

II. DISEASES OF FORAGE AND FIBRE CROPS

ALFALFA

BLACK STEM (Ascochyta imperfecta) was most prevalent shortly before the second cutting in Alta. The estimated infection in 55 fields examined was a trace in 8 fields, slight in 27, moderate in 17 and severe in 1. Infection was slight to moderate in the plots at Edmonton, Lacombe and Olds, while it was severe on Orestand at Lethbridge and slight to moderate on the other varieties (M.W. Cormack). The disease was very common, causing some damage, in the Whitefox alfalfa-growing area in Sask. (H.W.M.). A severe infection was reported in a field at Melita, Man., where the previous season's crop had been left in the field. It was moderate to heavy at Macdonald. A slight infection also occurred on Ladak and variegated alfalfa (Medicago media) in the plots at Morden, Man. (W.L. Gordon).

BACTERIAL WILT (Corynebacterium insidiosum). The estimated damage caused by bacterial wilt in alfalfa fields in Alta. in 1944 is given in the table below:

<u>District</u>	<u>Fields Examined</u>	<u>Percentage of Fields Damaged</u>					<u>Total</u>
		<u>Tr.</u>	<u>Sl.</u>	<u>Mod.</u>	<u>Sev.</u>		
		<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>		<u>%</u>
Brooks-Lethbridge (irrigated)	103	18	27	14	2		61
Clover Bar-Bremner	106	14	6	4	0		24
Lacombe-Wetaskiwin	57	0	7	0	0		7
Cherhill-Sangudo- Westlock	<u>60</u>	0	0	0	0		<u>0</u>
All Alberta	<u>326</u>						<u>29</u>

Bacterial wilt was found in all the 63 stands, three years old or older, examined in the irrigated districts, and the early stages of infection were detected in several of the 40 younger stands inspected. In recent years there has been a notable increase in the proportion of these younger stands, especially in the Brooks district, where the disease has been most severe. It has developed rapidly in the Clover Bar-Bremner district, east of Edmonton, where it was found in nearly one-quarter of the 106 fields examined in an area covering about one township. The early stages of the disease were also found for the first time in 4 widely separated fields in the Lacombe and Wetaskiwin districts. No trace of it has yet been found in the alfalfa seed-producing areas near Cherhill, Sangudo, and Westlock (M.W. Cormack).

ROOT ROT (Fusarium avenaceum, etc.). Slight to moderate damage was found in 2 fields at Brooks and in 1 at Bremner, Alta. F. avenaceum was isolated from the diseased roots (M.W.C.).

LEAF SPOT (Leptosphaeria pratensis (Stagonospora Meliloti)). A slight infection was present in the plots at Edmonton, Alta. (M.W. Cormack).

DOWNY MILDEW (Peronospora aestivalis). Infection was slight in one field at Duffield, Alta., and slight to moderate on young plants in the plots at Edmonton (M.W. Cormack).

YELLOW LEAF BLOTCH (Pseudopeziza Jonesii). Infection was severe in one plot and slight in a second, but the disease was not observed in any others of the Division of Forage Plants, C.E.F., Ottawa, Ont. (D.B.O. Savile).

COMMON LEAF SPOT (Pseudopeziza Medicaginis) was general and caused slight damage in the coastal areas of B.C. (W. Jones). This leaf spot was present through the Okanagan district, especially on plants near irrigation flumes (G.E. Woolliams). The estimated infection in 55 fields examined prior to cutting in Alta. was: trace in 2 fields, slight in 31, moderate in 18, and severe in 1. Infection varied from slight to moderate in the plots at Lacombe, Lethbridge, and Olds, and from moderate to severe at Edmonton, where there was considerable damage from defoliation (M.W. Cormack). Common leaf spot caused moderate damage from defoliation in the alfalfa growing area in northeastern Sask. and in the University plots, Saskatoon (H.W.M.). Infection was moderate to severe at Macdonald, Morden, and Winnipeg, Man., on alfalfa and at Morden on variegated alfalfa (M. media) (W.L. Gordon). Common leaf spot was not as prevalent at Guelph as in 1943 (J.D. MacLachlan). Defoliation was severe due to leaf spot in a field harvested late in Bellechasse Co., Que. (R.O. Lachance). A scattered light infection was recorded in Queens and Kings Co., P.E.I. (R.R. Hurst).

ROOT ROT (Rhizoctonia Solani). The organism was isolated from diseased roots obtained from a slightly damaged stand at Rainier, Alta. (M.W. Cormack). Crown rot was reported to have caused extensive damage at Brandon, Man.; Rhizoctonia Solani was isolated (W.J. Cherewick).

ROOT ROT (Sclerotinia sativa) caused slight damage in a field at Wetaskiwin, Alta. (M.W. Cormack).

CROWN ROT (low-temperature basidiomycete). Damage was much less prevalent and severe in Alta. than in 1943. Crown rot was found in 73 out of 223 stands of alfalfa examined in the central and north-central sections. The damage was estimated as a trace in 20 fields, slight in 48, and moderate in 5. Many of the other fields had been damaged in 1943 or previous years, but no further killing of plants was noted in 1944. Slight crown rot damage was found in 9 of the 103 fields examined in southern Alta. True winter killing was not observed in 1944 (M.W. Cormack).

MOSAIC (virus). A few affected plants were seen in a plot at the Sidney Station, B.C. (W. Jones).

MOSAIC (Medicago virus 2). Seven plants showing mosaic due to this virus were found on Aug. 17 in a field of Grimm at the Fredericton Station, N.B. The virus was readily transmitted by sap inoculation to Medicago sativa, Trifolium pratense, Datura Stramonium, Nicotiana glutinosa, N. Tabacum, and Cucumis sativus. An attempt to transmit it to Lycopersicon esculentum was not successful (D.J. MacLeod).

