infected. Pure cultures were obtained from the leaves of Bison. As the organism is carried within the seed, it is highly probable that it is also present in other parts of Saskatchewan, but whether its scarcity is due to the resistance of the commercial varieties of flax grown in the province or to environmental conditions adverse to its development, is not definitely known. The leaves of Bolley's Golden were heavily infected in the experimental plots and later over 50% of the bolls became affected. C. Lini was readily isolated in pure culture from affected seeds. A high percentage of affected seed, which yielded C. Lini when cultured, was present in samples of Liral Crown, Liral Dominion, Stormont Cirrus and J.W.S. varieties grown in the plots at Star City. No isolates of the fungus have been obtained as yet from plating seed of Bison, Redwing or Royal. This disease has not hitherto been reported from Saskatchewan.

HEAT CANKER. No specimens of heat canker were found during the summer which was cool and wet. This is in striking contrast to its general prevalence during the summer of 1941, when high temperatures were common.

FALL-FROST DAMAGE. Flax seed-bolls recently injured by frost appear water-soaked. If the seed is approaching maturity, it is discoloured, turning dark brown to almost black, often with a maroon tinge. The germination is slightly to severely affected. Seed damaged by frost in the earlier stages of maturity range from grey to almost black, usually accompanied by shrivelling and wrinkling of the epidermis. Germination is seriously reduced. Frost damage was general this fall and is the major cause of the low germination and high dockage of much of this year's crop.

Besides the diseases already reported, the following organisms have been isolated:

(i) From diseased seed:

Alternaria spp., common on all varieties; [x]bacteria undetermined (?Pseudomonas atrofaciens cf. P.D.S. 19: 30); [x]Botrytis of the cinerea type, from Bolley's Golden, but not observed in the field (cf. G.H. Pethybridge, H.A. Lafferty and J.G. Rhynehart, Journ. Dept. Agr. & Techn. Instr. for Ireland 21: 167-187. 1921, and B.R. Houston, U.S.D.A. Pl. Dis. Reporter 24: 213-4. 1940); Fusarium spp.; [x]Helminthosporium sativum, isolated from variety J.W.S.; Phoma spp., from Bison, Bolley's Golden and perennial garden flax (Linum perenne), but not observed in the field on the oil varieties (cf. Pethybridge et al. l.c.); ?[x]Sclerotinia sclerotiorum (cf. Pethybridge et al. l.c.), not observed in the field.

(ii) From roots, base of stem or seedlings:

[x]Alternaria spp.; [x]Ascomycete, undetermined; [x]Epicoccum purpurascens; [x]Phoma sp. (cf. Pethybridge et al. l.c.); Pythium de Baryanum; [x]P. megalacanthum; Rhizoctonia Solani; Fusarium spp.

The organisms marked by (x) have not been previously recorded in Saskatchewan. Their importance and distribution in the province are unknown. It should be noted that no specimens of the pasmo disease (Septoria linicola) have been found. 1/

Conclusions: Studies of the seed crop available for 1943 show that Polyspora Lini is present in widely separated parts of Saskatchewan and that it is being carried in the seed in greater amounts than usual, as a result of the wet season in 1942. To this must be added a number of other seed-borne pathogens whose importance and distribution in the province are unknown. Besides the unusual amount of frost-damaged seed, it is likely that there is still considerable cracking of the seed coat of the type reported by J.E. Machacek and A.M. Brown (Phytopath. 32: 733-734. 1942). If seed treatment with suitable fungicides has been deemed necessary in the past, the need for treating the 1942 Saskatchewan-grown seed is considerably greater. Thorough cleaning of the seed to remove, as far as possible, shrivelled and badly diseased seed is necessary before the seed is treated.

As already mentioned, it has been recommended that Royal replace Bison in the south and central districts on account of the greater rust-resistance of Royal, while Redwing is still recommended for the northern park belt.

## Other Observations

HEAD DISCOLORATION (Alternaria sp.) was general and moderate at Winnipeg, Man., but it was more pronounced on some varieties than others. The discoloration was dark brown, mostly on the tops of the plants. Alternaria sp. was very commonly associated (J.E. Machacek et al.).

Asterocystis radicis was found on roots of Royal growing in the greenhouse, Saskatoon, Sask., in soil collected from a flax field in the summer of 1942 (T.C. Vanterpool).

SEEDLING BLIGHT (Colletotrichum Lini). The organism was isolated repeatedly from seed of fibre flax from St. Adalbert, Que., and seed of unknown origin. It has not been previously detected in Que. (A. Payette).

