

## II. DISEASES OF FORAGE AND FIBRE CROPS

### ALFALFA

**BLACK STEM** (Ascochyta imperfecta). Of 18 fields examined in Alta., a trace was found in 4 fields, slight infection in 4 and moderate in 3; leaf infection also was moderate in the 3 latter fields and was severe on several plants in the plots at Edmonton (M. W. Cormack). A specimen was received from White Fox, Sask., Ascochyta, believed to be A. imperfecta was present on the leaf stipules (R. C. Russell). A. imperfecta was fairly common on the leaves causing the basal ones to drop at Macdonald College, Que. (M.C. 580). This appears to be the first report for Que. (I. H. Crowell)

**ROOT ROT** (Cylindrocarpon Ehrenbergi, etc.) caused a trace to slight damage in 13 fields out of 20 examined in central and northern Alta. in May. Although root rot was associated with bacterial wilt in southern Alta., the former was believed to have been the cause of moderate damage in 5 fields in the Brooks district, and of severe injury in 1 at Magrath out of 200 examined in June. (M. W. Cormack)

Fusarium Scirpi var. acuminatum was associated with a root rot in the Selkirk area, Man. (W. L. Gordon)

**STAGONOSPORA LEAF SPOT** (Leptosphaeria pratensis (Stagonospora Meliloti)). A trace was found on alfalfa at Edmonton and Wetaskiwin, Alta. The symptoms were very similar to those commonly observed on sweet clover and the fungus was isolated from both collections. It has not been previously reported on alfalfa in Alta. (M. W. Cormack)

**DOWNY MILDEW** (Peronospora aestivalis) was a trace on Ladak and Grant and slight on Lytton at Agassiz, B.C. in June (W. Jones). A slight infection was found in one field near Millet, Alta. The disease has been rare in the experimental plots in Alta., since the extremely susceptible variety, Lytton, was discarded. (M. W. Cormack)

**BACTERIAL WILT** (Phytophthora insidiosa) was severe in all fields of Grimm alfalfa on the Experimental Station, Summerland, B.C. Old fields were dying out rapidly and one field sown in the spring was killed out completely in September. No disease was found in new stands of Ladak. Experiments were completed that established the identity of the pathogen. (G. E. Wooliams.)

A special survey made in early June showed that bacterial wilt is already widespread in the irrigated sections of southern Alta. The estimated mortality occurring this year in fields examined in four separate irrigation districts is given in Table 2.

Table 2. Estimated percentage of alfalfa plants dying from bacterial wilt in fields 3 years old and older in June, 1940.

Damage in 1940	Number of fields examined			
	Brooks	Vauxhall	Lethbridge	Glenwoodville
None	0	0	0	7
Trace	27	6	27	4
1-2%	19	1	11	2
5%	9	2	17	1
10%	8	3	4	0
15-30%	4	0	0	0
Total fields	67	12	59	14
Average damage	4%	4%	3%	1%

The least damage was found in the small irrigation district at Glenwoodville, where several 3- and 4-year-old stands were apparently uninfected and damage occurred only in older stands. In the other districts, plants were dying in all fields examined that were 3 years old or older. The early stages of infection were found in many fields less than 3 years old, particularly in the Brooks district. Here, most of the killing this year occurred in relatively young stands since most of the older stands, including those in which severe injury was found in 1939, have been ploughed up. In the Lethbridge district, however, the older stands predominate and the actual killing observed in 1940 was less than at Brooks. This would appear to indicate that the disease was introduced more recently or is progressing less rapidly at Lethbridge than at Brooks. Bacterial wilt was found for the first time at the Experimental Station, Lethbridge, but not more than a trace of plants in stands 5 or more years old were affected.

Bacterial wilt was not found in alfalfa growing on dry land, even in fields adjacent to those irrigated. (M. W. Cormack)

CROWN GALL (Phytoplasma tumefaciens). A few plants showing symptoms resembling crown gall were found in an irrigated plot of 2-year-old alfalfa at Lethbridge, Alta. Bacteria were abundant in the proliferated crown tissue and the type appearing most abundantly in the isolations closely resembled P. tumefaciens. (M. W. Cormack)

YELLOW LEAF BLOTCH (Pseudopeziza Jonesii). A slight infection was found in 4 fields out of 18 examined in early July in Alta. New growth became moderately infected in the plots at Edmonton in early June and again in September. (M. W. Cormack)

COMMON LEAF SPOT (Pseudopeziza Medicaginis) infection was slight in 3 fields, moderate in 2 and severe in 1 at Brooks in Alta.; it was general but usually slight in the plots at Edmonton and Lacombe. Severe defoliation occurred in registered fields across northern Sask. The lower leaves were heavily infected in June at Macdonald College, Que., although the spring was dry. The disease was also recorded in B.C., Man., and P.E.I.

