II. DISEASES OF FORAGE AND FIBRE CROPS

ALFALFA

BLACK STEM (Ascochyta imperfecta). Slight to moderate infection was observed in 8 fields in Alta. in August. Infection was slight in the plots at Lethbridge, and slight on the stems and moderate on the leaves in those at Edmonton (M.W.C.). Alfalfa plants received from Pas Trail in the Melfort district, Sask., showed small black spots on the sepals, pedicels and pods; Ascochyta ?imperfecta was present (H.W.M.). Black stem was present on certain strains in the plots at Swift Current (T.C. Vanterpool). A severe general infection was present on alfalfa at Pleasant Home, Man. (J.H. Craigie)

BACTERIAL WILT (Corynebacterium insidiosum). In a large proportion of the alfalfa fields in the Kamloops district, many plants died, due to winter killing in the severe winter of 1942-43. Examination revealed that bacterial wilt occurred in the fields showing winter killing and was affecting a large proportion of the plants (G.E. Woolliams). Bacterial wilt was found in 86 out of 125 stands of alfalfa examined in the southern irrigated districts of Alta. in June. It occurred in all the 80 stands three years old or older, and the damage in 1943 was estimated to be a trace in 11% of these fields, slight in 41%, moderate in 34% and severe in 14%. A trace of damage was found in 6 of the 45 young stands examined, and the early stages of infection were detected in several others. Severe damage occurred in a four-year-old variety plot of Autogamous at the Station, Lethbridge. In the two-year-old variety plots the damage was a trace to slight in Autogamous and a trace in all other varieties except Ladak, in which no infection was found. The disease was observed for the first time on non-irrigated land in Alta., in the Clover Bar district east of Edmonton. Damage ranging from a trace to moderate was present in 4 out of 30 fields examined in late September. It was not observed early in the season and apparently became established and developed rapidly as a result of the abnormally wet weather of the past two seasons. (M.W. Cormack)

DOWNY MILDEW (Peronospora aestivalis) infection was a trace to slight on Grimm and other hardy varieties in the plots at Edmonton, Alta., and moderate on all non-hardy varieties except Argentine, which was severely affected. (M.W. Cormack)

YELLOW LEAF BLOTCH (Pseudopeziza Jonesii) was quite general in one field of Grimm at the Station, Summerland, B.C. (G.E. Woolliams)

COMMON LEAF SPOT (Pseudopeziza Medicaginis) was fairly general on Vancouver Island and the lower mainland, B.C.; considerable defoliation resulted (W. Jones). A slight to moderate infection was found in 10 fields in Alta. in August. The disease appeared unusually early in the plots at Edmonton and caused considerable damage before the first cut of hay. Infection was slight in the plots at Lacombe and Olds (M.W.C.). Infection was general and slight at Morden, Man., while it was relatively heavy at Sanford (W.L. Gordon). Common leaf spot was prevalent in the Guelph area, Ont, (J.D. MacLachlan). A severe attack of this leaf spot caused a premature yellowing at the Botanical Garden,

Montreal, Que. (J.E. Jacques). Common leaf spot was heavy in 4 fields and traces in all others examined in P.E.I. (R.R. Hurst). A slight infection was found at Starrs Point, N.S., on black medick, Medicago lupulina. (R.M. Lewis)

LEAF SPOT (Pseudoplea Trifolii). A slight infection was recorded in the University plots, Vancouver, B.C. (W. Jones). For previous reports see P.D.S. 22:18.

ROOT ROT (Rhizoctonia Solani). Odd plants were found affected at Brandon, Man., while 10% of the plants were killed or dying at Morden. (J.H. Craigie)

Sclerotia of Sclerotinia sclerotiorum were found in a sample of alfalfa seed received by the Laboratory at Saskatoon, Sask. (S 1291; DAOM 14042). The sclerotia were cultured and the fungus determined by J.W. Groves. (R.C. Russell)

LEAF SPOT (Stemphylium ? botryosum) was fairly general on alfalfa, but caused very slight damage on the lower mainland, B.C. (W.Jones)

CROWN ROT (a low-temperature basidiomycete). Crown rot or true winter killing, either singly or in combination, caused very severe damage in alfalfa stands in the central and northern areas of Alta. The percentage of damaged fields is given for the different districts in Table 3.

Table 3. Percentage of alfalfa fields damaged by crown rot and winter killing in Alta. in 1943.

District	Fields Examined	Crown Rot	True Winter Killing	Combined Crown Rot and Winter Killing
Northern	58	26%	38%	36%
Central	48	60	8	32
Southern	125	13	17	
All Alta.	231	26%	20%	16%

In north-central and northern Alta., damage was found in all alfalfa fields examined, of which about 40% were completely killed out or were so severely damaged as to be worthless. In another 20%, nearly half of the plants were killed, and in the remainder there was slight to moderate damage. If this area is considered as a whole, true winter killing was the most important. In the Athabaska district, there was very little snow cover in January, during extremely severe weather, and approximately 90% of the alfalfa was killed. The situation in the Peace River district was reported to be similar. Severe killing also occurred in other forage crops, and even in the native pastures. Crown rot patches were usually evident in protected locations where the alfalfa had not been winter-killed. In the central areas, south of Westlock, a heavy snow cover remained throughout the winter and the fairly general killing of alfalfa on hillsides occured apparently during a period of low temperature, after growth started in the spring. Crown rot was unusually prevalent in these central areas and caused moderate to severe damage in many fields. Later in the season some of the

less severely affected stands made a fair recovery as a result of the extremely favourable growing conditions. In southern Alta., crown rot was less prevalent than in 1942, and in most fields it caused only a trace to slight damage. Winter killing was fairly severe in a local area north of Brooks, but was absent in other southern districts. (M.W. Cormack)

MOSAIC (Medicago virus 2). A trace of mosaic was found in the plots at Fredericton, N.B. (D.J. MacLeod)

WITCHES' BROOM (virus) was found affecting at least 5% of the plants in a field at Armstrong, B.C. A survey of adjacent fields was not made (G.E. Woolliams). Slight damage was found in a field near Cherhill, Alta.; there was a slight increase in damage in the affected plots (P.D.S. 22:19) at Edmonton. (M.W. Cormack)

YELLOW TOP (boron deficiency) was general in one field in P.E.I. Some of the affected plants developed leaf-like petals in addition to the yellow chlorosis in the top of the plant. The purple coloration described by some workers was absent. (R.R. Hurst)

COMMON CLOVER

SOOTY BLOTCH (Cymadothea Trifolii). A fairly general infection occurred on red clover on the lower mainland and Vancouver Island, B.C., and caused slight to moderate damage (W. Jones). Traces of the disease were present in all red clover fields examined in P.E.I. (R.R. Hurst)

POWDERY MILDEW (Erysiphe Polygoni) was severe on red clover in the plots at Lethbridge, Alta., and slight at Edmonton. It was generally prevalent at Guelph, Ont. Traces were present in all red clover fields examined in P.E.I.

LEAF SPOT (Stagonospora recedens) was fairly general on the lower mainland, B.C., and caused considerable damage in some fields. (W. Jones)

RUST (Uromyces Trifolii) was general and severe on stems and leaves of red clover in the plots at Agassiz, B.C. (W. Jones). The rust was heavy on the leaves of red clover at the Botanical Garden, Montreal, Que. (J.E. Jacques). Rust infection was a trace to heavy in P.E.I. causing severe damage in some fields. (R.R. Hurst)

SWEET CLOVER

ROOT ROT (Cylindrocarpon Ehrenbergi, etc.). Slight to moderate damage occurred in the variety plots at Edmonton, Alta. (M.W. Cormack)

LEAF SPOT and STEM BLIGHT (Leptosphaeria pratensis (Stagonospora Meliloti). A slight infection was found in 2 fields in Alta. and in the plots at Lacombe (M.W.C.). Stem blight was severe in certain lines in the nursery of the Dominion Forage Crops Laboratory, Saskatoon, Sask. (T.C. Vanterpool). A slight infection was observed on scattered plants at Winnipeg, Man. (J. E. Machacek)

ROOT ROT (Phytophthora Cactorum). A trace to slight damage was found in 2 fields and in many roadside stands in southern Alta.; about 10% of the plants were dying in one field near Millicent. (M.W. Cormack)

LEAF SPOT (Pseudopeziza Meliloti). A trace was present on the leaves of some seed plants at Morden, Man., on Sept. 1. (W.L. Gordon)

ROOT ROT (Rhizoctonia Solani). Odd plants were found affected at Brandon, Man. on June 24. (J.H. Craigie)

ROOT ROT (Sclerotinia sativa Drayton & Groves) caused slight damage in the Alpha variety at Lacombe, Alta., and moderate to severe damage in the plots at Edmonton (M.W. Cormack). This Sclerotinia was first recognized as a distinct pathogen in the root rot complex of alfalfa and sweet clover in Alta. by Dr. Cormack about 1933. Almost at the same time it was realized that the organism was possibly an undescribed species. The same organism was encountered by Drayton on tulips and once on narcissus. The perefect state was developed in culture and has now been described (F.L. Drayton and J.W. Groves, Mycologia 35: 517-528. 1943). Up to the present this root rot on sweet clover and alfalfa has been recognized only in Alta. and Sask.