WITCHES' BROOM (*virus*). A low percentage of plants was found in fields of Grimm in the Armstrong district, B.C. (G.E. Woolliams). Witches' broom caused about 5% damage in a field near Cherhill, Alta. Occasional plants were severely affected in a field at Bremner, and in an old plot at Lacombe. The plots that have been under observation for several years at Edmonton were so severely thinned out that they were plowed up in 1944 (M.W. Cormack).

YELLOW S (boron deficiency). Evidence of boron deficiency was observed in several fields in the Grand Forks district, B.C. (G.E. Woolliams). Plants suffering from what appeared to be boron deficiency were brought to the Laboratory, Charlottetown, P.E.I. (R.R. Hurst).

COMMON CLOVER

LEAF SPOT (*Cercospora zebrina*) was found for the first time in Alta., where it was observed in 13 fields of alsike clover in the Drayton Valley; the estimated infection was a trace in 4 fields, slight in 8 and moderate in one (M.W. Cormack). A moderate infection was observed on some plants of alsike at Norgate, Man. (W.L. Gordon).

SOOTY BLOTCH (*Gymadothea Trifolii*). A slight infection occurred in the plots of alsike at Edmonton, Alta. (M.W. Cormack). A trace infection was general on alsike at Norgate, Man. (W.L. Gordon).

POWDERY MILDEW (*Erysiphe Polygoni*) was present on red clover in several parts of the Okanagan Valley, B.C., but nowhere was it severe (G.E. Woolliams). Infection was slight in 6 fields of red clover and moderate in 3 out of 19 examined in Alta.; a slight to moderate infection occurred in the plots at Edmonton, Alta. A slight infection was found for the first time on alsike in the same plots (M.W.C.). Infection was general and severe on red clover at Minniconas, Man., slight to moderate at Winnipeg and slight at Clearwater Bay, Ont. (W.L. Gordon). Powdery mildew was less prevalent at Guelph, Ont., than in 1943 (J.D. MacLachlan). Powdery mildew was severe, very few plants appearing free from infection, at the Botanical Garden, Montreal, Que. (J.E. Jacques). Traces of powdery mildew were noted on wild red clover in Prince Co., P.E.I. (R.R. Hurst).

LEAF SPOT (*Gloeosporium spadiceum*). Infection was slight in 5 fields of red clover in Alta. and moderate in one, the latter in the Drayton Valley district (M.W. Cormack).

ANTHRACNOSE (*Kabatella caulivora*) caused slight damage in 4 fields of red clover and moderate damage in 1 in Alta. Siberian Red was severely damaged at Lacombe, particularly in the 5-acre increase plot, where 25-50% of the plants were ruined. Damage varied from slight to severe on the other varieties at Lacombe. Infection was moderate to severe in one plot of Siberian Red at Olds, but other plots of the same variety were only slightly infected (M.W. Cormack).

LEAF SPOT (*Leptosphaeria pratensis* (*Stagonospora Meliloti*)). A slight infection was found in 7 fields of alsike clover at Drayton Valley and Sangudo. The pathogen was isolated and is apparently identical with isolates from sweet clover (M.W. Cormack).

BACTERIAL LEAF SPOT (Pseudomonas syringae). Two or three affected plants were noted in block 1A, Division of Forage Plants, C.E.F., Ottawa, Ont. (R.G. Atkinson). This is the first report of the disease on red clover to the Survey (I.L.C.).

LEAF SPOT (Pseudopeziza Trifolii). Only a trace was found on the stipules of an alsike clover plant at Norgate, Man. Ascospores were 7.5-10.5 x 2.5-3 microns. This is the first record on alsike in Man. (W.L. Gordon).

LEAF SPOT (Stagonospora recedens). A slight infection was found in 2 fields of red clover at Drayton Valley, Alta. Isolations yielded a fungus, which appears to be distinct from S. Meliloti obtained from sweet clover and alsike clover (M.W. Cormack). Some leaves of red clover were infected at Morden, Man. Spots mostly circular, up to about 6 mm., zonate except when confluent; spores 10-12.5 x 3 microns, slightly smaller but similar to those of Ascochyta imperfecta on alfalfa (W.L. Gordon). The pathogen is tentatively determined as S. recedens (I.L. Connors).

RUST (Uromyces fallens). Infection was severe on leaves and petioles of red clover at Winnipeg, Man.; trace on Manhardi at Morden, general and moderate at Clearwater Bay, Ont. (W.L. Gordon). A trace was observed on wild red clover in Kings Co., P.E.I. (R.R. Hurst).

MOSAIC (Trifolium virus 1). Three affected plants of Ottawa Double-Cut red clover were found at the Fredericton Station, N.B. The virus was transmitted by sap inoculation to Trifolium pratense, Pisum sativum and Vicia Faba. Attempts to transmit it by sap inoculation to Phaseolus vulgaris, Lycopersicum esculentum, Medicago sativa, and Nicotiana Tabacum failed (D.J. MacLeod).

Mosaic affected Ladino white clover in patches in field plots at Agassiz, B.C. (W. Jones).

SWEET CLOVER

STEM CANKER (Ascochyta caulicola). A slight infection was found in one field at Edmonton, Alta. (M.W. Cormack).

BLACK STEM (Ascochyta lethalis). Infection was slight in 2 fields and moderate in one out of 12 examined in Alta. (M.W.C.).

ROOT ROT. Fusarium avenaceum was isolated from diseased roots obtained from a slightly injured stand at Markerville, Alta. The same pathogen and Cylindrocarpum Ehrenbergi caused slight to moderate damage in the plots at Edmonton (M.W. Cormack).

LEAF SPOT and STEM BLIGHT (Leptosphaeria pratensis (Stagonospora Meliloti)). Infection was a trace in 4 fields, and slight in 3 in Alta. and in the plots at Edmonton (M.W.C.). A moderate infection was general in the University plots, Winnipeg, Man. (W.L. Gordon).