WILT (Fusarium Lini) was fairly common in Sask. A moderate infection was found at Young, causing a 10% loss. It was also present on Crown flax from Cantuar, Sask. (H.W. Mead). A light to moderate general infection occurred in Crown at Winnipeg, Man., with more severe infection in large patches. Some 20% of plants were affected in a field at Niverville (W.L. Gordon). Wilt was present in susceptible varieties at Ont. Agr. College, Guelph, Ont. (J.D. MacLachlan). Wilt was observed in fields in Glengarry Co. It occurred in scattered isolated patches, but they were conspicuous enough to attract the attention of the growers (J.E. Howitt).

STEM CANKER (Fusarium spp.) occurred in rapidly spreading patches in flax. It was always associated with rust infection. The fungus begins in the

1/ As Prof. Vanterpool pointed out to me, the perfect stage of the organism is Sphaerella Linorum Wr. described by H.W. Wollenweber (Rev. Bot. Inst. 'Miguel Lillo' 2(2a): 483-494. 1938. Abstract in R.A.M. 18: 111-2. 1939) from material collected in South America. (I.L. Conners)

rust pustules and spreads out often girdling the stem. F. Scirpi var. acuminatum and F. Equiseti were isolated from material collected in Man. and F. avenaceum from specimens collected at Spalding Sask., by Dr. P.M. Simmonds (J.E. Machacek and W.L. Gordon).

ROOT ROT (Fusarium spp.). In a field of the fibre flax Liral Dominion, at Ottawa, Ont., the plants were dead or nearly so in quite extensive patches representing 10% of the area on Aug. 10. The worst spots appeared to be on slopes exposed to considerable water erosion in the spring, but over most of the field scattered plants were affected. Flax had not been grown on the farm for at least 10 years. The previous crop had been oats. At first this was thought to be wilt, for Fusarium oxysporum was isolated by Dr. W.L. Gordon from the stem bases of samples of diseased plants, while only one isolation was obtained from bases of healthy plants. F. scirpi var acuminatum was also isolated a few times, chiefly from the diseased plants. However, the disease looked more like a root rot, since it did not show up until the crop was approaching maturity (I.L. Conners).

RUST (Melampsora Lini) was unusually prevalent especially in southern Alta. and apparently caused slight damage in a few fields. Infection was a trace in 8 fields, slight in 4 and moderate in 3 out of 17 examined. Infection was slight in the plots at Edmonton, absent to moderate at Lacombe, absent to severe at Lethbridge and it was also reported from Grande Prairie (M.W. Cormack). Rust was moderate to severe on Bison and Redwing and light on Royal in Sask. In many fields no rust developed on Royal. The loss from rust was considerable in some districts, if susceptible varieties were grown (H.W. Mead).

Rust occurred in epidemic form in many localities in Man. in 1942. The first infections were observed on June 23, and by mid-July infections ranging upwards of 80% were present in some fields. The rust infection was not uniformly distributed. Although present in all fields examined, the rust varied greatly in intensity from field to field. Fields of flax in which the rust infection averaged 80% or more were, in some instances, located only a few miles from fields of the same variety which carried infections of only 5% or less. The very uneven distribution of the rust indicated very strongly that the spores initiating the infections were of local origin, for infections caused by wind-borne spores, as is the case in epidemics of leaf and stem rust of cereals, are usually fairly uniformly distributed over very large areas, when the source of initial inoculum is derived from a distant source. Heavily infected fields, in some instances, were found to be located very close or adjacent to fields on which flax was produced last year. Some of the most severely affected were adjacent to fields on which the flax had been harvested by the combine method. This method permits the straw to be scattered over the whole surface of the field, where it often remains undisturbed until the following year.

Of the two varieties, Bison and Redwing, which are the most commonly grown varieties in Man., Bison was the more susceptible. The heaviest infections observed on Bison exceeded 80% while infections in excess of 35% were nowhere observed on Redwing. The variety, Royal, was observed in several experimental plots at Winnipeg, and appeared to be quite resistant under field conditions. The infection on this variety averaged about 7% (B. Peturson).

Rust was present on some varieties at the Ont. Agr. College, Guelph, Ont. (J.D. MacLachlan).

BROWNING and STEM BREAK (Polyspora Lini) was present along with rust on most samples received from Sask. points. It was collected at Kyle, Viscount, Dinsmore and Sovereign. There were indications that it was fairly general in distribution and did considerable damage (H.W. Mead). Stem break caused slight damage on several varieties in the plots at Macdonald College, Que. Its identity was confirmed by plating out the pathogen (R.A. Ludwig). Stem break was rather destructive on Liral Dominion at the Station, Charlottetown, P.E.I. (R.R. Hurst).