LUPINE

POWDERY MILDEW (Erysiphe Polygoni). A moderate infection occurred in a planting of field lupines at Edmonton, Alta. This appears to be a new host record for Alberta . (A.W. Henry)

BUCKWHEAT

YELLOWS (Callistephus virus 1) was common on the rough Fagopyron tataricum varieties in Carleton, York, Sunbury, Albert, Westmorland and Kings Counties, N.B.; infection ranged from 8 to 12%. A trace was found on Silver Hull in York Co. (D.J. MacLeod). An occasional plant of Silver Hull was affected by yellows in P.E.I. (R.R. Hurst)

CORN

EAR, STALK and ROOT ROTS (Diplodia Zeae, Fusarium moniliforme, Gibberella Saubinetii, Nigrospora sphaerica). On open-pollinated varieties and commercial hybrids, Gibberella Saubinetii and Diplodia Zeae were the only important ear-rot pathogens in Essex and Kent Counties, Ont., in 1943. Infection by these two organisms was closely correlated with injury by ear worm and corn borer. (A.A. Hildebrand)

SMUT (Ustilago Zeae). A trace of smut was present in the plots at Fredericton, N.B. and a diseased specimen was received from Sussex (D.J. MacLeod). Smut was seen occasionally on fodder corn in Queens Co., P.E.I. (R.R. Hurst)

FLAX

The following account on the "Flax Diseases in Saskatchewan in 1943" was prepared by Professor T. C. Vanterpool, University of Saskatchewan, Saskatoon, Sask.

SEEDLING BLIGHT (Rhizoctonia Solani). Contrary to the findings of the previous season, seedling blight caused considerable thinning out of flax stands in 1943, and thus in many districts also contributed indirectly to losses caused by weeds. In all, 43 flax fields were examined carefully for seedling blight in the northeast, east-central, central and west-central parts of the province during June. In these 43 fields, seedling blight was estimated as severe or moderate in 40%, as slight or a trace in 44% and as causing no damage in the other 16%. It seems legitimate to infer that in the 40% where the disease was severe or moderate, the crowding out of flax by weed growth was considerably enhanced by the reduction of the stand by blight. Isolations were made from blighted seedlings from ten fields and in all instances Rhizoctonia Solani predominated, with occasional cultures of Pythium de Baryanum, Fusarium Scirpi var. acuminatum, F. Equiseti, F. avenaceum and F. oxysporum f. Lini. The evidence this year indicates that Rhizoctonia seedling blight is more severe on flax following fallow than on flax or cereal stubble. More observations are necessary to settle this point.

RUST (Melampsora Lini) was again severe in Sask., though in general the loss was not as great as in 1942. Drier conditions in many districts slowed down its development and spread, and in only a relatively few districts did it reach epidemic proportions comparable to last year. Infection was again heaviest on Bison, ranging from slight to severe. Many fields of Royal were encountered in which little or no rust could be found. However, occasional fields of this variety were seen where a moderate infection of 25-30% was present. In a small area in one field of Bison showing a 50-60% rust infection, many plants were found practically free from rust. When these clean plants were pulled and hand threshed, they yielded the characteristic seed of Royal. On the basis of the rust reaction, nearly every one of the Royal plants in the admixture could be separated from the Bison plants. The susceptible Bison is no longer recommended for Saskatchewan. On the other hand, the acreage of Royal increased considerably this year. At the present time, it is anticipated that future losses from flax rust will be slight.

STEM CANKER (Melampsora Lini and Fusarium spp.) was again present in many fields of Bison late in the season; it was not as severe as in 1942. The Fusarium spp. present were identified as F. Scirpi var. acuminatum and F. avenaceum by Dr. W. L. Gordon.

WILT (Fusarium oxysporum f. Lini) was found in fields at Conquest (5%), Watrous (15%), and Young (20%) in Sask. The variety being grown in each field was the wilt-susceptible Crown. Ninety per cent of the isolates from Crown seedlings grown in samples of these 3 soils were F. oxysporum f. Lini; the other 10% were mainly F. Equiseti, Rhizoctonia Solani and Pythium de Baryanum.

STEM BREAK and BROWNING (Polyspora Lini). Lesions were conspicuous on the cotyledons in many fields during the survey in June. This situation was not unexpected, as the seed from the 1942 crop was known to carry a large amount of infection. Of the 96 samples of seed that were plated out, 42% showed a trace to moderate infection with Polyspora Lini. Further progress of the disease including

a weakening of the stem at the cotyledonary node was probably retarded by dry atmospheric conditions. Traces of the stem-break stage were found at several scattered points, but 20-30% of the stems were broken in two fields of Royal. These two fields were sown in 1942 to Bison, which had suffered heavily from both phases of the disease. A heavy wind storm in the preceeding week was considered by the grower to have increased the stem break. It is probable that neglect of crop rotation, etc., is responsible for the high incidence of P. Lini on much of the flax seed in the province, particularly on Bison. Moreover, unless seed treatment of flax becomes widespread, and proper crop rotation and other hygienic practices are carried out, there is every reason to believe that Royal seed will become as generally infected as Bison is now. Royal is now recommended to be grown in most districts and Bison to be discontinued.

In the variety plots at the University, Saskatoon, the browning phase of the disease was late in developing, as it first appeared within a fortnight of harvest in most varieties. The direct damage would be considered as negligible, but the development of the browning phase, even at such a late date, means that the seed for next year's crop becomes infected. This explains why stem break has been reported from Sask. for many years, and yet both the stem break and browning phases were conspicuous and moderately destructive in widely separated localities only in the cool wet summer of 1942.

Polyspora Lini was readily isolated from over-wintered stubble affected by stem break and browning from the plots at Saskatoon. It emphasizes the necessity of crop rotation and the inadvisability of using flax as a nurse crop. Stubble affected by stem break and browning or rust would act as a source of inoculum for neighboring fields.

PASMO (Septoria linicola) has not yet been detected during field surveys in Sask. A careful search for it was made Aug. 9-10 in the southern parts of Sask. without success.

LATE ROOT ROT (Fusarium spp., etc.) was rarely of any consequence in 1943. Drought possibly interfered with the development of clear-cut symptoms.

BOLL LESIONING (hail). Many fields in the southern part of Sask. showed 10 to 20% of the bolls discoloured or lesioned during the second week in August. The discolorations or lesions were somewhat lighter in colour than those typical of browning. The injury was suspected to be due to hail. Bolls from 9 fields were selected and 154 seeds taken from the discoloured bolls were plated on potato dextrose agar. No growth occurred or Alternaria spp. developed from the majority, but 9 seeds from 5 different fields yielded Polyspora Lini. This supports the view that the discoloration was due to slight hail injury. Seed plated out in a similar manner, from bolls affected with browning last year, yielded over 75% of P. Lini. Flax appears to be considerably less susceptible to hail damage than the cereals.

HEAT CANKER (non-parasitic). Typical heat canker damage was found in June on plants about 4 in. tall in a field with a southern slope at the north end of a large slough. The field was protected from cool northerly winds by the rising land to the north. Practically all the damaged seedlings were on the southern exposure of the ridges formed by the drills. Damage was as high

as 15% in a few portions of the drill rows, but it was only 2-3% in the field as a whole. Two other fields showing heat canker were encountered in July, but the trouble was complicated by root rot.

SPERGON INJURY (cf. Journ. Am. Soc. Agron. 35:733-737. 1943) was observed on Bison in March in a greenhouse test on the effects of various chemicals when used as seed disinfectants for flax. The randomized spergon-treated rows could readily be picked out from the others.

CHLOROTIC DIE-BACK (cf. H.H. Flor. Journ. Am. Soc. Agron. 35:259-270. 1943) was observed at one end of a 1/100 acre plot of Bison at the University, Saskatoon. The changes of leaf colour were as described by Flor. Soil reaction was pH 8.0 plus in the affected area and pH 7.0 in the normal areas. The reduction in yield was estimated as slight to moderate.