ROOT ROT (Phytophthora Cactorum). About 5% damage was found in one field and a trace in another in southern Alta. Occasional plants were also dying in all roadside stands examined (M.W. Cormack).

CROWN ROT (Rhizoctonia Solani). Extensive damage was reported from Brandon, Man.; R. Solani was isolated (W.J. Cherewick).

ROOT ROT (Sclerotinia sativa). Moderate to severe damage occurred in the plots at Edmonton, Alta. (M.W. Cormack).

BROOMCORN MILLET

SMUT (Sphacelotheca destruens) was heavy on a sample of 1943 seed from Ritchie, Sask.; when this seed was sown in the greenhouse, half the plants were affected (P.M. Simmonds).

BUCKWHEAT

YELLOW (Callistephus virus 1) was fairly general on varieties of Eragopyron tataricum in York, Sunbury, Carleton, Victoria and Westmorland Co., N.B.; an occasional plant of Silver Hull (F. esculentum) was affected at the Station, Fredericton, N.B. (D.J. MacLeod).

CORN

EAR ROTS (Diplodia Zeae, Fusarium moniliforme, Gibberella Saubinetii, Nigrospora sphaerica) were all at a low ebb on Nov. 7, 1944, in Essex and Kent Counties, Ont. Diplodia, however, could be found in every field of hybrid and open-pollinated corn, although damage was usually slight. Ears infected by F. moniliforme could also be found in every field. Gibberella was present only in some fields, and then only at low infection rates. Nigrospora likewise occurred only in certain fields, although infection from this pathogen may have increased before harvest (L.W. Koch).

RUST (Puccinia Sorghi). A trace to slight infection was observed on some leaves at Morden, Man. (W.L. Gordon). Traces of rust were recorded in Queens Co., P.E.I. (R.R. Hurst).

SMUT (Ustilago Maydis). A moderate infection was general at Morden, Man. (W.L. Gordon). The disease was prevalent throughout the Guelph district, Ont. (J.D. MacLachlan). An affected specimen was received from Chicoutimi, Que. (L.T. Richardson). Traces of smut were found in Queens Co., P.E.I. (R.R. Hurst).

FLAX

Professor T.C. Vanterpool, University of Saskatchewan, Saskatoon, Sask., has again prepared an excellent summary of his observations, entitled "Flax Diseases in Saskatchewan in 1944."

The fluctuating weather conditions which prevailed in many parts of Saskatchewan this season appear to have affected the growth of flax adversely. They appeared to have favoured more particularly the development of late root rot and the condition on flax described here as die back.

SEEDLING BLIGHT (*Rhizoctonia Solani*). Some seedling blight was found in flax fields examined early in the season, but heavy rains in June, especially on the heavier soils, buried the tiny dead seedlings under wash soil. Very little of the disease was found after the rains, so that it was not possible to estimate how much effect this disease had on reducing flax stands. *R. Solani* was again the predominant cause of the trouble where this was found.

RUST (*Melampsora Lini*). In the over-all picture rust caused less damage than usual. Infection was generally slight on the Royal variety, low spots of the field or where the growth was heavy showing moderate amounts. The situation was similar in the Redwing variety. Early infections, even in the cotyledonary stage, were conspicuous in many districts. This serious situation could be lessened by more thorough removal of bits of rust-infested straw during seed-cleaning, by the earlier ploughing under of flax stubble and volunteer flax plants, and by growing all flax on land not in flax the previous year. Rust was unusually light on the native wild flax (*Linum Lewisii*). In 1942 when rust infestation was heavy on cultivated flax, it was also common on wild flax.

STEM CANKER (*Melampsora Lini* and *Fusarium* spp.). As was to be expected, with the almost complete elimination of the rust-susceptible variety Bison, stem canker was not as prevalent in commercial flax fields in 1944 as during the previous two years. Among the susceptible varieties in the University experimental plots, however, infection was high and the brown discoloration extended far beyond the black telia.

WILT (*Fusarium oxysporum* f. *Lini*) was recorded in three farm fields at Young, Alford, Elrose respectively, where the wilt-susceptible variety Crown was grown but not over 15% of the plants were affected.

STEM BREAK and BROWNING (*Polyspora Lini*). The June survey revealed an unusually large number of flax fields showing severe cotyledonary lesioning. Isolations from representative samples gave mainly *Polyspora Lini*. Severe stem break and browning were expected to develop in these fields. A pre-harvest survey at the end of August showed that little or no stem break had developed in areas where the weather during July and August was dry and hot, such as at Rose-town and points west, but with increasing rainfall north, east and southeast of this area, stem break and browning were correspondingly more severe. The stem break phase was particularly heavy in fields at Juniata, Guernsey, Hanley, Birsay, Tuxford and Archydal, with the browning lesions only moderate in size and numbers at this stage. These observations bring out very clearly the close relationship between moisture conditions and the development of the disease in Sask. One of the most severely attacked fields was sown on flax stubble; another rated as severe was a fallowed field adjoining a flax stubble field which was not ploughed up until the new flax crop was well established. In this latter field, a careful examination showed that the disease was most severe on the side nearest to the stubble field and gradually decreased toward the more distant side. Late August and September rains in some districts favoured the spread of the browning phase

and doubtless increased the amount of seed-borne infection. That spore production was abundant at this time is indicated by the heavy spore load (centrifuge test) of P. Lini on some 1944 seed samples examined. This, however, gives no indication of the percentage of internally seed-borne infection, which may even be entirely absent or present as a trace. This disease continues to be of much concern as it is generally distributed throughout the province and is not entirely eliminated by seed treatment. More attention should be given to every factor relating to its control by all growers, but most particularly by growers of certified seed.

PASMO (Septoria linicola). No authentic reports of the presence of this disease in Sask. have been received. Unconfirmed reports in September received indirectly from elevator agents, credited the disease to be present in the extreme south of the province. An attempt was made to obtain specimens, but without success.