LEAF SPOT (Stemphylium botryosum) was more prevalent than that caused by Pseudopeziza Medicaginis in several fields about Agassiz, B.C. It was also found at Milner. Spots numerous, circular to elongate, up to 2.5 mm. long by 1.0 mm. broad, light brown, papery with purplish margins (W. Jones). It is suspected that this disease is the same as the brown leaf spot described by L. R. Tehon and E. Daniels, *Phytopathology* 15:714-19. 1925, but as S. P. Wiltshire (*Trans. Brit. Myc. Soc.* 21:224-228. 1938) has shown, they incorrectly determined the pathogen on alfalfa. According to the recent work of Oliver F. Smith (*Jour. Agr. Res.* 16:831-840) the pathogen is Stemphylium botryosum. (I. L. Connors)

WITCHES' BROOM (virus?). About 1% of the plants were moderately to severely affected and many others were beginning to show the symptoms in a plot at Edmonton, Alta. (M. W. Cormack)

YELLOWS (boron deficiency) was quite general and damage was thought to be considerable in Queens Co., P.E.I.

YELLOWS (non-parasitic) was slight to moderate in 3 irrigated fields in southern Alta.; the cause is unknown. (M. W. Cormack)

WHITE SPOT (non-parasitic). Moderate spotting of the leaves was found in 2 irrigated fields in southern Alta. (M. W. Cormack). A single plant was seen at Macdonald College, Que. (I. H. Crowell)

WINTER INJURY. Alfalfa and clover were almost completely destroyed along the north shore of P.E.I. by the winter weather. (R. R. Hurst)

#### COMMON CLOVER

CERCOSPORA LEAF SPOT (C. zebrina) was common on alsike clover at Macdonald College, Que., on June 17.

SOOTY BLOTCH (Cymadothea Trifolii) was reported as follows: Infection general on red clover on Vancouver Island and in the Fraser Valley, B.C.; abundant infection on red clover at Lennoxville, Que., in some fields almost every leaf being affected, yet the plants apparently were not appreciably injured (D. B. O. Savile); general and very abundant on red clover in the oat growing region of Que., especially on plants in fields of cereals, but less common on those in ditches, roadsides and pastures. (I. H. Crowell)

POWDERY MILDEW (Erysiphe graminis) was general but infection variable in the Okanagan Valley, B.C. Infection was slight in 2 fields west of Edmonton, Alta., and moderate in the plots at Olds. Up to 100% of the leaf surface was covered at Macdonald College, Que., but infection variable.

ANTHRACNOSE (Kabatiella caulivora). A severe infection was found on red clover in a field near Fallis, Alta. (A. W. Henry)

STAGONOSPORA LEAF SPOT (Leptosphaeria pratensis (Stagonospora Meliloti)). A slight to moderate infection was found on alsike clover at 2 locations near Edmonton, Alta. (M. W. Cormack)

COMMON LEAF SPOT (Pseudopeziza Trifolii) was rare on red clover at Macdonald College, Que. on May 31, and moderate at Yarmouth, N.S. on Sept. 7.

SCLEROTINIA ROT (S. Trifoliorum). A small number of red clover plants were affected on June 5, at Macdonald College, Que.; sclerotia were abundant in 1938, and several were found by this date in 1940, but intensive research failed to reveal any in 1939. (I. H. Crowell)

STEMPHYLIUM LEAF SPOT (S. sarcinaeforme). A few infected leaves were found at Macdonald College, Que., on June 17. (I. H. Crowell)

RUST (Uromyces Trifolii) was slight on red clover at Agassiz, B.C. and moderate at Lennoxville, Que.; it was also collected on white clover at Berwick, N.S.