Other Observations

HEAF BLIGHT (Botrytis cinerea, etc.) was severe in a field of Gossamer at St. Pamphile, Que. Dark brown discolorations were present on the bolls which often extended down to the main stem destroying the seeds and fibre. Botrytis was consistently isolated from diseased parts of the affeted plants. In association, were Alternaria, Cladosporium and other, undetermined fungi. (A. Payette)

WILT (Fusarium Lini). A trace of wilt was found in a field at High River, Alta. (W.C. Broadfoot). Wilt was severe on Crown and light on Royal, Redwing and Bison in the wilt-sick plot at Saskatoon, Sask. (H.W.M.) One plot of Liral was almost completely destroyed by wilt in the variety plots at Ste. Anne de la Pocatiere, Que. The plot was located in a slight depression. Other replicates of the same variety were unaffected. A light infection was present in neighboring plots of Cirrus and Gossamer, which were on a higher level (A. Payette). Wilt was also severe in one field of Cirrus at Ste. Anne. Isolations from seed samples from this district revealed the presence of this organism in 2 samples. (C.Perrault)

RUST (Melampsora Lini) infection was a trace in 2 fields in the central part of Alta., slight in 5, moderate in 4, and severe in one, located at Alliance. The only variety affected in the plots at Lacombe was Bison. No rust was found in southern Alta. (M.W.C.) Rust first appeared in Sask. about the middle of June, on seedlings of all varieties. In the Craik area, fields of Bison showing 60% infection were seen. In the Ricetown area at the same time, a light infection was present on Royal. Dry weather, however, delayed rust development with the result that infection was in general not severe when flax began to ripen. Isolated cases of a 20% infection were reported on Royal. Infection was light on irrigated fields at Swift Current, and severe at Dafoe and Oakshela. (H.W.M.)

In 1943, flax rust was first observed in Man. at Winnipeg, on June 10. On that date, young aecial infections were observed on volunteer flax plants growing in flax stubble. From this it would appear that discharge of flax rust sporidia occurred about the first of June. Frequent examination and testing of rusted stubble from then on showed that discharge of sporidia occurred whenever conditions were favourable until June 19. Temperature and moisture conditions were favourable for the development of flax rust during the latter part of June

and it had spread on susceptible varieties throughout Man. by the end of that month. Flax rust, however, developed rather slowly during July and early August owing to the exceptionally high temperatures which prevailed during that period. In general, rust infections averaged from 5 to 15% on Bison and Redwing. In a small percentage of the fields of Bison rust infections averaged upwards of 50%. Only traces of rust occurred on Royal and no rust at all was observed on Viking (B. Peturson). A sample of rusted flax was received from Soulange Co., Que. (R.O. Lachance)

STEM BREAK and BROWNING (Polyspora Lini). Infection was a trace in 3 fields and slight in 3 out of 27 examined in Alta. It also ranged from a trace to moderate in the plots at Lethbridge (W.C. Broadfoot). Stem break moderately infected Bison at Saskatoon, Sask. (H.W.M.)

SEEDLING BLIGHT and ROOT ROT (Rhizoctonia Solani). Seedling blight caused moderate damage at Gray, Sask., and slight injury at Swift Current and Admiral; it was also reported from the Rosetown area (H.W.M.). Root rot was reported in Man. : severe infection occurred on some varieties in the plots at Morden with many plants killed; 30% of plants were infected at Deloraine and 40% at Whitewater, while a trace occurred at Starbuck (W.L.G.). As a damping-off and wilt, the pathogen was severe on some plants in the plots at Winnipeg. (J.E. Machacek)

PASMO (Septoria linocola) was found in 11 fields out of 12 examined in the Haywood and St. Claude areas in Man. Infection ranged from a trace to 50% with an average infection of 12% (M. Newton). A slight infection was also found on Royal at Morden. (W.L. Gordon)

HEAT CANKER (non-parasitic) caused a trace, 5% and 10% damage in 3 fields in southern Alta. (W.C. Broadfoot)

TERMINAL BUD INJURY (cause unknown). The terminal buds of plants were white and dead in a Royal selection in the plots at Saskatoon, Sask. The plants stooled out more than usual and were ragged in appearance. Later examination revealed that plants had made a fair recovery, but the crop was late. (H.W.M.)

FOXTAIL MILIET

SMUT (Ustilago Crameri) was observed in the experimental plots only at Saskatoon, Sask. (T.C. Vanterpool)

GOLDENROD

RUST (Coleosporium Solidaginis and C. delicatulum Hedgc. & Long) was epidemic in the goldenrod plots in the Arboretum, Ottawa, Ont., and caused extensive defoliation of the more seriously affected species. Coleosporium Solidaginis was well established in the plots and the amounts of rust recorded on each species are probably reliable indices of their relative susceptibilty, at least to the predominant local race or races. Some species believed to be here reported rusted from the first time are indicated by an (n). Two species showed a necrotic resistant reaction indicated by an asterisk (*) and two showed

small pustules containing a few spores but no necrosis (**).

The hosts and percentages of the rust were as follows: Solidago altissima L. 10% on most plants, up to 50% on a few; S. caesia L. 50%; S. canadensis L. 10%; S. gigantea Ait. 60%; S. gigantea var. leiophylla Fern. (n) 60-75%; S. glomerata (n) 5%; S. lepida DC. (n) 15%; S. lepida var. elongata (Nutt.) Fern. (n) 15%; S. lepida var. fallax Fern. 15%**; S. mollis Bartl. 20%; S. puberula Nutt. nil; S. racemosa Greene var. Gillmani (Gray) Fern. (n) trace*; S. Riddellii Frank (n) 10%; S. rigida L. (n) 10-100%; S. rugosa Mill. trace; S. sempervirens L. (S. glaberrima Martens 10%*; S. missouriensis Nutt. trace, S. sempervirens as det. 10%); S. Shortii T. & G. (n) 15%**; S. speciosa Nutt. 75%.

The amount of rust on the Euthamia spp. cannot be considered as an index of their susceptibility, since C. delicatulum was first discovered in the district this year and did not reach these plots until late in the summer. Traces of C. delicatulum were found on Euthamia camporum Greene and E. Nuttallii Greene, but no rust was present on E. caroliniana (L.) Greene. (D.B.O. Savile and I.L. Conners)

KOK-SAGHYZ

BLOSSOM BLIGHT (Botrytis sp., cinerea type) was reported causing considerable damage to kok-saghyz at the Experimental Farm, Agassiz, B.C. on June 2 by M.E. Clarke. "This condition is increasing rapidly as a result of cold wet weather". Affected flowers "rarely mature properly, but tend to ripen before being developed fully." The same fungus was isolated from rotted root-cuttings at Ottawa, Ont. Cultures of these two isolates were similar. (F.L. Drayton)

ROOT ROT (Fusarium sp.) affected less than 0.5% of the plants in the plot at Kentville, N.S. A species of Fusarium was the dominant isolate from the affected tissue. (J.F. Hockey)

ROOT-KNOT NEMATODE (Heterodera marioni) was found in a plant at Ottawa, Ont.; it was also observed at Toronto. (A.D. Baker)

RUST (Puccinia Hieracii). A trace of rust was found in the plots at Lethbridge, Alta. (W.C. Broadfoot). Plants of kok-saghyz were successfully inoculated, in the spring, with P. Hieracii, in the Laboratory greenhouse, Winnipeg, Man., using urediniospores from the common dandelion. Plants with dentate leaves without exception bore uredinia, although not as freely as the common dandelion, but plants having entire leaves showed, in general, only infection flecks (A.M. Brown). A moderate infection was seen on Aug. 2, on a few plants of kok-saghyz growing close to a rusted common dandelion in a plot in the Arboretum, Ottawa, Ont. The pustules were small, but without marginal discoloration. Accordingly this host is fairly congenial. Contrary to Brown's observations, both plants with entire and those with dentate leaves were affected. In the fall two adjacent clones in a bed in the Arboretum became heavily rusted, while the others remained free, but it is not clear whether differences in susceptibility were involved. In Oct. rust appeared in the greenhouse on T. laevigatum (Willd.) DC., T. ceratophorum (Led.) DC., T. latilobum DC., and three unnamed plants. It persisted until late December and then gradually disappeared. (D.B.O. Savile). Rust was found on a few leaves in the planting at Kentville, N.S. (J.F. Hockey)

WILT (Sclerotinia sclerotiorum) affected a few plants in the 1942 planting at Kentville, N.S. in June. The pathogen was isolated and sclerotia were observed among the wilted leaves. (J.F. Hockey)

BACTERIAL LEAF SPOT (Xanthomonas sp.). No further reports of this leaf spot, observed at Winnipeg, Man., in 1942, have been received, but attention is drawn to the work of J.S. Niederhauser (Phytopathology 33:959-961), who has described a severe leaf spot and blight on kok-saghyz, observed in a test plot at Ithaca, N.Y. in Sept. 1942. The pathogen is described as Xanthomonas taraxaci n. sp.