LATE ROOT ROT (Rhizoctonia, Fusarium spp., etc.). Damage characterized by premature ripening of the plant with slight stunting and shrivelling of the seed was conspicuous in many districts this year, especially in some parts of the south (Willowbunch), where it was present in definite areas. Late root rot is usually distinct from die back (see below), though root rot in some cases may possibly be a contributing factor in die back. Owing to the late appearance of both these troubles, the loss in affected areas would be slight, but the reduction in yield between healthy and diseased plants may be as high as 40%.

DIE BACK (cause unknown). About the first week in August several varieties and selections in the plots at Saskatoon developed striking die back symptoms. The upper third of the plants including the bolls turned brown, while the lower two-thirds remained relatively green for some considerable time afterwards. The roots more often appeared normal, with some evidence of cortical lesioning. Similarly, the seeds of affected plants were usually normal, but in some cases shrivelling was evident. In field surveys after this date, die back as described above was found to be common throughout the central, west central and south (especially at Saskatoon, Tessier and Keeler) on individual plants or on small clumps scattered generally through fields. The trouble has not been seen or reported from the moister northeastern areas of Saskatchewan. Isolations from affected stem parts yielded Alternaria species only. This die back is definitely not caused by Botrytis cinerea, which is reported as the cause of a die back of flax in Ireland and California. In the south, around Willowbunch, die back and root rot seemed to merge into one another. There, in several fields both symptom types were present in sharply delimited areas of irregular shape amongst green healthy areas. From the roots of affected plants the fungi usually associated with late root rot were isolated. The soil reaction in diseased areas was pH 8+, and in normal areas around pH 7. My hypothesis at present is that the trouble is due primarily to adverse soil and irregular or changeable weather conditions, associated in some instances with slight root rot caused by cortical invading fungi.

STEM DISCOLORATION. A condition which has not attracted attention before was frequently encountered just before harvest in the University plots and in commercial fields especially in the Tessier area. Brown to dark brown

areas $\frac{3}{4}$ to $1\frac{1}{2}$ inches long completely encircled the stems, usually in the upper two-thirds. Alternaria was obtained from a moderate percentage of affected stems on plating out. This condition might bear some relation to the die back described above.

FUNGUS LESIONING FOLLOWING HAIL INJURY. On August 22 a flax field at Willowbunch showed fungus lesioning $\frac{1}{4}$ to 1 inch above and below bruises from hail stones which fell on August 1, Phoma, Alternaria and Cladosporium were isolated. It is not possible to say to what extent one or more of these organisms increased the initial hail damage, but the appearance of the lesions suggested that damage other than what would result from drying out alone had ensued.

IRREGULAR STANDS. Many instances were encountered of irregular emergence of flax last spring, particularly in the heavy soils of the Rosetown area, which was not attributable to differences in seed viability, seed-coat cracking or seed-borne organisms. From results on one farm with seed from the same source sown in the same field on different dates, it appears that flax is very susceptible to the time of rainfall following sowing. Whether the rain fell immediately after sowing or one, two or three days later, appears to influence emergence considerably. More information on this point, especially from other districts, is desirable.

Other Observations

Attention is drawn to Alternaria linicola Groves & Skolko isolated from seeds of flax (Can. Jour. Research 22 C:223, 1944). The authors state that the fungus has been isolated from seeds originating in Que., Ont., Man., Sask., and Alta., i.e. from all the provinces where the production of seed and fibre flax is of commercial importance. This disease has not yet been recognized in the field, but the authors predict that, under suitable conditions, A. linicola is likely to be found causing considerable damage probably as a leaf blight or in pre-emergence mortality. The large size of the conidia, and their resemblance to A. Brassicae should make it relatively easy to distinguish A. linicola on field material from the ubiquitous A. tenuis. Although the authors point out that it is difficult to distinguish cultures of A. linicola from non-sporulating strains of A. tenuis, they have been able to obtain conidia on agar using the mutilation technique of Rands (I.L.C.).

ANTHRACNOSE (Colletotrichum Lini) infection varied from a trace to slight in stands from Ceresan-treated seed of Cirrus and Gossamer in Kamouraska, L'Islet and Temiscouata Counties, Que., while it was moderate to severe where the seed was untreated. The disease was reported from Chateauguay Co., and its presence was confirmed by a seed examination (R.O. Lachance, A. Payette).

DODDER (Cuscuta Gronovii). A plot of flax contained many infected plants at Gilbert Plains, Man.; Chenopodium sp. in the same plot was also attacked (W.E. Sackston).

STEM CANKER (Fusarium sp.). A moderate infection was seen at Portage la Prairie, Man. (J.E. Machacek).

WILT (*Fusarium oxysporum* f. *Lini*). In experiments on seed disinfection at Ste. Anne de la Pocatiere, some plots of Gossamer on clay soil were severely infected by wilt. Neither Ceresan, Arasan, nor Spergon had any effect on its development (A. Payette). Traces were also present in nearly every plot in the variety test at the Station (R.O. Lachance).

RUST (*Melampsora Lini*). A slight infection was seen in Lirral Dominion at Ladner, B.C. (W. Jones). Rust was observed in 7 fields out of 11 examined in Alta.; infection was a trace in 2, slight in 2 and moderate in 3. Infection was a trace to slight in the plots at Beaverlodge and Edmonton; it was slight on Bison and Redwing at Lacombe, but rust was not seen on L33-14 selection (M.W.C.). Rust was fairly common in Sask.; a few fields of Bison were severely infected, while Royal was moderately rusted in some areas. At Saskatoon on July 17, infection was moderate on Bison, slight on Biwing and Kota, while no rust was seen on Arrow and Dakota (H.W.M.).

