II. DISEASES OF FORAGE AND FIBRE CROPS

ALFALFA

BLACK STEM (Ascochyta imperfecta). Sl. infection in the rod rows at Saanichton, B. C. (W. Jones). Infection was 7-tr. 22-sl. 24-mod. 3-sev./71 fields examined in the Peace River area, Alta. (J. B. Lebeau). The disease was general throughout the irrigated areas of s. Alta. Infection was sl.-sev. in June and July following a wet, cool spring. Its unusual prevalence caused considerable anxiety to alfalfa seed growers in the Brooks district, but no sev. damage was reported. After the weather became warm and dry there was a marked decrease in the infection of the second growth (E. J. Hawn). Infection was 8-sl. 15-mod. 19-sev. in the 42 fields examined in Sask. Black stem killed much of the first growth made during July and August, giving to many fields a brown cast, which was gradually replaced by the green of the second growth. Although conditions looked favourable in early July, seed set was poor. For the second year the weather has been cool and moist, favourable for the development of the disease and poor for burning the stubble. In consequence, there has been a build-up of inoculum on fallen leaves and stubble (H. W. Mead).

Black stem was present in all parts of Man., and was particularly noticeable in the northern seed-growing area. Infection was mod.-sev. on the leaves and stems. It was also present on pedicels and pods, and in one field severe lesioning appeared to reduce seed set markedly. The severity of the disease was sharply reduced in fields that had been burned in the spring (W. C. McDonald).

WINTER CROWN ROT (low-temperature basidiomycete). Damage was slight in the plots at Lethbridge, Alta., and it was suspected to have caused injury to one field observed near Pincher Creek late in the season (M. W. Cormack, E. J. Hawn). At Saskatoon and in n. Sask. 14 fields showed scattered light infection, 4 mod. and 2 sev. In the latter fields over 40% of the stand was destroyed, the affected plants being in irregular patches (H. W. Mead). The pathogen was isolated by M. W. Cormack from diseased material collected from a field near Durban, Man. Typical symptoms of the disease were observed in other fields in the area, and its prevalence in Man. will be investigated in the spring of 1952 (W. C. McDonald).

ANTHRACNOSE (Colletotrichum destructivum) caused sl. infections on Grimm at two places in Kamouraska Co., Que. The casual organism was again isolated from girdled stems. Leaves on affected plants were reddish from an accumulation of carbohydrates. The pathogenicity of the organism has not been tested (R. O. Lachance).

BACTERIAL WILT (Corynebacterium insidiosum). Diseased plants were received for examination from Salmon Arm, B. C. (G. E. Woolliams). Examination of plants taken from 23 fields in s. Alta. showed the average percentage of infected plants to be 33.7 in stands seeded in 1948, 23.6 in stands sown in 1949, and 4.0 in those seeded in 1950 (E. J. Hawn). Wilt infection was 1-tr. 1-sl. 1-mod./71 fields examined in the Peace River District (J. B. Lebeau).

In one field, 7-8 years old, in the Kenville area, Man., plants were severely affected. In other fields infection was nil-tr. (W. C. McDonald). Several specimens of alfalfa from the Guelph area, Ont., were submitted for examination and the pathogen successfully isolated. Infection was mod.-sev. in limited areas in the fields (E. H. Garrard). Bacterial wilt was rather severe in one field at Ste. Anne de la Pocatiere, Que. In Nicolet Co. and elsewhere in Kamouraska Co. only traces were found in an occasional field. As alfalfa is usually grown in mixed stands with grasses for hay, and very frequently under pasture, diagnosis of disease is often very difficult. No wilt was observed in the St. Jean and St. Hyacinthe districts (R. O. Lachance).

ROOT ROT(various organisms) was observed on plants sent from Falkland, B. C., for diagnosis. The District Agriculturalist stated that most of the plants in the field were stunted with islands of normal plants. Moisture supply was considered adequate for normal growth (G. E. Woolliams). Infection was 2-tr. 3-sl./71 fields examined in the Peace River District and 4-tr. 7-sl/12 fields in the Sangudo area, Alta. (J. B. Lebeau). Root rot (Cylindrocarpon ehrenbergi) was found associated with winter crown rot in 2 fields in Sask.; damage was tr. (H. W. M.).