SEEDLING BLIGHT (Rhizoctonia Solani). Diseased specimens were received from Zealandia, Sask. (H.W. Mead).

PASMO (Septoria linicola). Infection was moderate at Morden, Man., and slight on one variety at Winnipeg. Material collected at Morden by Dr. C.H. Goulden was examined (W.L. Gordon).

HAIL caused heavy damage in some flax fields in Sask. (H.W. Mead).

## FOXTAIL MILLET

ROOT ROT (Pythium arrhenomanes and P. spp.) caused a trace of damage to foxtail millet in my experimental plots at Saskatoon, Sask. Isolations were made from necrotic lesions on the roots. This is the first time the disease has been observed in the field in Sask. (T.C. Vanterpool).

SMUT (Ustilago Crameri) affected 7.6% of the heads in the untreated control in my plots at Saskatoon, Sask. Affected heads appear bleached compared with healthy heads before the crop has reached maturity. The seed was obtained from the Seed Laboratory, Plant Products Division, Saskatoon (T.C. Vanterpool). This smut has been detected previously in Canada in seed samples only. Cf. P.D.S. 20:24. (I.L. Conners).

## KOK-SAGHYZ

CROWN GALL (Agrobacterium tumefaciens (Sm. & Towns.) Conn. Journ. Bact. 44: 359. 1942; Bacterium tumefaciens Smith & Townsend, Science ser. 2, 25: 671. 1907; cf. Starr et al. Phytopath. 33: 316. 1943). One specimen from the plot in the Division of Horticulture experimental area, Ottawa, was examined Oct. 30 (L.T. Richardson).

CROWN ROT (Erwinia carotovora). Two specimens of kok-saghyz (Taraxacum kok-saghyz Rodin) affected by crown rot were received from Lethbridge, Alta., Nov. 31 (L.T. Richardson).

BACTERIAL LEAF SPOT (Xanthomonas sp.) was observed at Winnipeg, Man., on kok-saghyz in late summer of 1942. The causal organism has been isolated and its pathogenicity demonstrated by artificial inoculations (W.A.F. Hagborg).

## MANGEL

CROWN CALL (Agrobacterium tumefaciens; cf. synonymy p. 27) affected the occasional root in many fields throughout P.E.I. (R.R. Hurst).

LEAF SPOT (Cercospora beticola). Severe in many fields in south-western Ont., where it caused considerable defoliation particularly about Galt (J.K. Richardson); very prevalent in the Guelph district (J.D. MacLachlan); infection generally heavy and damage severe in P.E.I. (R.R. Hurst).

ROOT KNOT (Heterodera marioni) was fairly general in a plot at the University, Vancouver, B.C., causing swellings on fibrous roots of various sizes. It had no apparent effect on yield (W. Jones).

LEAF SPOT (Phoma Betae) was present on the leaves of 60% of the plants being grown for seed at Grank Forks, B.C. (G.E. Woolliams).

STORAGE ROT (Rhizopus sp.) affected a few roots in Jan., 1942, at Duncan, B.C. Rhizopus was isolated from the diseased tissues (W. Jones).

CRINKLE (virus). A trace was found in two fields in York and Carleton Counties, N.B. The affected plants were dwarfed and the younger leaves were severely crinkled and curled (D.J. MacLeod). Crinkle was found occasionally in Queens Co., P.E.I. (R.R. Hurst).

MOSAIC (virus). Ten per cent of the plants affected in a plot grown for seed at the University, Vancouver, B.C. (W. Jones); 15% of plants affected in two fields of stecklings at Verchères, Que.; about 25% of the mother beets were affected in one at St. Hilaire; the diseased plants produced few or no seed stalks (E. Lavallée); a trace in a seed plot in York Co. and in a field in Sunbury Co., N.B. (D.J. MacLeod); occasionally in some fields in Queens Co., P.E.I. (R.R. Hurst).

BLACK HEART (boron deficiency). An affected specimen was brought in from Arnprior, Ont. The central or heart leaves were drying and the heart was rotting from the top downwards. Brown transverse cracks also occurred on the leaf petioles (H.N. Racicot).

DAMPING-OFF (cause undetermined). One 2½ acre field was completely destroyed at Farnham, Que. (E. Lavallée).

FASCIATION. A trace was found in 11 seed plots in Queens, Sunbury, York, and Carleton Counties, N.B. In some plants the entire stem was flattened and was 2-3" in width (D.J. MacLeod and S.F. Clarkson).