In 1944, aecial infections of flax rust were observed on volunteer flax seedlings at Winnipeg, Man., on May 26, and by June 6, the red stage was beginning to appear. The seedlings on which these infections occurred were growing among some flax stubble and uncut flax plants from the previous year. All the susceptible volunteer plants became very heavily infected as did susceptible varieties sown adjacent to this old flax field. Susceptible flax varieties sown at a distance of 100 yards from this field also became heavily infected, but infection at this distance from last year's flax field occurred a full week later than in the plots growing adjacent to it. Generally throughout Manitoba flax rust in farmers' fields was less prevalent than it had been for several years past. Only traces of rust were found in Royal which constituted the majority of the flax fields examined. Even in Bison and Redwing the percentage infection did not much exceed 5%. The decrease in prevalence of flax rust was, no doubt, due to a decrease in rust inoculum present in Man. owing to the displacement last year by Royal (a resistant variety) of Bison (a very susceptible variety), which for some years past comprised a large percentage of the flax acreage (B. Peturson).

Rust was reported for the second year by a provincial weed inspector from Soulanges Co., Que. (cf. P.D.S. 23:24) (R.O. Lachance).

STEM BREAK and BROWNING (*Polyspora Lini*). A 5-20% infection was seen in 2 fields in Sask. Leaf and stem lesions were common in some varieties in the University plots, Saskatoon (H.W.M.).

SEEDLING BLIGHT (*Rhizoctonia Solani*). A moderate to severe infection occurred in a seed bed in the Laboratory greenhouse at Ste. Anne de la Pocatiere, Que., where sound seed of Cirrus disinfected with Arasan had been sown. There was some typical damping off when the plants were 3 to 4 in. high, but most plants succumbed when about 10 in. high; pinkish lesions were present on the hypocotyl (A. Payette).

PASMO (*Sphaerella linicola* (*Septoria linicola*)) caused moderate damage to Royal in the plots at Agassiz, B.C. (M.F. Clarke). The pathogen was detected on specimens of seed and fibre flax received earlier from Mr. Clarke and the organism was isolated by W.E. Sackston. Pasm infection was moderate to severe in 7 fields, trace to slight in 5 out of 14 fields examined in Man. (W.L. Gordon).

Fibre flax stems received from E.M. Mackay of the Fibre Flax Pilot Mill at Portage la Prairie, Man., on Dec. 7, 1944, bore what appeared to be pycnidia of Septoria linicola on pasmo-diseased areas. Mounts showed, in one case, perithecia containing asci, mostly with immature spores; ascospores 8, biserial in a straight to tortuous ascus, 2-celled, slightly curved, hyaline, tapering at each end, and some, apparently mature, were 16-19 x 3 microns. No paraphyses were seen (W.E. Sackston, W.L. Gordon).

CHLOROSIS (excess lime) was observed at Brandon, Man.; plants were chlorotic and stunted in large patches (J.E. Machacek).

DIE-BACK (cause unknown) caused severe damage in patches in fields at Provost, Alta., and in the plots at Lacombe (G.B. Sanford). Die-back affected 10-25% of the plants in fields at Weyburn and Major, Sask. The upper part of the plant had a scorched brown appearance and the bolls were usually empty. The injury has been attributed to drought with hot winds, but it may also be due to the fact that the flax was grown on soils showing eroded or "burn-out" spots found in soils of the Echo association (Univ. of Sask. Soil Survey Rept. 12:60. 1944) (H.W.M.). About 75% of the plants of Cirrus were affected by a die-back in a field in Kamouraska Co., Que. The lower part of the plant usually remained green, but sometimes the entire plant was involved. No organism was isolated although numerous attempts were made. The soil was dry, sandy, and poorly prepared; weeds were numerous (R.O. Lachance).

SPERGON INJURY. Spergon applied at the rate of 5 oz. per bu. caused a malformation of the leaves, which usually became united into a tube in a planting in Kamouraska Co., Que.; about 90% of the seedlings were affected, but they soon recovered (R.O. Lachance).

KOK-SAGHYZ

YELLOW (Callistephus virus 1). Four plants were found affected in the plots at the Fredericton Station, N.B. (D.J. MacLeod).

MILKWEED

LEAF SPOT (Cercospora clavata). The leaves of some cultivated plants of Asclepias syriaca were moderately affected in a large plot at Morden, Man. A trace of Colletotrichum fusarioides (Ell. & Kell.) O'Gara and Coniothyrium sp. (spores 5-8.7 x 2.5-3.5 microns) was found intermixed with the Cercospora. C. clavata was severe on many leaves of a clump of A. syriaca grown as an ornamental at Morden, Man. In this collection the spores were unusually long, being 67.5-127.5 x 4-6 microns (W.L. Gordon).

ARGENTINE RAPE

WHITE RUST (Cystopus candidus). A slight infection was general in a field of Argentine rape (Brassica Napus) at Sanford, Man.; a moderate infection occurred on some leaves (W.L. Gordon).

SAFFLOWER

RUST (Puccinia Carthami). Infection was moderate to severe in one plot at Lethbridge, Alta. (W.C. Broadfoot). Rust was heavy on a small plot at the Field Husbandry Farm, University of Sask., Saskatoon. This plot was a 1/4 mi. from the plots where the disease occurred in 1942 and 1943 (H.W.M.).

SORGHUM

BACTERIAL LEAF SPOT (Pseudomonas syringae). A light general infection was observed on Kafir corn in the Botanical Garden, Montreal, Que.; it did not seem to cause appreciable damage (J.E. Jacques).

SOYBEAN

The account below on "Soybean Diseases in Southwestern Ontario in 1944" was prepared by Drs. L.W. Koch and A.A. Hildebrand, Harrow, Ont.

The disease situation in soybeans in southwestern Ont. this year differed from that of the past several years. Not only were losses due to disease reduced to a minimum, but also, while only traces of several of the more commonly occurring diseases could be found, certain new and potentially dangerous ones were encountered for the first time.