A detailed survey of root and crown rotting fungi presently being made in Man. has resulted in the frequent isolation of Rhizoctonia solani, Cylindrocarpon ehrenbergi, Fusarium acuminatum and F. avenaceum (W. C. McDonald).

STEM NEMATODE (Ditylenchus dipsaci) was found in the Lethbridge, Raymond, Glenwood, Turin, and Brooks districts in s. Alta. and the infestation was 5-tr. 5-sl. 1-mod. in the 31 fields examined. There was no evidence of increase in the incidence of the disease in fields or plots where infested plants were found in 1950 (E. J. Hawn). Nematodes were found on the crowns of 2 plants in the Laboratory nursery, Edmonton. The plants are hybrid selections from the Forage Crops Laboratory, Saskatoon, Sask. The nematode, however, has not yet been observed at Saskatoon (G. B. Sanford).

LEAF SPOT (Leptosphaeria pratensis (Stagonospora meliloti). Tr. infection in 2 fields near Falher, Alta. (J. B. Lebeau). Light infection in 4 fields in the White Fox - Hudson's Bay area, Sask. (H. W. M.). Tr. infections in scattered areas of Man. (W. C. McDonald).

DOWNY MILDEW (Peronospora aestivalis). Infection was sl.-mod. in the plots at Lethbridge, Alta., tr.-sl. in fields in the Brooks area in July (E. J. Hawn) and sl. infection in 2 fields in central and n. Alta. (J. B. Lebeau). A single field, heavily infected, was found in the Swan River area, Man. (W. C. McDonald). Downy mildew caused sl. damage to a field of Grimm near Kingston, Ont., and in a field of the C. E. F., Ottawa; affected leaves died and considerable twisting of stems was observed (W. R. Childers, F. S. Nowasad). Infection was severe in single fields at St. Gregoire, Nicolet Co., and St. Pascal, Kamouraska Co., Que. Only a trace was seen at Ste. Anne de la Pocatiere (R. O. Lachance).

YELLOW LEAF BLOTCH (Pseudopeziza jonesii). Infection was: Tr. in the varietal nursery at Lethbridge, Alta. (E. J. Hawn); 3-sl. 4-mod. 3-sev./71 fields examined in the Peace River District (J. B. Lebeau); 8-sl. 2-mod./42 fields in Sask., often mixed with common leaf spot (H. W. M.); and 7-sl. 2-sev./44 fields in Que. (R. O. Lachance).

COMMON LEAF SPOT (Pseudopeziza medicaginis) was general on several varieties at the Exp. Farm, Agassiz and on Rhizoma in the Univ. plots, Vancouver, B. C. (H. N. W. Toms). Infection was tr. in the varietal nursery at Lethbridge, Alta. (E. J. Hawn) and 18-tr. 27-sl. 12-mod./71 fields examined in the Peace River area (J. B. Lebeau). Infection was estimated as 4-sl. 8-mod. 3-sev./42 fields in Sask.; defoliation was light even where infection was heaviest (H. W. Mead). The disease appeared to be less prevalent than in other years in Man.; no sev. infections were observed (W. C. McDonald). Common leaf spot can be found in almost every stand of alfalfa in Que., infection being tr.-mod. Infection is usually severe when the cutting of the crop is unduly delayed (R. O. Lachance). A mod. infection was reported in a field in Colchester Co., N. S., in June and a trace in one in Cape Breton in August. (C. O. Gourley). In the first field, M. lupulina was also infected (D. W. Creelman). A trace was found in a field in Queens Co., P. E. I. (R. R. Hurst).

CROWN BUD ROT (Rhizoctonia solani, etc.), apparently caused by Rhizoctonia solani, Fusarium spp., and possibly other fungi, was again prevalent in alfalfa stands in s. Alta. Detailed survey data show the average percentage of infected plants to be as follows: 100% in fields sown in 1947 and 1948, 93.6% in stands sown in 1949, and 50.7% in those sown in 1950. There is thus a large positive correlation between age of stand and severity of the disease. First reported in 1950 under Crown Rot (P. D. S. 30:29) (E. J. Hawn).

WILT (Sclerotinia trifoliorum). A few plants were found wilting and sclerotia present in a field at St. Damien, Bellechasse Co., Que. (R. O. Lachance).

ROOT GALLS(?virus). Numerous galls were found on roots of alfalfa plants in one hybrid line from Saskatoon, planted in the Laboratory nursery at Edmonton, Alta. Examination failed to reveal any nemotodes present. It is suggested that the galls are of virus origin comparable to those on sweet clover described by L. M. Black (Am. Jour. Bot. 38:256-267. 1951) (G. B. Sanford).