YELLOWS (Callistephus virus 1). A trace of yellows was found in the plot at Fredericton, N.B. (D.J. MacLeod). Yellows was the most prevalent disease of kok-saghyz at Kentville, N.S., in 1943. Infection varied from 0 to 12% and averaged about 1%. All affected plants were rogued out late in the season. (J.F. Hockey)

CROWN ROT (cause undetermined). A few scattered plants in the plots at Lethbridge, Alta., were nearly rotted off near the crowns. A dark-coloured fungus was consistently isolated from this material, but has not fruited in culture.

MILKWEED

LEAF SPOT (Cercospora clavata (Gerard)Cooke). A moderate infection was present on the leaves of some plants of Asclepias syriaca L. at Morden, Man. on Sept. 1. The spores were 32-145 x 5-6 microns, longer than usual (W.L. Gordon). This leaf spot was also present in the Ottawa district, Ont., on A. syriaca and A. incarnata. The first collection was made on A. incarnata on Aug. 18 in the milkweed plots of the Division of Botany and Plant Pathology at Deakin's farm by H. A. Senn (DAOM 13789). The disease was heavy on A. syriaca in the same plots in September. There was also a moderate infection on current year's seedlings in a 5-acre field on the Caldwell farm, Central Experimental Farm (DAOM 13785); it caused slight damage, but as the leaves were not being stripped from the young plants, the disease may be destructive next year on account of the plentiful inoculum provided by the old leaves. Heavily infected wild plants were collected at Sand Point (DAOM 13783) by H. Groh. Pycnidia, containing microconidia, and perithecial initials were abundant among the conidiophore fascicles on the older, blackened, shrivelled leaves. It was also collected on wild plants at Uplands (DAOM 13784). Further, a collection was made on A. incarnata f. albiflora Heller in the Arboretum plots, Sept. 25 (DAOM 13782).

Parts of both collections on A. incarnata and one on A. syriaca were sent to Dr. Chas. Chupp, who identified the pathogen as C. clavata. If the characters used by Chupp in his key of the Cercosporae on Asclepias (in litt) are brought together, Cercospora clavata may be characterized as follows: spots on leaves usually indistinct, fruiting effuse, hypophyllous (where spots distinct, amphigenous); conidiophores pale to medium in colour, mostly not in dense fascicles, sometimes branched, 4-6 x 15-60(80)microns; conidia coloured, cylindro-obclavate rounded or obconic at base, 4-6 x 20-100 microns, mostly 20-60 microns. The Cercospora on A. incranata has been described as an independent species, C. incarnata Ell. & Ev., but Chupp has concluded, as the

result of these and other collections, that it is identical with the older C. clavata.

This leaf spot appears to be one of the most common and widely distributed diseases of milkweed. In the early stages the fungus forms a velvety growth, delimited somewhat by the veins, completely covering angular areas on the lower leaf surface with a paling of the corresponding areas on the upper surface. In fact, the symptoms are more suggestive of a leaf mould than a leaf spot. (I.L. Conners and D.B.O. Savile)

RUST (Uromyces Asclepiadis Cooke). A few pustules of rust were collected in the plots of milkweed (Asclepias syriaca) at the Ontario Agr. College, Guelph, Ont., on Oct. 5, 1943, by S. Martin. Nearly all the pustules were telia with a few urediniospores present, but one uredinium was seen. A few stems of swamp milkweed (A. incarnata) were collected Sept. 21 at Tilbury by David A. Arnott (DAOM 14008). The material was heavily infected, but this was the only time rust was observed, although several hundred pounds of leaves had been collected by the same person. Only teliospores were observed in mounts from the telia.

Uromyces Asclepiadis is the only rust of any consequence on milkweed. It is known throughout the eastern half of the United States reaching Canada in southern Ontario; it also occurs in Bermuda, the West Indies, Central and South America. Only uredinia and telia are known. According to Arthur (Manual Rusts in U.S. and Canada p. 324. 1934), "Some collections from the warm regions of the southern border of the United States and southward often have the appearance of a systemic aecial development, but no pycnia can be found ..... In northern regions the drawn chlorotic appearance of young shoots has not been seen, and uredia are not as abundant as telia, both of which occur late in the season."

Other Ontario collections in the Herbarium are: on A. incarnata, London, Ont., J. Dearness (Can. Fungi 171, in part and Seym. & Earle, Ec. Fungi 330); on A. syriaca, London, J. Dearness (Can.Fungi 171, in part); St. Catharines, I.L. Conners (DAOM 667); New Glasgow, I.L.C. (DAOM 14).

The rust was successfully cultured on potted plants with abundant development of uredinia from material collected in Pennsylvania by W. W. Thurston, Jr., but the culture was afterwards lost.

It is believed that Uromyces Asclepiadis does not overwinter in the uredinial stage throughout the northern part of its range, but the milkweed becomes re-infected from urediniospores blown up from the south, for the rust has never been detected before August in Ont. The role of the teliospores has yet to be demonstrated. U. Asclepiadis may become fairly abundant on the host as the specimens in the herbarium indicate, but it seems unlikely that it would become destructive in Ont. (I.L. Conners)

YELLOWS (Callistephus virus 1). A virus disease of the common milkweed, Asclepias syriaca, was observed in the Ottawa district, Ont. as early as 1930 (DAOM un-numbered). The individual shoots are dwarfed to less than half their normal height and fail to develop an inflorescence. Usually several thin shoots arise together, due to several buds developing close to each other on the old rhizome. The leaves are pale, the green colour disappearing most rapidly from the lamina; they are small and acutely pointed.

Attempts to transmit the virus by sap inoculation to healthy cucumber and milkweed failed completely, although a fine carborundum powder was used as an abrasive. On the other hand, the virus of cucumber mosaic was successfully transmitted from Echinocystis and Aquelegia to cucumber using the same technique. From the symptoms and the failure to transmit the virus by sap inoculation, it may be concluded that the disease is not cucumber mosaic, which, however, is known to occur on Asclepias syriaca (Doolittle and Walker, Jour. Agr. Res. 31:1-58. 1925). For the present this virus disease is tentatively considered aster yellows, which has not been reported on A. syriaca, but for which Kunkel (Am. Jour. Botany 13: 646-705. 1926) found A. nivea a relatively susceptible host. (D.B.O. Savile)

SAFFLOWER

LEAF SPOT (Macrosporium (Alternaria) Carthami Rodighin). A severe infection was observed on some leaves of safflower (J.E. Machacek and J.H. Craigie). This is the first report of the pathogen in Canada.

SEEDLING BLIGHT (Botrytis sp., cinerea type) heavily infected and caused severe damage to seedlings ot two lines, S 1047 and S 1055, sown in flats in the greenhouse, Arboretum, Ottawa, Ont., in May. Emergence was far less than in 7 other lines sown in the same soil at the same time. Botrytis fruited abundantly on the soil, the achene coats, and the injured seedlings. Later, additional seed of S 1047 was planted in pots in the greenhouse and outside in a garden on the same day. Only 2 seedlings emerged from about 50 seed in the pots, where the soil was continuously wet, but about 30 healthy seedlings appeared in the garden, where soil moisture was generally much lower, out of about 60 seeds. (D.B.O. Savile)

RUST (Puccinia Carthami). A slight general infection was observed in the plots at Lethbridge, Alta., in early September. No rust was found in a 10-acre planting at Barons (M.W.C.) Pycnia were noted on the cotyledons of safflower seedlings on June 28 at Winnipeg, Man. The pycnia are small. The seed had been obtained from Morden and both urediniospores and teliospores were present on the seed (A. M. Brown) A moderate infection of the rust was general at Morden in August (W. Sackston)

When fragments of overwintered, rusted safflower leaves were added to the soil just above safflower seed sown in flats in the greenhouse, Arboretum, Ottawa, Ont., in May, about 30 pycnial infections were obtained on the cotyledons and hypocotyls of 14 seedlings. The pycnia were extremely small and were virtually invisible when the minute drop of nectar was removed. That the pycnia are functional is indicated by the fact that two pycnial infections on plants in the writer's garden remained sterile and that a belated infection in the original experiment, which developed after all other pycnia had dried up, remained sterile for a month and then promptly developed uredinia when diploidized with nectar from newly-produced pycnia.