POD and STEM BLIGHT (Diaporthe Phaseolorum var. Sojae), first noted July 18, continued to be found throughout the growing season in nearly every commercial planting visited. Except in one field on Pelee Island, where soybeans had been grown for ten years in succession, the disease did not appreciably reduce yield. However, since the disease is seed borne, the occurrence of even a few affected plants in virtually all stands means that there is a general and a potentially important carry over of inoculum from this season to the next. Given next year a season favourable for the development of the disease, it could become epiphytotic.

BUD BLIGHT (virus). In the course of a routine inspection of laboratory experimental plots on July 7, attention was attracted to a number of plants that exhibited a symptom picture not previously encountered. The youngest tip leaves of these particular plants were cupped and showed a brownish discoloration at the apex, along the edge or from the tip toward the centre of the leaflets. In transmitted light the veins of the young leaves showed a marked clearing and there was a suggestion of inter-veinal rugosity. In attempts to unfold the leaflets the tissues were found to be "hard" and brittle.

The second youngest trifoliate leaf showed yellowish-brown to brownish discoloured areas between the veins as well as a distinctly rugose condition. The appearance of these leaves suggested infection by a virus of the mosaic type. Unlike mosaic, however, the mottled appearance of the leaves of the plants in question was due to contrasts among yellows, browns and greens rather than between varying intensities of greens as in the early stages of mosaic. The third youngest trifoliate leaflets were normal in size and colour except for a slight rugosity or blistering of the interveinal tissues.

All down the stem the buds gave the suggestion of flaccidity and showed browned and withered tips. Like the youngest leaves they were extremely brittle and broke off with the slightest handling. When the stalks were cut open, the pith at each of the distal nodes showed a distinctly brown, water-soaked condition. (In later stages, all the nodes of a plant were found to show the internal, brownish discoloration). Internally and externally the roots appeared perfectly healthy. When the growing point of the main stalk was affected as described above, growth was arrested and the plants became conspicuous because of their stunted condition. Sometimes only a single branch of a plant showed typical symptoms and stunting.

The above symptoms together with others observed later in the season, including a characteristic blotching of the pods, coincided so closely with those described for Bud Blight, that there is no doubt as to the identity of the disease.

Samson who observed this disease on vegetable soybeans in Indiana in 1941, found that it was caused by the tobacco ring spot virus or a virus that has somewhat similar properties, (U.S. Pl. Dis. Reporter 26 (17):382. 1942). In 1942, Johnson observed the disease on field soybeans in Ohio and confirmed the identification of the causal virus, (U.S. Pl. Dis. Reporter 27 (2):86-87. 1943). The latter investigator referred to the disease as Soybean Streak. In addition to Indiana and Ohio the disease has now been reported from seven more states. According to Koehler (Soybean Digest 4 (8):6-7. 1944), "In the Northern Mississippi valley 'Bud Blight' appears to rival in importance the bacterial blights of which there are several".

Bud blight was found in nearly every field inspected in Essex and Kent Counties, the number of affected plants ranging from a trace in many cases to a maximum of about 2% in others. If, like mosaic, this disease should prove to be seed borne, then already an appreciable amount of inoculum is present in the seed for next year's planting.

PHYLLOSTICTA LEAF SPOT (P. sojaecola). On June 17, Phyllosticta leaf spot was noted on the lower leaves of plants in a number of commercial plantings. In a few weeks the disease entirely disappeared and caused relatively little damage this year as compared with last.

BACTERIAL BLIGHT (Pseudomonas glycinea). During the early part of the current season infection by bacterial blight was general and threatened to be serious. However, with the onset of dry weather, the disease for the most part disappeared. During an inspection of the 5,000-6,000 acres of soybeans on Pelee Island on September 8, it was noted that there was heavy and almost general infection by bacterial blight. Infection seemed to be recent and while possibly contributing to slightly earlier defoliation had come too late to be a limiting factor in production.

FROG-EYE (Cercospora sojae). Towards the latter part of the season, as was the case last year, the reddish-brown to blackish-brown, more or less elongated lesions, characteristic of the frog-eye disease, were observed on the stems of plants in the laboratory experimental plots and in commercial plantings of the district. Observational evidence to date suggests that C. sojae is a weak parasite capable of attacking stems of plants only after they have reached a relatively late stage of maturity.

BROWN SPOT (Septoria Glycines). Early in September specimens of diseased soybean leaves that had been sent to Ottawa by J.K. Knights, Supervisor, District Experimental Substation, Fort William, Ont., were relayed to Harrow for diagnosis. The symptoms so closely resembled those described by Wolf and Lehman for brown spot (J. Agr. Research 33 (4):365-374. 1926) that the disease was tentatively diagnosed as such. Isolations from brown spots on the leaves yielded pure cultures of a Septoria sp. apparently identical with that reported last year (P.D.S. 23:31-32) as having been isolated from lesions on stems of plants at Harrow and identified as S. Glycines Hemmi. Thus, it has been established that brown spot occurs not only on stems of plants in Ontario, but also on leaves, and in widely different climatic zones within the province.

CHARCOAL ROT (Macrophomina Phaseoli (Maubl.) Ashby). On August 21, while inspecting a stand of soybeans being grown for registered seed, attention was attracted to a plant that was wilted and dying. Closer examination of the diseased plant revealed the presence of a lesion on the stem at about the ground level. Beneath the epidermis in the dried-out cortical tissues of the diseased area was noted a thick "peppering" of minute, black, shiny, sclerotia-like bodies. On the basis of these symptoms the disease was diagnosed as charcoal rot. Single sclerotia transferred to artificial media readily yielded pure cultures of M. Phaseoli (= Sclerotium bataticola). In greenhouse infection experiments, the disease was reproduced on soybeans in typical form. This fungus has been reported only once before to the Survey (P.D.S. 13:29), when it was found on sweet pepper in the Niagara Peninsula by J.K. Richardson.