WITCHES' BROOM (Virus). Trace infection observed in 2 fields in the Falher district, Alta. (J. B. Lebeau).

In 1946 J. D. Menzies (Phytopathology 36:762-774. 1946) reported the successful transmission of witches' broom of alfalfa from plant to plant by a leaf hopper identified as Platymoideus acutus Say and by grafting to Medicago lupulina and M. hispida. In a recent paper, E. C. Klostermeyer and J. D. Menzies (Phytopathology 41:456-458. 1951) report the successful transmission of the virus to 15 species in the Leguminosae, including Melilotus albus, Trifolium pratense, and T. repens (White and Ladino clover). The insect nector is now identified as Scaphytopius (Cloanthanus) dubius (Van Duzec) (I. L. C.). This leafhopper is very close to S. acutus (Say), and until recently was considered to be a variety of that species.

It replaces acutus west of the Rocky Mountains from California to B. C. It is found on a large number of host plants. Specimens have been seen from the Soda Creek - Quesnel region of B. C. ; they were collected in connection with studies on witches' broom of potato, which occurs in the area. S. dubius and S. acutus are highly variable species and it has been suggested that one or both may consist of several races with different food plants but morphologically indistinguishable. So far, this seems to be only a theory, unsupported by experimental evidence (Bryan P. Beirne).

YELLOWS (boron deficiency) was general especially in the n. Okanagan Valley and around Salmon Arm, B. C. (G. E. Woolliams). Yellows was quite common on light sandy soils in Que., whereas it was seldom observed on heavy clay or silt. Damage was sl. -mod. in 19 out of 44 fields examined; all samples were checked microscopically (R. O. Lachance).

WINTER KILLING. Damage was 4-tr. 18-sl. 13-mod. 3-sev. /71 fields examined in the Peace River District, Alta. ; damage was sl. in 3 fields in the Sangudo district (J. B. Lebeau). Winter injury was observed in 6-42 fields examined in Sask. causing sl. damage. Injury was less severe than in previous years, possibly because soil moisture conditions were good in the fall of 1950 (H. W. Mead). Winter killing was sl. -sev. in Que. Plants located in low spots in the various fields were all destroyed, whereas grasses such as timothy overwintered quite well. Heavy rains fell in December and January (R. O. Lachance).

COMMON CLOVER

WINTER CROWN ROT (low-temperature basidiomycete) caused sl. damage in 2 Sask. stands sown in 1949, but some winter injury was also present (H. W. Mead).

SOOTY BLOTCH (Cymadothea trifolii) was general on alsike clover in fields about Kentville, N. S., causing some yellowing and drying of the leaves; the disease was also recorded on red clover at the station (D. W. Creelman). The fungus was collected on the native species, Trifolium fimbriatum, at Long Beach, B. C. (W. Newton).

POWDERY MILDEW (Erysiphe polygoni) was quite general on Dollard red clover, a recent introduction from Macdonald College at Grand Forks, B. C. Some 35-50% of plants were severely affected, whereas the others were free of infection although intermixed with diseased ones (G. E. Woolliams). Tr. infection on red clover in one field in Queens Co., P. E. I. (R. R. Hurst).

ANTHRACNOSE (Kabatiella caulivora). Infection was 5-tr. /9 fields examined in the Peace River District, Alta. (J. B. Lebeau). Heavily infected fields showing severe damage were found at Lansdowne, Digby Co., and at the Kentville Station, N. S. ; infection estimated to be 50-75% (K. A. Harrison, D. W. Creelman).

LEAF SPOT (Pseudopeziza trifolii). Tr. infection was observed in a field at Dawson Creek, B. C. (J. B. Lebeau). A 5% infection was recorded in red clover at Kentville, N. S. (D. W. Creelman).

LEAF SPOT (Stagonospora recedens) caused a tr. infection in a field at Falher, Alta. (J. B. Lebeau).

RUST (Uromyces fallens). A tr. was recorded in a field in Queens Co., P. E. I. (R. R. Hurst).

MOSAIC (Trifolium virus 1). A tr. to 3% mosaic was found in 6 fields of red clover in 4 counties of N. B. (D. J. MacLeod).