## RAPE

BLACK ROT (Xanthomonas campestris (Pamm.) Dowson, Zentralbl. f. Bakt. u.s.w. Abt. 2, 100: 190. 1939; Bacillus campestris Pammel, Iowa Agr. Exp. Sta. Bull. 27: 130. 1895; Starr & Burkh. Phytopath. 32: 600. 1942) was present as a leaf infection in the Guelph district, Ont., especially where rape was in close proximity to a turnip field, in which black rot was prevalent (J.D. MacLachlan).

## SAFFLOWER

RUST (Puccinia Carthami Corda). A trace of rust was observed on safflower (Carthamus tinctorius) in the plots of the Dominion Forage Crops Laboratory, Saskatoon, Sask. on August 15. Varietal differences were apparent (T.C. Vanterpool).

Infection was light to moderate on several lines or varieties in the above plots on September 9 (12016). Spores were present in the washings of the seed of 8 of the 13 lines sown in 1942 at Saskatoon. Five lines, all carrying spores, were from Indian Head, 5, with trace on one, from Ottawa and 3, all clean, from Lethbridge, Alta. After the plots were harvested, seed was examined and spores were found on all varieties (R.C. Russell). The rust was first recorded at Morden, Man., on July 28 by W.E. Sackston (12017). The severity of infection on the same plants was estimated by B. Peturson to be 20% on Aug. 26. No rust was found on safflower in the plots at Winnipeg (W.L. Gordon). No rust was found in plots at Lethbridge, Alta., according to Dr. M.W. Cormack nor were spores found on seed of the 1942 crop examined by me. The rusts of safflower, their hosts and distribution have been studied and the results have been incorporated into a paper for publication in Phytopathology (I.L. Conners).

## SORGHUM

LEAF SPOT (undetermined) was present at Saskatoon, Sask. Three attempts to isolate a causal organism failed. (T.C. Vanterpool).

## SOY BEAN

LEAF SPOT (Ascochyta sp.) very slightly infected soy beans at Agassiz, B.C., in July. The spots were few, circular to elongate, light brown with a purplish or dark brown border, 2-10 mm. in diameter. The spots often drop out, giving a shot-hole appearance to the leaf. Pycnidia are immersed, light brown, 100-150 microns in diameter; spores hyaline, usually constricted at the septum, 7-12 x 3-4 microns (W. Jones).

ANTHRACNOSE (Colletotrichum Glycines Hori). During September, an extensive survey of soy bean plantings was carried out in Essex Co., Ont. Several diseases were encountered in fields grown both from registered seed and from that obtained from commercial sources. Anthracnose was found a few times affecting stems of plants. Numerous black ascervali were noted scattered uniformly over the surface of the affected tissue. The fungus agreed microscopically with the description of C. Glycines (L.W. Koch and A.A. Hildebrand). S.G. Lehman and F.A. Wolf (Journ. Agr. Res. 33: 381-390. 1926) have found the perfect stage in nature as well as obtaining it in culture and named it Glomerella Glycines.

POD and STEM BLIGHT (Diaporthe Phaseolorum (Cke. & Ell.) Sacc. var. Sojae (Lehm) Wehmeyer). During the summer of 1941, plants within an area of some 400-500 sq. ft. were almost completely destroyed in a planting of soy beans at the Station, Harrow, Ont. The symptoms of the disease were identical with Pod and Stem Blight as described by S.G. Lehman (Ann. Mo. Bot. Gard. 10: 119-169. 1923). Over 90% of the isolations from typically diseased plants yielded pure cultures of either the Phomopsis stage or the Diaporthe.

In 1942, the disease was found again not only in different plantings at the Station, including those of foundation stock intended for registration, but also to a greater or less extent in every field inspected during the county-wide survey. On account of its widespread occurrence and destructiveness this disease must be regarded as the most important affecting soy bean culture in this part of Ont. The disease has not been previously reported in Canada. (L.W. Koch and

A.A. Hildebrand). Lehman described the fungus as Diaporthe Sojae. L.E. Wehmeyer (The genus Diaporthe etc. pp. 47-48. 1933) doubts whether it is distinct from D. Phaseolorum, but he maintained it as a variety of the latter (I.L. Conners).

WILT (Fusarium oxysporum Schl. f. ?tracheiphilum Snyder & Hansen) caused as much damage and occurred almost as widely in Essex Co., Ont., as Pod and Stem Blight. In affected plants, the roots and base of the stem become brown with a browning of the vascular system. In advanced stages the pathogen produces masses of salmon-coloured spores visible to the unaided eye on the stems and lower branches. Frequently branches are attacked at the point where they join the main stem, wilt and give to the stem a "spur-blight" effect (L.W. Koch and A.A. Hildebrand).