The pycnia are followed by uredinia, or mixed uredinia and telia. On two occasions, when inoculations were made from fresh uredinia that were mixed with telia, further pycnia were produced. It should also be noted that the two groups of pycnia that occurred in the garden must have come from spores in the seed sample, which had been stored at room temperature. Thus it appears not only

that the teliospores of the rust can germinate without previous exposure to freezing temperatures, as might be expected of a subtropical species, but that some of them can germinate within a few days after maturing. P. Carthami is a brachy-form with a tendency toward short-cycling, but is still heterothallic. It may also be noted that P. Carthami is capable of infecting the corn flower, Centaurea Cyanus, forming small pustules within large flecks. (D.B.O. Savile)

SORGHUM

BACTERIAL LEAF SPOT (Pseudomonas syringae) infection was severe and general on the leaves of sorghum at Morden, Man. (W.L. Gordon). Infection was not heavy, but general on Early Amber sorghum in the Botanical Garden, Montreal, Que. (J.E. Jacques)

SMUT (Sphacelotheca Sorghi) infected 5% of the plants in a field at Morden, Man. (W.L. Gordon)

SOYBEAN

The account below on "Soybean Diseases in Southwestern Ontario in 1943" was prepared by Drs. L.W. Koch and A.A. Hildebrand, Dominion Laboratory of Plant Pathology, Harrow, Ont.

The diseases of soybeans encountered during the 1943 growing season in laboratory experimental plots, in Station plantings and in commercial stands throughout Kent and Essex Co., Ont., are recorded in descending order of importance, with pertinent comments on each, as follows:

FUSARIUM BLIGHT (Fusarium oxysporum Schl. f. tracheiphilum Snyder & Hansen) noted first in the laboratory plots on July 6, reached a peak in the district about mid-July and, in general, was more destructive than any other disease encountered during 1943. While most infected plants died, others that later recovered showed for a time foliar symptoms not unlike those exhibited by mosaic-infected plants. Specimens showing most clearly the typical, salmon-coloured spore masses of the causal organism on the stems were to be found more readily among plants infected later in the season. In plots planted with diseased and with healthy seed, respectively, the incidence of blight was in the ratio of 185 to 3, thus furnishing strong circumstantial evidence of the seed-borne nature, as yet unproved, of the pathogen.

POD and STEM BLIGHT (Diaporthe Phaseolorum (Cke. & Ell.) Sacc. var. Sojae (Lehm.) Wehmeyer) first noted on August 14, was well established in the district by August 24 and reached the peak of its destructiveness early in September. In 1941 the disease made its appearance much earlier in the season, photographs of severely infected areas having been obtained as early as July 10.

DOWNY MILDEW (Peronospora manshurica (Naoum.) Syd.). On June 23, twenty-six days after the seeding date, downy mildew was noted in the laboratory experimental plots that had been planted with healthy and diseased seed and with seed that had been treated with Fermate, Arasan and Spergon. Counts were made not only

of the number of affected plants in the various plots but also of the number of lesions on the leaves of each affected plant. The results of the count, on a strictly comparable basis, are as follows:

Kind, or Treatment, of Seed	Number Affected Plants	Number Lesions Present
Spergon	0	0
Select Healthy	2	2
Arasan	2	8
Fermate	6	7
Ordinary Commercial	44	71
Select Diseased	326	724

The relatively high incidence of mildew on plants originating from diseased seed would point strongly to the fact that the pathogen is seed-borne. Since plants originating from Spergon-, Arasan-, and Fermate-treated seed showed lower incidence of mildew than ordinary, non-treated commercial seed, apparently these disinfectants were effective in reducing the disease. Since plants grown from seed selected as healthy were virtually free from the disease, careful seed selection can be highly efficaceous in controlling the disease.

At the time the counts were made, most of the plants were in the 5 leaf stage. It was noted that almost invariably mildew infection was confined to leaflets of the third-formed leaf. Thus infection seemed to be correlated in some way either with the ontogony of the plant or with some set of environmental conditions that pertained when the plants had reached that particular stage of development. Two other interesting points in regard to mildew infection were these: (1) that in the case of certain plants, infection instead of producing the more typical scattered spots on the leaf, involved the whole under-leaf surface, producing symptoms of the mottle type that could easily be mistaken for mosaic; (2) that at the time the counts were taken, the disease was found only in plantings the rows of which ran east and west and, indeed, so far as individual plots were concerned, there was a preponderance of mildew in the rows towards the south. These various circumstances suggest that some infection at least may have resulted from inoculum carried by south-west winds which prevail in the district, thus forming an interesting parallel with infection of tobacco with downy mildew.

The phenomena described above were observed on the variety A.K. Harrow, which is more susceptible to mildew infection than any other variety grown in Kent or Essex Counties.

PHYLLOSTICTA LEAF SPOT (Phyllosticta sojaecola Massl.). Early in July, when the soybeans were about five weeks old, the older leaves of many plants in the experimental plots showed evidence of a serious leaf spot condition. Examination of the round or oval, sometimes irregular, dark to olive brown spots revealed the presence of a Phyllosticta species which morphologically conforms closely with Phyllosticta sojaecola as described by K. Boning: (Phyllosticta-Fleckenkrankheit der Sojabohne. Prakt. Bl. Pflanzenb., 16 (7-8): 168-172. 1938). Inspection of Station plantings and of commercial plantings in the district showed that the disease had reached epidemic proportions and that due to the presence of necrotic tissue, leaves of affected plants suffered much more extensive wind-injury

than did those of non-infected plants. In 1940, Phyllosticta ?phaseolina Sacc. (P.D.S. 20:25) was reported from British Columbia as affecting a few leaves of soybean. The present report, however, is apparently the first to record the occurrence in Canada at least of a Phyllosticta in epiphytotic proportions.

MOSAIC (virus). Neither in the experimental plots nor in commercial plantings was mosaic an important limiting factor in production. However, apparently three different types of the disease were encountered:

Type 1 - Common Mosaic. Plants more or less stunted and remaining green after most healthy plants have shed their leaves; younger leaves puckered or blistered along the veins, older leaves (especially on variety Manchu) showing areas of brownish or bronzed net-veining.

Type 2 - Leaf Roll. Plants spindly and more stunted than in common mosaic; older leaves very deep green in colour; younger leaves narrowed and rolled; veins noticeably cleared.

Type 3 - Gray Flock or Ring Spot. Plants of an infected group may or may not be stunted. A striking symptom is a mottle on the leaves caused by a gray flecking, with flecks in some instances forming a distinct ring. This type was observed on a Station planting of A.K. Harrow. R.W. Samson (U.S. Plant Disease Reporter 26: 382. 1942) and R.C. Baines (U.S. Plant Disease Reporter 27: 512. 1943) have reported a disease on soybeans that appears to be similar to that caused by the tobacco ring-spot virus.

Whether or not the symptom pictures described above are due to different viruses, to different strains of the same virus or to inherent varietal or strain differences in the host is not known, and it is felt that the mosaic-complex in soybeans is in need of considerable clarification.

FROG-EYE (Cercospora sojina Hara). On August 25, reddish-brown to blackish-brown, more or less elongated lesions were noted on the stems of plants in the laboratory experimental plots. Specimens were collected and upon examination it was found that a species of Cercospora was fruiting on the characteristic lesions on the stems. In spore size, septation and other characteristics, the conidia of the fungus agree with those of Cercospora daizu Miura (= C. sojina Hara), the causal organism of frog-eye disease. Later in August and during September, the disease affected large numbers of plants both in the experimental plots and in commercial plantings of the district. This is the first reported occurrence of this disease on soybeans in Canada. L.J. Tyler (U.S.Pl. Dis. Reporter 27 (20): 507. 1943) has recently indicated that the correct name for the organism causing frog-eye leaf spot is C. sojina Hara of which C. daizu Miura is a synonym. According to Dr. Chupp (in litt), the original description was published in Nogyo Sekai Tokyo 9:28. 1915. Although he has not seen it, he has compared authentic material received from Dr. Hara with the material which Lehman described in Carolina. Since C. sojina was described first, it is the accepted name.

BROWN SPOT (Septoria glycines Hemmi). On September 22, attention was attracted to certain plants in the experimental plots, the stalks of which showed areas with a distinctly silvery sheen. These silver-coloured areas were thickly covered with the fruiting bodies of a fungus. Microscopic examination revealed

species of Septoria and the pycnidia and spores agree in size, etc., with those described for Septoria glycines Hemmi. Brown spot, like frog-eye, apparently has not heretofore been reported in Canada.