MOSAIC (Pisum virus 2). Three affected plants of alsike clover were noted in York Co., N.B. (D. J. MacLeod)

YELLOW (virus). A moderate outbreak was observed on white clover in one field in Queens Co., P.E.I.

GENETIC CHIMERA. Several specimens of red and alsike clover were seen at Macdonald College, Que., where a whole leaf, one side or sectors of the leaf were almost white, while the other parts or leaves were the normal green; usually several or all leaves on a plant were affected, but in varying degrees. (I. H. Crowell)

#### SWEET CLOVER

STEM CANKER (Ascochyta caulicola) was slight in 3 fields and moderate in 1, out of 19 examined in Alta. (M. W. Cormack)

BLACK STEM (Ascochyta lethalis). A moderate infection was observed in 2 fields in Alta., and, late in the season, in the plots at

Lacombe. Single spore isolates obtained from this material were distinct from those obtained from stem canker. (M. W. Cormack)

ROOT ROT (Fusarium spp., etc.). The damage from root rot was about 5% in 2 fields near Lethbridge, Alta., in May. Moderate infection was also found in some of the check plots at Edmonton and Fallis. Moderate root rot damage was caused by Fusarium culmorum in a plot at Lacombe in August. (M. W. Cormack)

STAGONOSPORA LEAF SPOT and STEM BLIGHT (Leptosphaeria pratensis (Stagonospora Meliloti)). Leaf spot was a trace in 7 fields and slight in 8 others in Alta. as well as in the plots at Lacombe and Lethbridge. Stem blight was slight to moderate in 4 fields. Mature perithecia of the perfect stage, Leptosphaeria pratensis, were found for the first time in Alta., when they were collected on overwintered stems in the southern part of the province. (M. W. Cormack)

PHYTOPHTHORA ROOT ROT (P. Cactorum), which was first reported from Alta. last year (Phytopath. 30:700-701. 1940 and P.D.S. 19:27-28) appears to be generally distributed in the southern part of the province. The damage was estimated to be a trace to slight in 8 fields, 5% in 2, and 10% in 1 out of 17 examined; a moderate infection was also found at Fallis, west of Edmonton. (M. W. Cormack)

WITCHES' BROOM (virus?). One plant was found severely affected in the plots at Edmonton, Alta. (M. W. Cormack)

MOSAIC (virus). A single plant was seen in a plot at the University, Saskatoon, Sask. Leaves were mottled and distorted; the plant was dwarfed, and much branched.

#### LUPIN

ROOT ROT (Pythium sp.). About 10% of the plants were killed in a plot of sweet blue lupin (Lupinus angustifolius) at Edmonton, Alta., in August. Yellow lupin (L. luteus) in an adjacent plot was unaffected. A species of Pythium resembling P. de Baryanum was isolated and pathogenic to the blue lupin in field inoculation tests. Pathogenicity tests have not yet been made on the yellow lupin.

A similar root rot caused by Pythium spp. in Germany was also reported as most severe on blue lupin (Schulz, H. Phytopath. Zeitschr. 12:351-359. 1939) (M. W. Cormack)

#### BUCKWHEAT

A smut (Ustilago utriculosa) affected plants of Polygonum sp. (most probably P. lapathifolium according to H. Groh) in a field of buckwheat at Danville, Que. When the buckwheat was threshed it "caused a black cloud to come from the thresher". (I. L. Connors)

YELLOW (virus). A trace of yellows was found in Queens Co., P.E.I. This is the first record from P.E.I. (R. R. Hurst)

#### CORN

STALK and EAR ROTS (Fusarium moniliforme, etc.). Seed corn suffered severe damage from ear rots in the seed corn belt in southwestern Ontario. Open pollinated strains in general were more severely damaged than hybrid varieties. In one 55-acre field near Forest, infection was about 90%. The fungi responsible were Nigrospora sphaerica, Fusarium moniliforme, F. graminearum, and Diplodia Zeae. (L. W. Koch)

RUST (Puccinia Sorghi). A trace was observed in one field in Queens Co., P.E.I.

WILT (Pythium arrhenomanes). Several fields of corn were affected in the Red River Valley, Man. The disease occurred in patches. The casual organism was identified by T. C. Vanterpool. (J. E. Machacek)

SMUT (Ustilago Zeae) was reported as follows: Light infection at Melville and Saskatoon, Sask.; slight infection at L'Assomption, Que.; one specimen from Queens Co., P.E.I.