DOWNY MILDEW (Peronospora manshurica). Infection was slight on Pagoda, Richland, Minsoy; very slight on Harbora; trace on Mandarin; and nil on Kabatt at Matsqui, B.C. This is the first report of the disease in B.C. (W. Jones). Infection ranged from a trace to severe in Essex Co., Ont., but in general damage was slight (L.W. Koch and A.A. Hildebrand).

BACTERIAL BLIGHT (Pseudomonas glycinea Coerper, Journ. Agr. Res. 18: 188. 1919; Bacterium glycineum Coerper l.c.; cf. Starr & Burkh. Phytopath. 32: 601. 1942) slightly affected a few plants at Agassiz, B.C. (W. Jones). The leaves were infected on 90% of the plants of Manitoba Brown in a field being grown for seed at Grand Forks (G.E. Woolliams). Infection ranged from slight to moderate in most of the plantings at Brooks and Lethbridge, Alta., including several fields of Pagoda and Kabatt. At Olds, infection was moderate on Manitoba Brown and slight on other varieties (M.W. Cormack). Bacterial blight caused slight damage in a private garden at Saskatoon, in the University plots and at Codette, Sask. (T.C. Vanterpool and H.W. Mead). The organism was isolated from soy beans from Aylsham, Sask. Infection was moderate at Otterburne, Ste. Adolphe and Union Point, Man.; severe on Sioux, but trace to moderate on other varieties at Morden. The organism was isolated in each case and appeared typical (W.A.F. Hagborg). In marked contrast to 1941, infection was light, only a trace of the disease being found in a few fields in Essex Co., Ont. (L.W. Koch and A.A. Hildebrand). Infection was trace to slight on Early Black Eye at Ste. Anne de la Pocatière, Que. (R.O. Lachance).

MOSAIC (virus) caused slight damage in the University plots, Saskatoon, Sask. (T.C. Vanterpool). Mosaic infection was general and ranged from slight to severe in the Station plots at Harrow, Ont., including those being grown as foundation stock for registration and in most of the fields inspected in Essex Co. In the aggregate, infection was more severe in fields planted with non-registered seed (L.W. Koch and A.A. Hildebrand). A trace of mosaic (Medicago virus 2) was found in a plot at the Station, Fredericton, N.B. (D.J. MacLeod).

LOSSES FROM DISEASE. In 1942, some 7535 acres of soy beans valued at $300,000 were grown in Essex Co., Ontario. Reduction in yield due to the incidence of disease is conservatively estimated at almost 6%, i.e. $18,000. If the losses due to disease in adjacent counties approximated those in Essex, the loss was about $80,000, for the crop in Southwestern Ont. was worth some $1,315,000.

As suggested by and under the supervision of the Harrow Laboratory, the Experimental Station has undertaken a programme of disease control involving careful roguing and complete destruction of diseased plants in an effort to eliminate all seed-borne diseases from foundation and other plots (L.W. Koch and A.A. Hildebrand).

## SUGAR BEET

The following discussion on "Diseases of Sugar Beets in Southwestern Ontario in 1942" was contributed by Dr. A.A. Hildebrand, Dominion Laboratory of Plant Pathology, Harrow, Ont.

CERCOSPORA LEAF SPOT (C. beticola), as usual, was present on sugar beets throughout almost the whole area. Environmental conditions were more conducive to early infection this year than last and during late August the disease must have caused serious loss through defoliation of plants.

Due to unfavourable conditions in the spring, seeding operations this year were spread over a much longer period than usual. As a consequence, in August when Cercospora inoculum was abundant, fields of beets differed widely as to their stage of development. It was noted repeatedly that Cercospora infection was more severe on the early planted, hence more mature beets, than on the later planted ones. Since stomatal movement is greater on mature than on younger leaves, and since infection by Cercospora is favoured by greater stomatal movement (V.W. Pool, and M.B. McKay, Journ. Agr. Res., 5: 1011-1038. 1916), it may readily be understood why earlier planted beets were heavily infected while younger plantings in close proximity remained virtually free from the disease.

PHOMA LEAF SPOT (P. Betae) occurred throughout the area on commercial beets, infection for the most part being confined to the older, lower leaves. The disease persisted much later this year than last, surprisingly heavy infection being noted as late as Sept. 7.