BACTERIAL BLIGHT (Pseudomonas glycinea (Coerper) Stapp). Bacterial leaf spots, like mosaic, were a negligible factor in the district this year. In June, in two commercial plantings, up to 40% of plants, then 8 to 10 in. tall, were infected. Later in the season the disease disappeared in these two plantings, and apparently had no effect on yield.

ANTHRACNOSE (Colletotrichum Glycines Hori). On leaf petioles of diseased plants collected on August 23, anthracnose was noted for the first time this season. Subsequently the disease was noted on late-collected specimens.

ASCOCHYTA and ALTERNARIA sp. At various times throughout the season, Ascochyta (cf., below) and Alternaria were found fruiting on lesions on leaves, in a manner which suggested that they might possess primary parasitic capability.

Other Observations

LEAF SPOT (Ascochyta sp.). A slight infection was observed on a few plants at the Station, Agassiz, B.C. (W. Jones). A moderate infection was recorded at the Station, Kentville, N.S. (G.W. Hope). Material from both places was examined. In the Agassiz material (DAOM 14079), the spores were 6.0-9.0 x 2.0-3.5 microns, the larger spores being 1-septate and this is probably the same fungus as reported in 1942 (P.D.S. 22:29). In the Kentville material (14078), the pycnidia were about 150 microns diam., with large ostiole, spores 4.5-9.0 x 2.5-3.5 microns - the smaller mostly continuous, cylindric to broadly ellipsoid, the larger mainly 1-septate, cylindric or irregular, straight or curved, sometimes slightly constricted at the septum, which is not always visible, except under the 2 mm. objective. These specimens were examined by A. A. Hildebrand, who points out that this Ascochyta from B.C. and N.S. is quite distinct from that found at Harrow, Ont. In the Ont. material, according to him, the spores average 13.0 x 2.8-3.0 microns, and the septum shows distinctly. A prepared slide showed these differences clearly. (I.L. Conners and D.B.O. Savile)

BACTERIAL BLIGHT (Pseudomonas glycinea) was reported as follows: Infection slight to moderate in the variety plots at Lethbridge and Olds, Alta. severe on Manitoba Brown at Brooks, and a trace on Blackeye at Lacombe (M.W.C.); slight to moderate in a field of several acres and on Sioux in the plots at Morden, Man., slight in a 20-acre field at Homewood (W.L. Gordon); moderate in the plots at Kentville, N.S. (G.W. Hope)

MOSAIC (virus) occurred in various amounts in the plots at Agassiz, B.C. (W. Jones)

CHLOROSIS (excess lime) was severe on Sioux at Fort Whyte, Man. (J.E. Machacek)

SUDAN GRASS

BLOTCH (Helminthosporium turcicum Pass.). Affected leaves of Sudan grass were collected by R.C. Branbury, Agricultural Representative, on the farm of S.A. Montgomery, Hilton, Ont., Sept. 7, 1943, det. J. D. MacLachlan (O.A.C. 724, DAOM 14063). While the occurrence of H. turcicum is reported on Sudan grass (A.B. Seymour, Host Index p. 87. 1929), Drechsler (Jour. Agr. Res. 24:716) restricts H. turcicum to corn and contends that "a critical comparative study of the forms of Helminthosporium on Johnson grass and various types of sorghum will be necessary, before their identity with the corn leaf blight can be regarded as definitely established."

BACTERIAL LEAF SPOT (Pseudomonas syringae van Hall, Bijdr. Kennis Bakt. Planzenziekte. Inaug. Dissert. Amsterdam. 1902). A moderate infection was observed at the Botanical Garden, Montreal, Que. (J.E. Jacques)

MANGEL

CROWN GALL (Agrobacterium tumefaciens). A number of affected roots was brought to the Laboratory, Charlottetown, P.E.I. (R.R. Hurst)

LEAF SPOT (Cercospora beticola) was unusually heavy in the variety test plots, Division of Forage Crops, Central Exp. Farm, Ottawa, Ont. Tip Top was the most resistant variety. Although all the leaves of Frontenac, Prince and Giant White Sugar were affected, these varieties showed some resistance, while all other varieties were heavily diseased (Div. of Forage Crops). This leaf spot was generally prevalent on mangels and sugar beets at Guelph, Ont. (J.D. MacLachlan). A slight infection was observed on the inflorescence of seed plants of Frontenac in the Montreal district, Que., in Aug.; damage was negligible (R.O. Lachance). At the Station, Kentville, N.S., 2-40% of the plants were affected on Aug. 24, while 98-100% showed leaf spot on Oct. 1. Good control was obtained early in the season by treatment of the seed with Arasan (J.F. Hockey). Leaf spot was heavy in a field of Frontenac in Queens Co., P.E.I. The primary pathogen is unknown; only Alternaria, determined as A. tenuis by J.W. Groves, was found on the spots. (R.R. Hurst)

LEAF SPOT (Phoma Betae) was fairly general on the foliage of seed plants at the Farm, Agassiz, B.C.

ROOT ROT (several organisms including Phoma Betae) caused considerable damage to seedlings and young stecklings at Agassiz. It affected 25% of the seed plants of Sludstoup variety in the plots at the University, Vancouver, B.C. Roots were partly to wholly decayed. (W. Jones)

LEAF SPOT (Ramularia beticola) was general in a seed crop of Long Red and caused moderate damage to the foliage at Dewdney, B.C.

MOSAIC (virus) affected 20% of the plants of Sludstoup grown for seed at the University, Vancouver, B.C. (W. Jones). A trace was observed in fields of Frontenac being grown for seed in the Montreal district, Que. (R.O. Lachance). A trace of mosaic (Beta virus 2) was found in a plot at the Station, Fredericton, N. B. (D.J. MacLeod)

BLACK HEART (boron deficiency). An occasional root was affected in many fields in P.E.I. (R.R. Hurst)

BLACK ROOT (cause ?) affected and caused the death of 50% of the plants in the variety plots at Ste. Anne de la Pocatiere, Que. This disease resembles closely the disease known as black root described on sugar beets. (R.O. Lachance)

FASCIATION (cause unknown). A trace was observed in the plots at Fredericton, N.B. (D.J. MacLeod). An average of 6% of plants was affected in several fields in P.E.I. (R.R. Hurst)

SUGAR BEET

The account below on "Diseases of Sugar Beets in Southerwestern Ontario in 1943" was contributed by Dr. A. A. Hildebrand, Dominion Laboratory of Plant Pathology, Harrow, Ont.

Due (1) to continued unfavourable weather conditions which greatly extended the planting season, (2) to the use, for the first time, of segmented seed by a considerable number of growers and (3) to severe outbreaks of black-root among seedlings of later plantings, the sugar-beet fields of Southwestern Ontario presented a more variable picture than for a number of years past. As in preceding seasons, incidence of disease contributed to reduction in yield and quality.

BLACK ROOT (various fungi). In Southwestern Ont. the planting of sugar beets is usually almost completed by the end of May. This year, however, planting of over 60% of the acreage devoted to this crop was delayed by wet weather, until well on into June, some fields being seeded as late as June 20. In many of the later-planted fields, incidence of black root was especially severe and resulted in complete loss of about 6% of the total acreage planted.

CERCOSPORA LEAF SPOT (C. beticola). This season, for the first time in many years, Cercospora leaf spot was relatively unimportant as a factor limiting production, this being due to the fact that, as a result of general late-planting and mid-season drought, the foliage of beet plants had not reached the physiological stage of maturity necessary for infection, when, in mid-season, fungous inoculum was available.

RHIZOCTONIA ROT (R. Solani). This root disease was of almost general occurrence throughout the district, and in a few cases, caused losses up to 10% of the stand. In the aggregate, however, total loss of yield would not exceed 4%.

HEART ROT (boron deficiency). Probably as the result of continued dry weather later in the growing season, boron deficiency symptoms became apparent on sugar beets growing in the light, marl soil of the Blackwell area near Sarnia.

LEAF MOTTLES. For the past three years, a fine and a coarse mottle of the leaves of sugar beets have been under observation and investigation. That they are of the nature of a virus has been greatly discounted by the fact that

all attempts to transmit them by insects and by grafting have failed. This year some evidence was obtained that they may be of the nature of nutritional disorders correlated with soil type. Near Wallaceburg, Ontario, there is an almost abrupt line of demarcation between soils of two different series, one a Clyde silt loam, the other a Brookston clay. During surveys carried out this summer, it was noted that the mottles were present in abundance on plants growing in the Clyde loam, but were practically non-existent on those in neighbouring fields of the Brookston clay.