#### FLAX

WILT (Fusarium spp.) was reported from Osborne (F. oxysporum forma associated) and Petersfield, Man. (F. Scirpi var. acuminatum and Helminthosporium sativum) (W. L. Gordon). A slight infection was reported in one field at Ste. Anne de la Pocatiere, Que. (L. J. S. Laporte)

RUST (Melampsora Lini). Infection was severe in the plots at Lethbridge, Alta., and in several fields in the irrigated districts. Infection was a trace to moderate in the varieties at Olds and Lacombe and slight in a field at Camrose. Rust was conspicuous in the University plots, Saskatoon, Sask. Infection was slight on Bison, trace to slight on Redwing and a trace on Royal. It was also common on the wild flax, Linum Lewisii (T. C. Vanterpool). A moderate infection on Royal was seen at Lacross and rusted samples were received from Saskatoon and Elrose districts. Rust infection varied from a trace (usually) to 30% in 11 affected fields in Man.

BROWNING (Polyspora Lini). A severe infection was found in the plots at Fallis, Alta., on July 12 (A. W. Henry). It affected 1% of the Bison plants in the University plots, Saskatoon, Sask. The chief symptom was a stem break about 1½ inches above the ground level (T. C. Vanterpool). It caused slight damage in a plot of Royal and one of fibre flax and a trace in 2 others of fibre flax at Scott. A trace was present on Bison

and Royal, but not on Redwing in field blocks of foundation stock at Saskatoon.

SEEDLING BLIGHT. Rhizoctonia Solani and Fusarium Scirpi var. acuminatum were associated with a seedling blight of flax at Brandon, Man. In isolations, the former organism was the more prevalent. (W. L. Gordon)

PASMO DISEASE (Septoria linicola). A trace was present on 60% of the plants at Brandon, Man.

HEAT CANCKER (non-parasitic) caused slight injury at Cromer, Man.

#### FOXTAIL MILLET

SMUT (Ustilago Crameri Körn) was found in a seed sample of foxtail millet from Carnduff, Sask. Smut balls, which were noted in the sample by P. M. Simmonds, were composed of the ovaries, more or less completely destroyed by the smut. This is the first collection of the smut in Saskatchewan, although it is present in a seed sample of foxtail millet deposited in the herbarium from Delta, Ont., grown in 1935. Three other samples from Saskatchewan and found to be smutty were seed of broom-corn millet. In one from Howard, Sask., fragments of the smut boil of Sphacelotheca Panici-milacei (Pers.) Bubak (Sorosporium Panici-milacei Takah.) were present. This latter smut is not uncommon and is known from every province except N.S. Mr. A. W. Wright, Seed Inspection Division, Ottawa, kindly determined the seed samples. (I. L. Connors)

#### MANGEL

SCAB (Actinomyces scabies) caused slight damage in a small plot at Fredericton, N.B. (D. J. MacLeod)

LEAF SPOT (Cercospora beticola) was general and caused moderate damage at Agassiz, B.C. (W. Jones). A scattered infection was found in a crop being grown for stecklings at Armstrong, B.C.; the damage was negligible (R. E. Fitzpatrick). A heavy infection occurred at Standbridge East, Que., while light infections were observed elsewhere (E. Lavallee). In one field in Western Ontario, over 90% of the plants showed marked injury (J. E. Howitt). The disease was reported as heavy in a field in Prince Co., P.E.I. (R. R. Hurst)

MOSAIC (Beta virus 2). Two plants showing mosaic were found on a farm in York Co., N.B.; the mottle was very marked and the plants were dwarfed. (D. J. MacLeod)

FERN LEAF (virus). One affected plant was found in a plot at Fredericton, N.B. (D. J. MacLeod)

CRINKLE (virus). A trace of the crinkle disease described last year (P.D.S. 19:31) was found at the Station, Fredericton, N.B.; the vector was not established. (D. J. MacLeod)

ROOT ROT (cause undetermined). Roots planted for seed were moderately damaged by decay at Milner and Ladner, B.C. (W. Newton). A decay of the fibrous roots was general in a field at the Experimental Farm, Agassiz, and caused severe damage.

#### SORGHUM

SMUT (Sphaceolotheca Sorghi) was very common and destructive on amber sugar cane and broom corn at Macdonald College, Que.