ASCOCHYTA and ALTERNARIA sp. As in past seasons, Ascochyta and Alternaria were found fruiting on lesions on leaves in a manner which suggested that they might possess primary parasitic capability.

FUSARIUM BLIGHT (Fusarium oxysporum f. tracheiphilum). Last year Fusarium blight was the most destructive disease encountered. This year, the disease was virtually non-existent, only a few affected plants being noted throughout the whole season.

MOSAIC (virus) also was almost absent. Only in the variety Manchu were a few infected plants noted.

DOWNY MILDEW (Peronospora manshurica). Even on the variety A. K. Harrow, which is very susceptible to attack by downy mildew, not a single infected plant was noted this year.

RED SPIDER. In the course of an inspection on Aug. 21, it was observed that portions of fields and in some cases whole fields, particularly of the variety Manchu, showed a grayish-green rather than the normal green colour. Closer examination revealed that plants in the "off-colour" areas were heavily infested by red spider. The infestation lasted for some weeks and over a considerable portion of the soybean-growing area in Essex Co.

Other Observations

WILT (Fusarium sp.). A few scattered plants of Pagoda were affected at the Agassiz Farm, B.C. (W. Jones).

DOWNY MILDEW (Peronospora manshurica) was general on the foliage of Pagoda at Agassiz, B.C. (W. Jones).

BACTERIAL BLIGHT (Pseudomonas glycinea) was reported as follows: slight general infection on 2 garden rows of Black Eye at Agassiz, B.C. (W. Jones); slight to moderate damage in the plots at Lethbridge, Alta. (M.W.C.); infection a trace at Winnipeg, moderate in East Kildonan and Morden, and severe at Brandon (W.L.G.); severe infection in 1941-4, 1941-5, causing some defoliation at Nappan, N.S. (J.F. Hockey).

MANGEL

CROWN GALL (Agrobacterium tumefaciens) affected 2 roots of Frontenac in Queens Co., P.E.I. (R.R. Hurst).

LEAF SPOT (Cercospora beticola) was moderate about Guelph, Ont. being not as severe as in 1943 (J.D. MacLachlan). Infection was a trace to heavy in a field of Frontenac in Prince Co., P.E.I. (R.R. Hurst, D.B.O. Savile).

LEAF SPOT (Phoma Betae). A slight infection was observed on the leaves of seedlings and mother plants of Tip Top at the Farm, Agassiz, B.C. (W. Jones). A moderate infection was found in one field of mangels grown for seed at Vernon, B.C. (G.E. Woolliams).

LEAF SPOT (Ramularia beticola). Infection was general causing moderate damage to the foliage of Tip Top at Agassiz, B.C. (W. Jones).

RUST (Uromyces Betae). A slight infection of uredinia was present at the Station, Sidney, B.C. on Feb. 1 (W. Jones).

ROOT ROT (various) caused a loss of 10% of the foundation seed plants in the University plots, Vancouver, B.C. (W. Jones).

MOSAIC (virus) affected 25% of the crop of one variety in the University plots, Vancouver, B.C. (W. Jones). A trace of mosaic (Beta virus 2) was found in a plot at the Station, Fredericton, N.B. (D.J. MacLeod). A trace of mosaic was observed in a field of Frontenac in Queens Co., P.E.I. (R.R. Hurst).

BLACK HEART (boron deficiency) was seen affecting the odd plant of Frontenac in Prince Co., P.E.I. (R.R. Hurst).

FASCIATION (cause undetermined). About 2% of the plants in a seed plot at the Fredericton Station, N.B., showed varying degrees of fasciation (D.J. MacLeod). An occasional plant was noted in a field of Frontenac in Prince Co., P.E.I. (R.R. Hurst).

SUGAR BEET

The report as follows on "Diseases of Sugar Beets in Southwestern Ontario in 1944" was contributed by Dr. A.A. Hildebrand, Dominion Laboratory of Plant Pathology, Harrow, Ont.

Because of excessive rainfall, seeding of sugar beets was below normal in April, but with improved weather plantings were abnormally heavy in May, and growing conditions were excellent. In general, disease as a factor reducing yield or impairing quality of beets was not as important this year as in several previous seasons.

BLACK ROOT (various fungi). Despite seemingly favourable soil conditions, black root accounted for a loss of some hundreds of acres this spring. It is difficult to appraise accurately the loss in acreage due to black root alone, since this year an unusually heavy infestation by flea-beetle coincided with incidence of the disease, especially in later plantings.

RHIZOCTONIA ROT (R. Solani). As usual this disease was of almost general occurrence throughout the district and would account for a total loss of about 2% of yield.

RHIZOPUS ROOT ROT (Rhizopus arrhizus). In 1942 Hildebrand and Koch reported (Can. Jour. Research 21 C:235-248. 1943) that sugar beets growing in an experimental plot at the Harrow laboratory were attacked and destroyed by a root rot caused by R. arrhizus Fischer. Early in September of the current year the disease was found for the first time in Canada in commercial stands in the southern part of Essex Co. Although the disease did not cause significant losses in the field, nevertheless, it constitutes a serious potential threat to beets assembled in piles at concentration points, especially under conditions conducive to "sweating" and heating.

DODDER. Also in September, dodder was found parasitizing beets in certain fields of Essex Co.

CERCOSPORA LEAF SPOT (C. beticola). This year for the first time in many seasons, Cercospora leaf spot was virtually absent, only a few scattered leaf infections having been noted throughout the whole district.

Other Observations

LEAF SPOT (Cercospora beticola) was moderate at Guelph, Ont., being less severe than in 1943 (J.D. MacLachlan).

RUST (Uromyces Betae) was fairly general on the foliage in the plots at the Station, Sidney, B.C., on Feb. 2 and Nov. 1 (W. Jones).

SUNFLOWER

POWDERY MILDEW (Erysiphe Cichoracearum). A slight infection of the oidial stage was general at Morden, Man. (W.L. Gordon).