PHOMA SEED-HEAD INJURY. On July 9, in a field of seed-producing plants, it was noted that many of the seed-heads showed an apparently diseased condition. Some of the seeds of affected heads were already dead or showed a reddish to brownish discoloration. The small leaves, also the stalks of the seed heads, were "peppered" with small spots, grayish towards the centre and surrounded by reddish halo. On July 10, in attempt to isolate a possible causal organism, tissue plantings from affected leaves, stalks and seeds (previously surface-sterilized) were made on acidified and non-acidified potato-dextrose agar. In three days' time each planting yielded a culture of Alternaria and in another three days, Phoma also developed from every one of the plantings. Each of the organisms was obtained in pure culture and its pathogenecity was tested on healthy seed-heads in both field and greenhouse infection experiments. Phoma possessed marked pathogenic capability and readily produced symptoms identical with those observed under natural field conditions. While Alternaria did possess some slight pathogenic capability, the symptoms produced differed from those observed in the field.

While it has been known for a long time that Phoma is carried on sugar beet seed, it has not been known so definitely how the seed became infected. The observations recorded above furnish definite information in this regard.

RHIZOCTONIA ROT (R. Solani type). First becoming noticeable about July 9 and later reaching a peak during the first two weeks in August, Rhizoctonia rot was general in its occurrence throughout Essex, Kent and Lambton counties. In some instances as high as 20% of the plants in a field showed infection but, in the aggregate, it is estimated that the disease was responsible for a reduction in yield of about 5% of the crop. Two different types of infection appear to be associated with this disease. In the first, the fungus attacks the plants

at the ground level and infection, spreading upward, kills the base of the leaf petiole and downwards through the crown, affects the upper part of the root. Affected plants in a row may be readily recognized by the rosette of recumbent leaves, the petioles of which show a more or less extensive brownish discoloration near their point of attachment to the crown. When harvested the crown and upper part of affected roots may be completely rotted while the lower portion of the tap root may remain almost unaffected. In the second type of infection, the fungus attacks the root at some distance below the crown. Affected roots show more or less extensive brownish-discolored lesions. These are relatively shallow but deep fissures are also formed. In the latter are often visible brownish-coloured wefts of the coarse mycelium of the fungus. In the hot days of midsummer the leaves of affected plants may wilt but they do not necessarily die. As autumn approaches the above-ground parts of affected plants may be quite normal in appearance and give no indication of a diseased condition of the roots. When harvested, the lower part of the tap root of affected plants may be more or less completely rotted while the crown remains intact. Whether the symptoms described above represent two distinct types of disease caused by different strains of Rhizoctonia or whether they are merely different manifestations of the same disease caused by a single strain of the fungus are points which remain to be investigated.

RHIZOPUS ROT. In July, sugar beets growing in an experimental plot at the Harrow Laboratory exhibited a wilted condition. Examination of the roots of affected plants revealed the presence of a type of rot which had not previously been encountered in Ontario. Isolations from infected roots yielded repeatedly Rhizopus arrhizus Fischer in pure culture to the extent of almost 100 per cent. In field infection experiments, R. arrhizus was found capable of reproducing the disease on artificially injured but otherwise healthy plants exactly as it had been originally found under natural field conditions. Since 1915, when H.A. Edson (Journ. Agr. Res. 4: 135-168. 1915) described this disease as occurring to a limited extent in California and Colorado, it does not seem to have been encountered elsewhere on this host in North America.

SAVOY (virus). From July 9 until the end of the growing season savoy-infected plants were noted throughout the district. In not a single instance, however, were infected plants numerous enough to attract more than passing interest.

VIRUS-LIKE DISEASES. This season, as was the case last year, many plants were noted, the foliage of which exhibited symptoms strongly suggestive of the presence of virus. In the early part of the growing season the leaves of many plants showed a fine mottle which seemed to be similar to that described for mosaic-infected plants, except that, unlike mosaic, the mottle never appeared in the youngest leaves. It was observed that thrips were present on many of the mottled leaves and that later in the season, when thrips could no longer be found in sugar beet fields, the mottle did not appear on the later-produced leaves. There is, however, a coarse mottle which does persist throughout the season. Attempts to date to transmit the trouble from affected to healthy plants both by insect transfer and by patch grafts have been unsuccessful. The trouble may be of the nature of a nutritional disorder.