#### SOY BEAN

LEAF SPOT (Phyllosticta ?phaseolina Sacc.) affected a few leaves at the Farm, Agassiz, B.C. Spots circular, except along veins, 2-25 mm. in diam., light brown with darker brown margin; pycnidia few, dark brown, in central part of spot; spores biguttulate, hyaline, 7.0x1.8-2.0 u. (W. Jones)

BACTERIAL BLIGHT (Phytomonas glycinea) was general, but the infection was slight at Winnipeg, Man. It moderately infected Mandarin Brown, but very little was present on the other varieties at Lennoxville, Que. It is unknown whether this was due to differences in varietal susceptibility or to the use of infected Mandarin seed, and the rain was insufficient to cause extensive spread to other varieties. (D. B. O. Savile)

MOSAIC (virus). A trace was found at Winnipeg, Man.

#### SUGAR BEET

SCAB (Actinomyces scabies) caused slight damage to a small plot at Fredericton, N.B. (D. J. MacLeod)

LEAF SPOT (Cercospora beticola). All sugar beet fields were infected in Kent Co., Ont., but the damage varied widely. (L. W. Koch)

LEAF SPOT (Phoma Betae). A slight infection was present at the Station, Sidney, B.C.

LEAF SPOT (Ramularia beticola Fautry & Lambotte) was found for the first time in Canada in a field of *Cercospora* resistant beets, when it was collected by Dr. Irene Mounce at the Station, Sidney, B.C. The leaf spot was fairly abundant. This disease has been observed in the United

States, although it has never been reported according to Dr. John A. Stevenson, Washington, D.C. The spots were generally larger than those caused by *Cercospora* and the white conidiophores and conidia cause them also to be lighter in colour. The disease appears to be of minor importance, although it occasionally causes some damage in Denmark. A brief account with a good illustration is given by A. Wenzel (*Phytopath. Zeitschr.* 3:519-532. 1931). In these two countries the pathogen has been called *R. Betae* Rostrup, but since the two names appear to be synonymous, the older one, *R. beticola*, has been adopted here. (I. L. Connors)

LEAF SPOT (*Septoria Betae* West.). A *Septoria* found on rather faded leaves in two plots of about an acre each at the Station, Sidney, B.C., was referred to this species, but the symptoms do not suggest a very active parasite. This is the first report of its occurrence in Canada. (I. L. Connors)

RUST (*Uromyces Betae*) was general in January on the foliage of beets grown for seed at the Station, Sidney, B.C., but it was considerably checked during the dry summer. In October it was again general and the leaves were being severely damaged. It would appear from experiments made by Dr. Margaret Newton at Winnipeg, that the beet rust requires a fairly low temperature for urediniospore germination. (W. Jones)

#### SUNFLOWER

RUST (*Puccinia Helianthi*). A moderate infection occurred on the lower leaves at the University, Saskatoon, Sask. in July, and was severe on some varieties in late August. Rust infection was severe at Winnipeg and moderate at Brandon and Morden, Man.

WILT (*Sclerotinia sclerotiorum*). Infected plants were found at Edmonton, Alta. and at Morden, Man.

#### CULTIVATED GRASSES

AWNLESS BROME GRASS (*Bromus inermis*)

Ergot (*Claviceps purpurea*). A trace was found in one field out of 7 examined in Alta. A severe infection was found on a volunteer stand near Edmonton.

Anthraxnose (*Colletotrichum graminicola*) was found to be common at Macdonald College, Que. (I. H. Crowell)

Leaf Blotch (*Helminthosporium Bromi*) was slight in one field and moderate in 3 in Alta.; a severe roadside infection was found near Edmonton.

Halo Blight (*Phytonomas coronafaciens* (C. Elliott) Bergey *et al* var. *atropurpurea* (Reddy & Godkin) Magrou) had almost killed out a brome and timothy pasture at Morris, Man., when it was found on June 6. The remaining plants were severely discoloured, purple or black. An oat field adjacent to the pasture was severely infected throughout and a four foot

strip, next to the pasture was killed. The remaining seedlings were heavily attacked by a bacterial disease. The organism isolated from the brome grass was pathogenic to oats as well as the brome, but cultures from the oats were not pathogenic to brome grass although they were to oats. The disease in oat fields was thus due to a mixed infection of which only one pathogen was recovered or else was caused by an organism distinct from that on the brome grass. The killed strip suggested that some of the disease in the oat field was due to the pathogen on the brome grass. (W. A. F. Hagborg) This is the first report of halo blight on brome grass in Man. What may be the same disease has been reported from Alta. (P.D.S. 11:30)

Scald (Rhynchosporium Secalis). A slight infection was found in one field in Alta.