Other Observations

ROOT-KNOT NEMATODE (Heterodera marioni) was again found attacking sugar beets this year in the Blackwell district of Sarnia Twp, Ont., and was more injurious and numerous than in 1942. An apparently popular host of the nematode was the common burdock, Arctium minus (Hill) Bernh. The identification of the host was confirmed by Dr. H.A. Senn. The plant appears to be a new host for the root-knot nematode in Canada. (A.D. Baker)

SUGAR-BEET NEMATODE (Heterodera schachtii). New areas in which the sugar-beet nematode was located in 1943 in the Blackwell district of Sarnia Twp., Ont., slightly extended the regions known to be affected, but these areas all lie within the boundaries of the "precautionary area" previously established. In general, infection and injury were heavier in 1943 than in 1942. The presence of considerable numbers of gravid females of the nematode on the roots of curled dock, Rumex crispus L., in the same district indicated that the sugar-beet nematode is capable of completing its development on this plant. The identification of the host was confirmed by Mr. E.W. Hart. This is a new host for H. schachtii in Canada. (A.D. Baker)

LEAF SPOT and BLIGHT (Phoma Betae) was fairly general in April on new leaves of seed roots overwintered in the field at the Station, Sidney, B.C. Small to large brown areas occur on the lamina as well as necrosis and browning of the veins. Pycnidia were abundant. (W. Jones)

LEAF SPOT (Ramularia beticola) was general on seed crops in the Fraser Valley and at the Station, Sidney, B.C. It occurred on the leaf blades, petioles and stems and often on the flower pedicels. It was prevalent on the young foliage of overwintered seed roots in April at Sidney. (W. Jones)

RUST (Uromyces Betae). A light sprinkling of rust occurred on the leaves in mid April at the Station, Sidney, B.C. It was not observed on seed crops on the Lower Mainland. (W. Jones)

DAMPING OFF (cause undetermined). Severe damage was reported in the spring from one field at Raymond, Alta. (W.C. Broadfoot)

HOLLOW CROWN (cause unknown). A splitting of the crowns was prevalent, followed by the formation of hollow pockets at Giroux, Man. (J.E. Machacek)

LEAF SCORCH. Leaves punctured by hail were badly "scorched" at Portage la Prairie, Man. The large lesions were due to Alternaria, Cephalosporium and bacteria. (J.E. Machacek)

SUNFLOWER

MOULD (Botrytis cinerea and Sclerotinia sclerotiorum). The growth of mould caused slight damage to the heads of sunflower in the plots at Saskatoon, Sask. (H.W.M.). A head blight due to Botrytis cinerea was severe on a few heads in the Laboratory plots, Winnipeg, Man. (J.E. Machacek)

POWDERY MILDEW (Erysiphe Cichoracearum). The lower leaves of a few plants were lightly spotted with the oidial stage on August 27 in the plots of the Division of Forage Plants, Central Exp. Farm, Ottawa, Ont. (D.B.O. Savile)

DOWNY MILDEW (Plasmopara Halstedii) was destructive at the Station, Kapuskasing, Ont. J.P.S. Ballantyne, Superintendent, (in litt) stated that "In one plot where sunflowers are a continuous crop, last year an occasional plant, (under) 1% of the stand, was affected, but this year at least 75% are diseased. On other plants in rotations with other crops, the occasional plant was diseased last year and this year the condition was worse... The worst infection (this year) is on plots that were seeded quite early, but where sunflowers are grown continuously. Seeding was delayed 7-10 days. Following seeding we had a cool, wet month." The importance of soil infection was clearly demonstrated by Makota Nishimura (Jour. Coll. Agr. Hokkaido Imp. Univ. 9(3):185-210. 1922 and 17(1):1-61. 1926). (I.L. Conners)

Downy mildew was already severe when the plots of the Division of Forage Plants, Central Exp. Farm, Ottawa, were examined on Aug. 4. At least one third of the plants were affected and about half of these were completely useless. Severely affected plants had the internodes reduced to 1 in. or less and formed small heads or none at all. These severely injured plants were all about 18 in. high, whether the normal plants of the strain were tall (10 ft.) or short (3 ft.) or belonged to lines of intermediate height. (D.B.O. Savile)

RUST (Puccinia Helianthi) caused severe damage at Borden, Sask., in a field which was adjacent to one heavily rusted in 1942 according to W.J. White. The plants apparently became inoculated from rusted volunteer plants in the latter field or directly from the stubble. The rust was absent or a trace only in 7 other fields. A field sown with the same seed, 30 miles away, was free from rust (T.C. Vanterpool and P.M. Simmonds). A moderate infection occurred on some plants at Morden, Man. (W.L. Gordon)

Only a trace of rust was present in the plots of the Division of Forage Plants, Central Exp. Farm, Ottawa, Ont., on Aug. 4. The rust, however, developed rapidly, infection varying from slight to severe on Aug. 27, but it probably caused little damage. (D.B.O. Savile)

WILT (Sclerotinia sclerotiorum) caused slight damage in a planting at Flatbush, Alta. At Lacombe, where the disease was destructive in 1942 (P.D. S. 22:34), the sunflowers were planted in a new location and only a trace of damage occurred in both Mennonite and Sunrise (M.W.C.) Stem rot was reported by W.J. White from Borden and Wynyard, Sask., and the pathogen was isolated; however, the disease was not found in 7 other fields examined (T.C. Vanterpool). A small amount of wilt was found in the plots at Saskatoon and diseased specimens were received from Melfort, where it was reported to be severe (H.W.M.)

Infection was a trace at Morden, Man. (W.L. Gordon) and slight to moderate in the Winnipeg area. (A.M. Brown)

LEAF SPOT (Septoria Helianthi). Infection was slight on all varieties and strains at Lethbridge, Alta.; a trace on Mennonite and a slight infection on Sunrise was recorded at Lacombe, Alta. (W.C. Broadfoot). Quite a heavy infection was found on one leaf of a plant received from Kapuskasing, Ont.; the general situation is unknown. (I.L. Conners)

BORON DEFICIENCY was severe in a few lines of sunflower in the plots, Division of Forage Plants, C.E.F., Ottawa, Ont. on Aug. 4; most of the heads were stunted and had the appearance of being "frozen", the involucral bracts of the small unopened heads being blackened. Other symptoms were the extreme brittleness of the involucral bracts, and also of other parts of the plant and lumpiness and cracking of the petioles and rarely of the stems. A yellow spotting followed by a necrotic spotting of the lower leaves was most severe in the lines showing the most serious head and petiole symptoms and may be an additional symptom. The head symptoms have been observed in greenhouse cultures in both the Division of Horticulture and the Division of Forage Plants, but not the petiole cracking. A little of the lumpiness may have been due to tarnished plant bugs, which were present in small numbers, but most of it was definitely correlated with the head symptoms. Mr. F. Nowasad points out the variations in severity may be correlated with the types of root systems of the selections in question, rather than their boron requirements. Stem cracking as a symptom is mentioned by C.E. Schuster and R.E. Stephenson (Sunflower as an indicator plant of boron deficiency in soils. Jour. Amer. Soc. Agron. 32:607-621. 1940). (D.B.O. Savile)

CULTIVATED GRASSES

AGROPYRON - Wheat Grass

Leaf Spot (Ascochyta graminicola). Slight infection on A. Smithii at Oak Bluff, Man. (T. Johnson)

Ergot (Claviceps purpurea) was slight to moderate on A. cristatum, occasionally heavy on A. desertorum, slight on A. glaucum, A. Michnoi, a trace on A. junceum in the grass plots at Morden, Man. (W.L. Gordon). A severe infection was recorded on A. repens at Carman, Man. (J.E. Machacek), and a trace in A. trachycaulum in a field at Viking, Alta.