BLACK ROOT or DAMPING-OFF (cause undetermined). From May 28 until almost June 20, black root of seedlings constituted a more serious threat to the sugar beet crop than it has for a number of years past. Because of the severity

of the disease, many fields had to be resown either to sugar beets or more often to other crops and in many affected fields which were retained the effect of the disease was reflected later in reduction in yield and quality of beets. It was especially difficult this year to evaluate even approximately the losses due to black root since water damage following excessive rains, and delayed thinning and weeding due to acute labour shortage, were complicating factors.

## Other Observations

LEAF SPOT (Cercospora beticola) caused considerable damage to the foliage in one field at Agassiz, B.C., in July. Infection was general and damage slight on Vancouver Island and the lower mainland in Aug. (W. Jones)

ROOT-KNOT NEMATODE (Heterodera marioni (Cornu, 1879) Goodey, 1932) is very prevalent in the Blackwell district, near Sarnia, Ont., but it was very much less in evidence in sugar beets in 1942 than it was in 1940 and 1941. (A.D. Baker)

SUGAR-BEET NEMATODE (Heterodera schachtii Schm.). In the Blackwell district, lying to the east of Sarnia, Ont., a precautionary area has been established against the sugar beet nematode embracing all the infested areas of this district. There have been put into effect, through the Ontario Department of Agriculture, regulations which govern the growing and harvesting of all sugar beets in the district. To date, a total of 18 infested fields have been definitely located. No further infestation has been found at Glencoe, where one infested field was found in 1931. The above constitute the only definite records of distribution in Canada. While bare spots have been evident from time to time in some infested fields at Blackwell, the injury cannot yet be classified as severe, possibly due to the early adoption of precautionary measures. (A.D. Baker)

LEAF SPOT (Ramularia beticola) was general in seed crops on Vancouver Island and the lower mainland, B.C. It caused considerable damage to the leaves in crops being grown for seed, and it also affected the stems.(W. Jones)

MOSAIC (virus) affected about 12% of the mother plants in 2 fields of Frontenac, being grown for production of registered seed at St. Hilaire, Que. (R.O. Lachance)

HEART and CROWN ROT (boron deficiency) slightly affected a field of Frontenac at Joliette, Que., and a second at St. Hilaire (R.O. Lachance)

HOLLOW HEART (cause unknown). Three severely affected fields showing 30-40% of the roots variously injured were found in Que., at Joliette, Verchères and St. Hilaire respectively. Stem cracking was found associated with the hollow heart. (E. Lavallée)

## SUNFLOWER

RUST (Puccinia Helianthi). Both aecia and uredinia were found at Saskatoon, Sask. Rust was not as severe as usual in the extensive sunflower breeding plots of the Dominion Forage Crops Laboratory (T.C. Vanterpool). Rust was moderate on several varieties at Winnipeg, Man.

WILT (Sclerotinia sclerotiorum). About half the plants of Mammoth Russian were dying and many others were infected in the continuous sunflower plot at Lacombe, Alta. No infection was found in an adjoining field of the variety Sunrise (M.W. Cormack). Wilt was first observed in the plots at Saskatoon, Sask., on Aug. 12, when sclerotia were already present. Plants were attacked at the base or higher up the stem and in the head. According to Mr. E.D. Putt, the disease was severe at the Melfort Station and the Mennonite varieties are susceptible (T.C. Vanterpool). Affected plants were received from the Scott Station; damage was moderate. (H.W. Mead)

LEAF SPOT (Septoria Helianthi) infection was moderate to severe on material received from Melita, Man. (W.L. Gordon)

## CULTIVATED GRASSES

AWNLESS BROME GRASS (Bromus inermis)

Ergot (Claviceps purpurea). Infection severe in a field at Cardston, Alta., and moderate to severe in many roadside stands throughout the province; moderate infection at Winnipeg, Man.

Other records of ergot were: on Alopecurus aequalis collected by A.E. Roland and W.G. Dore on top of Cape Blomidon, N.S. on Sept. 2 (R.M. Lewis); on Agropyron repens at Porter Point, Kings Co., N.S. (R.M. Lewis); severe on grasses in Sask., especially common on those along the roadways including Agropyron repens and Stipa viridula (T.C. Vanterpool); on Bromus sp. growing alongside a field of barley at Grand Forks, B.C. (G.E. Woolliams); on Elymus glaucus in scattered spots near Sidney, B.C. (W. Jones)

Leaf Spot (Selenophoma bromigena) infection was in general moderate in Sask., although at Radisson it was severe. Distinct differences in the severity of infection were noticeable on the various lines being grown at Saskatoon. (H.W. Mead)

BROWN TOP (Agrostis tenuis)