DOWNY MILDEW (Plasmopara Halstedii) was heavy at the Station, Kapuskasing, Ont., on Aug. 10 (J.W. Groves). A 10-15% infection was observed in one field at Ste. Anne de la Pocatiere, Que. On most plants the infection occurred in the seedling stage, but on a few, infection was secondary. The disease appeared in a field in a 5-year rotation. In a neighboring field

sown this year for the first time to sunflowers, no mildew was observed although the same seed was used. It would appear that the organism may live several years in the soil (C. Perrault).

RUST (Puccinia Helianthi). A severe infection was general on the leaves of sunflower at Morden, Man. (W.L.G.). At Winnipeg, the variety Sunrise was severely rusted. In a greenhouse test, Sunrise was attacked by the rust strain from Helianthus annuus, but not by the strain from H. Maximiliani (A.M. Brown).

WILT (Sclerotinia sclerotiorum). A few plants were killed in the plots at Lethbridge, Alta. (M.W.C.). It caused moderate damage as a stem rot in one planting at Morden, Man. (W.L. Gordon). About 10% of the plants were infected in a 5-acre field at Ste. Anne de la Pocatier, Que. (C. Perrault).

FOOT ROT (Verticillium sp.). About 10% of plants were reported toppling over in a plot at the Station, Kapuskasing, Ont., apparently because the lateral roots were largely rotted off. No wilting had been noticed perhaps because of the wet weather. According to Dr. J.W. Groves, the organism is distinct from either V. Dahliae or V. albo-atrum (D.B.O. Savile).

BORON DEFICIENCY was moderate in a plot of Mennonite, but only a trace was present in an adjacent plot of Sunrise at the Station, Fredericton, N.B. The symptoms in Mennonite corresponded to those described by Schuster and Stephenson and D.B.O. Savile (P.D.S. 27:37). Cracking of the stem and petioles was also noticed (D.J. MacLeod).

CULTIVATED GRASSES

AGROPYRON - Wheat Grass

Ergot (Claviceps purpurea). Affected heads of western rye grass (A. trachycaulum) were received from Meadow Lake, Sask. (H.W.M.). A trace was recorded in A. repens in Queens Co., P.E.I. (R.R. Hurst).

Powdery Mildew (Erysiphe graminis). A moderate infection occurred on A. repens at Lower South River, Antigonish Co., N.S. (J.F. Hockey).

Leaf Spot (Phyllachora graminis). A severe infection was found in a roadside stand of A. repens at Edmonton, Alta. (M.W. Cormack).

Stem Rust (Puccinia graminis) was very severe on A. repens, particularly on plants growing near barberries at the Botanical Garden, Montreal, Que. (J.E. Jacques).

Leaf Rust (Puccinia Clematidis) was moderate to severe on A. repens growing near fields of cereals at Truro and Lower South River, N.S. (J.F. Hockey).

AGROSTIS - Bent Grass

Ergot (Claviceps purpurea). An affected specimen of Creeping Bent (A. stolonifera) was received from Nappan, N.S. (J.F. Hockey).

BROMUS - Brome Grass

Rust (Puccinia Clematidis). A heavy infection was observed on B. carinatus grown for a cover crop in the Station orchard, Summerland, B.C. The rust was identified by Dr. G.H. Cummins (H.R. McLarty, I.L. Connors).

Leaf Blotch (Pyrenophora Bromi). A moderate infection was found in 3 fields of awnless brome grass (B. inermis) in Alta.; infection was also moderate to severe in several roadside stands at Edmonton (M.W.C.).

Scald (Rhynchosporium Secalis). A slight infection was present in the plots of B. inermis at Edmonton, Alta. (M.W. Cormack).

Leaf Spot (Selenophoma bromigena). Infection was moderate in a field of B. inermis at Strathmore, Alta. (M.W. Cormack).

CALAMAGROSTIS - Reed Grass

Ergot (Claviceps purpurea) in C. inexpansa caused abortion in cows on a farm located near Unity, Sask. (H.W.M.).

DACTYLIS GLOMERATA - Orchard Grass

Rust (Puccinia graminis). A 10% infection was found on wild D. glomerata in Queens Co., P.E.I. (R.R. Hurst).

FESTUCA

Leaf and Stem Spot (Phytomonas agropyri (O'Gara) Bergey et al.). A slight infection was found in the plots of Creeping Red Fescue at Olds, Alta., and a trace at Edmonton. Bacteria were very numerous in the diseased tissues and the isolates obtained were apparently P. agropyri (M.W. Cormack).

HOLCUS LANATUS

Twist (Dilophospora Alopecuri) was common on H. lanatus in some areas in N. Saanich Co., B.C. (W. Jones).

PHLEUM PRATENSE - Timothy

Leaf Spot (Heterosporium Phlei) was present in all 6 fields examined in Alta.; infection was a trace in 1, slight in 3 and moderate in 2. Infection was slight in the plots at Edmonton and Olds (M.W.C.).

Rust (Puccinia graminis var. Phlei-pratensis) was reported as follows: general in the Lower Mainland, B.C. in Aug. (W. Jones); infections on wild stands 10% at Montague, 25% on Wood Islands, 40% at Summerside, P.E.I., in Sept. (R.R. Hurst).

POA - Bluegrass

Rust (Puccinia Poae-sudeticae). Infection was slight to moderate on P. pratensis in the plots at Edmonton, Alta. (M.W. Cormack).

LAWNS

Snow Mould (low-temperature basidiomycete) mildly attacked a few lawns in Saskatoon, Sask., and on the University campus, mostly on the protected northern exposures. The trouble was inconspicuous compared with the 1943 attack. No Typhula sp. was observed on grasses in 1944 (T.C. Vanterpool).

Winter Injury destroyed a number of lawns (Agrostis stolonifera) of several years standing at Charlottetown, P.E.I., the injury was due to the formation of ice pockets during the early spring (R.R. Hurst).