Powdery Mildew (Erysiphe graminis). Trace to heavy infection was present on July 22, on A. repens in P.E.I. (Bruce McLaren)

Leaf Blotch (Helminthosporium Tritici-repentis). A slight infection was noted at Winnipeg on June 22 and at Winkler on July 6 on A. repens. The tips of the leaves turned brownish-yellow and then completely withered. This is the first record in Man. on this host. (J.E. Machacek)

Crown Rust (Puccinia coronata) became moderately severe on A. repens and A. trachycaulum in the Laboratory plots, Winnipeg, Man. Both uredinia and telia were present on A. repens, which is a new host for Man. (A.M. Brown and T. Johnson)

Leaf Rust (Puccinia montanensis). A moderate to heavy infection on A. trachycaulum in the grass plots at Morden, Man. (W.L. Gordon)

Scald (Rhynchosporium Secalis) was common on A. repens along roadsides at Cloverdale, B.C. (W. Jones)

Brown Stripe (Scoletotrichum graminis). Slight infection in a field of A. trachycaulum at Viking, Alta. (M. W. Cormack)

BROMUS - Brome Grass

Bacterial Blotch (undetermined). One large patch of infected plants of B. inermis was found on the bank of the Red River, at Winnipeg, Man. Brownish-black elongated blotches or streaks were formed on the leaves. Bacteria oozed from the veins when the infected areas were sectioned. (J.E. Machacek)

Ergot (Claviceps purpurea). A trace on B. erectus was present in the plots at Morden, Man. (W.L. Gordon)

Leaf Blotch (Helminthosporium Bromi). Infection was severe in patches on B. inermis at Winnipeg, Man. (J.E. Machacek)

Scald (Rhynchosporium Secalis). A trace on Parkland brome grass at Lethbridge, Alta. (W.C. Broadfoot). Found for the first time on this host in Man., when infection was abundant in a few isolated patches on the banks of the Red River at Winnipeg; profuse conidial development. (J.E. Machacek)

Leaf Spot (Selenophoma bromigena). Infection was observed to be slight in 2 fields of B. inermis, moderate in 3 and severe in 4 in Man. (F.J. Greaney)

Smut (Ustilago bromivora). Severe infection on a few plants of B. ciliatus in Riding Mt. Park, Man. (T. Johnson)

CALAMAGROSTIS

Ergot (Claviceps purpurea). Slight infection on C. canadensis at South Alton, N.S. (R.M. Lewis)

Crown Rust (Puccinia coronata). Moderate to severe in the Laboratory plots, Winnipeg, Man., on C. inexpansa. (A.M. Brown)

DACTYLIS GLOMERATA - Orchard Grass

Purple Leaf Spot (Mastigosporium rubricosum). Infection general throughout the growing season on Vancouver Island and the lower mainland, B.C.; damage slight. (W. Jones)

Bacterial Leaf Spot (Pseudomonas syringae). Infection general but moderate in the Botanical Garden, Montreal, Que. (J.E. Jacques)

Stem Rust (Puccinia graminis). Infection slight but general in the plots at Morden, Man. (W.L. Gordon). Traces on wild plants in all counties of P.E.I. (R.R. Hurst)

ELYMUS - Rye Grass

Ergot (Claviceps purpurea). Infection a trace on E. canadensis in the plots at Morden, Man. (W.L. Gordon)

Leaf Spot (Phyllachora graminis). Infection severe on Elymus sp. at Edmonton, Alta. (A.W. Henry)

Crown Rust (Puccinia coronata). Moderately severe on E. canadensis, E. curvatus and E. dahuricus in the Laboratory plots, Winnipeg, Man. (A.M.Brown)

Leaf Rust (Puccinia montanensis). A slight infection in the telial stage of this rust occurred on the leaves of some plants of E. canadensis in the grass plots at Morden, Man.; the infection was severe on certain plants of E. dahurica, while adjacent plants were entirely free from rust. (W.L. Gordon)

Speckled Leaf Blotch (Septoria nodorum pro tem.). A trace was observed on some plants in the grass plots at Morden, Man. Spores measured 25-35 x 2.5-3.5 microns. For the time being the organism has been referred to S. nodorum because of its close morphological resemblance. A slight infection was also noted on E. giganteus in the same plots in a mixed infection with Scoletotrichum graminis. (W. L. Gordon)

Brown Stripe (Scoletotrichum graminis). A trace on some plants of E. giganteus in the plots at Morden, Man. (W. L. Gordon)

FESTUCA

Leaf Spot (Ascochyta graminicola). Slight infection on some plants of Festuca rubra in the grass plots at Morden, Man. The spores were 12.5-14 x 2.5-3 microns. A trace of Hendersonia crastophila Sacc., a new fungus for Man., was also found. The spores were 30-52.5 x 4-5 microns. (W. L. Gordon)

Ergot (Claviceps purpurea). A trace occurred on Creeping Red Fescue in the plots at Olds, Alta.

Stem Rust (Puccinia graminis). A trace of the uredinial stage present on F. rubra in the plots at Morden, Man. (W. L. Gordon)

HORDEUM - Barley

Stem Rust (Puccinia graminis). Slight uredinial infection present on Hordeum brevisubulatum in the plots at Morden, Man. (W. L. Gordon)

KOELERIA

Leaf Spot (Helminthosporium vagans) was abundant in a small planting of Koeleria cristata at Winnipeg, Man.; the leaves withered. (J.E. Machacek)

MUHLENBERGIA

Rust (Puccinia Schedonnardi Kell. & Swingle). A slight infection on a few leaves of Muhlenbergia cuspidata in the plots at Morden, Man. (W.L. Gordon). This is apparently the first Canadian record of this rust.

PHLEUM PRATENSE - Timothy

Leaf Spot (Heterosporium Phlei). Infection slight in the plots at Agassiz and at the University, Vancouver, B.C. (W. Jones); a trace to severe in clonal lines at Edmonton, Alta. (M.W. Cormack); general but not severe at the Botanical Garden, Montreal, Que. (J.E. Jacques); trace on the wild grass in P.E.I. (R. R. Hurst)

Stem Rust (Puccinia graminis var. Phlei-pratensis). Infection general and damage moderate on the lower mainland, B.C. (W. Jones). Infection moderate in a field near Edmonton, Alta. (M.W.C.). Rather heavy on some plants at the Botanical Garden, Montreal, Que. (J.E. Jacques). Infection a trace to heavy on timothy in all parts of P.E.I. (R. R. Hurst)

Crown and Root Rot (a low-temperature basidiomycete). Winter killing was slight in 2 fields and severe in a third, east of Edmonton. This fungus was isolated from the diseased material. (M.W. Cormack)

POA - Bluegrass

Ergot (Claviceps purpurea). A trace on P. Canbyi and P. glaucifolia in the plots at Morden, Man. (W. L. Gordon)

Powdery Mildew (Erysiphe graminis). Common on P. pratensis along the roadside at Langley, B.C. (W. Jones); moderate general infection on P. compressa and P. pratensis at Winnipeg, Man. (W. L. Gordon)

Stem Rust (Puccinia graminis). Uredinial infection was slight to moderate on P. Canbyi and slight on P. glaucifolia and P. nevadensis in the plots at Morden, Man. These are new host records for Man. (W.L. Gordon). In fact, this appears to be the first record of P. graminis var. Poae in Man. (I.L. Connors)

Brown Stripe (Scoletotrichum graminis). A trace of infection in the grass plots, Morden, Man., on P. compressa, a new host for Man. Spores were 35 x 8.5 microns. (W.L. Gordon)

TURF

Snow Mould (a low-temperature basidiomycete). Severe damage occurred in the early spring on many lawns and golf greens at Edmonton and other points in central and northern Alta. Although much of the killing was undoubtedly due to the weather, fungus mycelium was also commonly present. The low-temperature basidiomycete was the only pathogen isolated (M.W.C.). Snow mould caused severe damage to lawns at Saskatoon, Sask. The indications were that it was the major cause of "winter injury" in shaded and protected places. The "mould" was very conspicuous on April 4. Affected areas which were staked out the last week of March showed 50-100% injury 1½-2 months later. There was considerable variation in the amount of recovery, ranging from slight to virtually complete by fall. White clover and dandelions were completely killed out in the affected areas; only the grass showed recovery. The pathogen was isolated from lawn grasses at Saskatoon as early as 1932. (T.C. Vanterpool)

Snow Mould (Typhula sp.) caused a trace of damage in two small areas of a few square feet on the University campus, Saskatoon, Sask. The minute sclerotia, 0.5-1.0 mm. in diam., were common on decaying leaves and were readily cultured. Damage was slight, probably because the exposed nature of the diseased areas and the rapidity with which the snow receded. The affected areas have now fully recovered. A search has been made for this fungus at Saskatoon every spring since 1929, except in 1936, and this is the first time sclerotia have been observed. (T.C. Vanterpool)

Winter Injury appeared to be severe where the grass had become exposed during the winter at Saskatoon, Sask. It was especially severe on turf next to concrete walks across lawns. Here injury may have been, in part, due to packing of the snow rather than exposure. The grass made little or no recovery. (T. C. Vanterpool)