Grass Nematode (Anguina agrostis) (Steinbuch, 1799) Filipjev, 1936) was identified from plants of A. tenuis and Poa pratensis submitted by W.G. Dore who collected them near Yarmouth, Granville Ferry, and Grand Pré, N.S. (A.D. Baker)

CANADA BLUE (Poa compressa)

Powdery Mildew (Erysiphe graminis) slightly affected P. compressa and P. pratensis in the greenhouses, Dominion Forage Crops Laboratory, Saskatoon, Sask. No mildew was observed on brome, crested wheat grass, timothy and sheep fescue growing in pots on the same bench. (T.C. Vanterpool)

CRESTED WHEAT GRASS (Agropyron cristatum)

Ergot (Claviceps purpurea). A trace was present at Saskatoon, Sask., in a park (P.M. Simmonds) and in the plots of the Forage Crops Laboratory. (T.C. Vanterpool)

ORCHARD GRASS (Dactylis glomerata)

Stem Rust (Puccinia graminis). Moderate infection on O.A.C. 1 at Morden, Man.

Smut (Ustilago striiformis) affected heads of several plants at Elora, Ont. (MC 1016); it was also collected on this host (MC 1025), Phleum pratense

(MC 1026) and Agrostis stolonifera (MC 1027) at Macdonald College, Que. (I.H. Crowell)

TALL OAT GRASS (Arrhenatherum elatius)

Brown Stripe (Scoletotrichum graminis) was general and caused slight damage in the trial rows at Sidney, B.C. It was also common in the area on Elymus glaucus. (W. Jones)

Smut (Ustilago perennans). Slight infection at the Station, Sidney, B.C. (W. Jones)

TIMOTHY (Phleum pratense)

Heterosporium Leaf Spot (H. Phlei). Occasional spots were found at the Botanical Garden, Montreal, Que. (J.E. Jacques). Infection was about 10% on the wild grass and on many clones in the rust nursery, Charlottetown, P.E.I. (R.R. Hurst).

Stem Rust (Puccinia graminis var. Phlei-pratensis). A trace in one field in Alta. and in the plots at Edmonton (M.W. Cormack). It was remarkable that rust was almost entirely absent in places about Macdonald College, Que., where it was abundant in previous years. (I.H. Crowell). Stem rust was unusually common in P.E.I. in 1942; infection ranged from a trace to 100%. (R.R. Hurst)

Smut (Ustilago striiformis) was fairly common in the vicinity of Macdonald College, Que. (I.H. Crowell)

WESTERN RYE GRASS (Agropyron trachycaulum var. typicum)

Smut (Urocystis Agropyri) was observed on this host at Macdonald College, Que. The smut is also locally abundant on Agropyron repens. Ustilago macrospora and U. hypodytes were likewise abundant on A. repens, the latter smut being more widespread than the former. These last two smuts are new records for Que. (I.H. Crowell)

TURF

Snow mould (Fusarium ?nivale). Experiments were conducted on the plots of the Division of Forage Plants in 1940-41 and 1941-42 to determine how snow mould may be most economically controlled either with the mercury compounds now commonly used or preferably by some suitable substitute. Different species and strains of bent grasses differ greatly in their susceptibility to snow mould. Injury of the turf in the past two years was 70-75% for Washington bent, 55-65% for New Brunswick bent and only 15-25% for Colonial bent. However, Washington bent recovered quickly from the attack, but the other two grasses carried the scars of serious snow-mould attack until quite late in summer unless the turf was given special renovation treatment. Chemical treatment for snow mould in the spring of 1941 as soon as possible after the snow disappeared failed to control the disease. Of the materials applied in the fall of 1941 and of 1942, only the mercurials were effective. Semesan, Special Semesan, bichloride of mercury and Paratox all gave excellent control in both years, while calomel was relatively ineffective and oxide of mercury did very little good. Ceresan was tested in the fall of 1941 and although it gave excellent control it also severely injured the turf. The superiority of bichloride of mercury over calomel was also shown in tests containing mixtures of the two. Hydrated lime was wholly ineffective. Other substances which have proved useless as the result of two years' trial, were: Bordeaux mixture, Malachite green, combinations of the two, boron, copper sulphate, silver nitrate, and sulphur. Nomersan, with tetramethyl thiuramdi-

sulphide as the active ingredient, gave variable results, but further trials with the similar Thiosan will be conducted. (J.H. Boyce)

Brown Patch (Rhizoctonia Solani) affected large areas in several greens of the Municipal Golf Course, Montreal, Que. (J.E. Jacques). The disease was reported from 2 lawns in Charlottetown, P.E.I. (R.R. Hurst)