Leaf Spot (Selenophoma bromigena (Sacc.) Sprague & Johnson) was slight in 2 fields and moderate in 2 others in Alta. R. Sprague and A. G. Johnson recently transferred Septoria bromigena Sacc. to the above genus (Mycologia 32:415. 1940).

#### KENTUCKY BLUE GRASS (Poa pratensis)

Anthraxnose (Colletotrichum graminicola) was common as a leaf spot at Macdonald College, Que. (M.C. 572). (I. H. Crowell)

Smut (Ustilago striaeformis) was collected at Macdonald College, Que. (M.C. 610). (I. H. Crowell)

#### MEADOW FESCUE (Festuca pratensis)

Rust (Puccinia ?Poae-sudicatae) was severe on O1231, but no rust was seen on O1826 and O15 in the plots at Agassiz, B.C. (W. Jones)

#### ORCHARD GRASS (Dactylis glomerata)

Purple Leaf Spot (Mastigosporium rubricosum) was widely distributed on Vancouver Island and the Lower Mainland, B.C.; the damage was moderate. (W. Jones)

Brown Stripe (Scolecotrichum graminis) was general, but the damage was slight on Vancouver Island and the Lower Mainland, B.C.

#### PERENNIAL RYE GRASS (Lolium perenne)

Eye Spot (Ovularia Lolii) was general, but the damage was slight on Vancouver Island and in the Fraser Valley, B.C.

#### RED TOP (Agrostis alba)

Choke (Epichloe typhina) was abundant on a small patch of grass at Macdonald College, Que. (M.C. 611). (I. H. Crowell)

Shoot Blight (Fusarium Avenae) attacked individual clones in the test plots at Macdonald College, Que. in July. The culms were attacked about 16" from the ground causing the death of the distal portion. (I. H. Crowell)

Brown Stripe (Scoletotrichum graminis) was common in shaded places at Macdonald College, Que. (M.C. 601). (I. H. Crowell)

TIMOTHY (Phleum pratense)

Leaf Spot (Heterosporium Phlei) was severe on strain 0710 and a trace to moderate infection was present at Agassiz, B.C.; it was general on the Lower Mainland. Infection was moderate to severe in a plot at Edmonton and in a field at Flatbush, Alta. This leaf spot was quite abundant even on May 17 at Macdonald College, Que. A trace to heavy infection developed on several selections in the rust nursery at Charlottetown, P.E.I.

Stem Rust (Puccinia graminis var. phlei-pratensis) was severe on 01502 and slight to moderate on the other strains at Agassiz, B.C. It was reported as severe at Beaverlodge, Alta., and slight infection was observed in a field near Edmonton. Stem rust is abundant in Que. and it is obviously very destructive for it kills the stems when prevalent. (I. H. Crowell) It was very common on patches of the wild grass in P.E.I. and it was also present in the Nursery at Charlottetown.

Brown Stripe (Scoletotrichum graminis). A slight infection occurred at Agassiz, B.C.

Smut (Ustilago striaeformis) was found on a few plants in a pasture at Macdonald College, Que.

WESTERN RYE GRASS (Agropyron tenerum)

Ergot (Claviceps purpurea). A trace was found at Fort White, Man.

Smut (Ustilago bromivora). A moderate infection was observed at Strathmore, Alta., and in the plots at the University, Saskatoon, Sask.

## GOLF GREENS

Dollar Spot (Rhizoctonia sp.) badly disfigured golf greens at several of the leading golf courses in Ont. in the summer season. It did not respond to the ordinary mercuric chloride treatment and became worse as the season advanced, so that some of the greens appeared ruined in the late fall. (J. E. Howitt)

## MICHELS' HYBRID GRASS

Ergot (Claviceps purpurea). A slight infection was observed at Armstrong, B.C. (G. E. Woolliams)