YELLOWS (?virus) affected tr. -1% of the red clover plants in 2 fields in York, and one each in Sunbury and Carleton Counties, N. B. (D. J. MacLeod).

WITCHES' BROOM (?virus). A tr. of witches' broom was found in 3 red clover fields in York and Carleton Counties, N. B. (D. J. MacLeod).

FLORAL ABNORMALITY. A striking abnormality in alsike clover, in which the inflorescence is proliferated into a mass of minute, pale green or whitish bracts, is received at Ottawa from time to time for examination. A virus infection is commonly suspected, but since such plants usually occur singly in the fields, this cause is doubted. There are 2 specimens from Ont. and 3 from Que. in the Phanerogamic Herbarium. The earliest is dated 1902 and so was collected long before the use of DDT and 2,4-D, which might also be suspected except for the sporadic occurence of the plants. The most recent specimen to hand was received from near Beaverlodge, Alta. W. E. Sackston has observed a similar condition in an alfalfa plant from a field at Gilbert Plains, Man. Observations on the occurrence, nature, and persistence of the condition would be of interest (W. G. Dore). The abnormality was observed in Que. in Ladino clover in 1949 (P. D. S. 29:24) and again in 1950 and 1951. It has also been observed in alsike clover (R. O. Lachance).

WINTER KILLING (low temperature) was severe in a large plot of hybrid lines at Melfort, Sask. (H. W. M.).

SWEET CLOVER

BLACK STEM (Ascochyta meliloti) was common in the plots at Saskatoon and Melfort, Sask.; it also caused mod. damage in 10 fields in n. e. Sask. out of 15 examined (H. W. M.). The disease was very prevalent on plants of yellow sweet clover both along the roadsides and under cultivation, particularly as the stems matured, in Essex Co., Ont. Some 5-20% of stems were infected (W. G. Benedict).

LEAF SPOT (Cercospora davisii) was found affecting Melilotus albus in Malden Twp., Essex Co., Ont., 19 July (W. G. Benedict, D. B. O. Savile).

LEAF SPOT (Leptosphaeria pratensis (Stagonospora meliloti) was common on sweet clover throughout s. central and s. w. Ont., in the 30 counties visited (W. G. Benedict).

DOWNY MILDEW (Peronospora meliloti). A light, well scattered infection was observed on sweet clover at Spalding, Sask. The crop on Mn-deficient soil, but the plants showed no symptoms that might be attributed to the deficiency (T. C. Vanterpool).

ROOT ROT (Phytophthora cactorum) caused sl. -mod. damage to growth in a plot in a 4-year rotation of wheat sown down to sweet clover, sweet clover, sugar beets, and sugar beets. Although the rotation was laid down in 1929, no damage has been observed previously in the sweet clover (M. W. Cormack, E. J. Hawn). Root rot was found affecting 1% of the plants of yellow sweet clover in a field in Essex Co., Ont. Severe sweet clover failure was not in evidence this year although the fungus, which is thought to be associated with a soft rot of corn roots and sweet clover crowns, was isolated in the spring (W. G. Benedict).

LEAF SPOT (Pseudopeziza medicaginis) affected 6% of leaves in a collection made at Maidstone, Essex Co., Ont., on white sweet clover (W. G. Benedict).

MOSAIC (virus) was common on sweet clover wherever it was growing in the Okanagan Valley, B. C. (G. E. Woolliams).

VETCH

ANTHRACNOSE (Colletotrichum viciae Dearn. & Overh.). A heavy infection occurred in a field sown down to hairy vetch in a forage crop experiment at Kentville, N. S. Both the leaves and stems were affected, resulting in yellowing and defoliation of the lower leaves. Stems were brown, shrunken and dried out and thus of very little value as feed, (KP1789) (D. W. Creelman). This pathogen has not been previously reported in Canada (I. L. C.).

BUCKWHEAT

YELLOWS (Callistephus virus 1) affected 2-31% of the plants of tartarian buckwheat in 8 fields examined in central N. B.; a trace was also present on Silver Hull in a field in York Co. (D. J. MacLeod).

CORN

EAR ROTS (Diplodia zeae, Fusarium graminearum and F. moniliforme). Ear rots caused by each of these pathogens occurred in trace amounts on all varieties throughout Ont. in 1951 (W. E. McKeen).

LEAF SPOT (Helminthosporum turcicum) occurred on several commercial hybrids, the centre of infection being in Kent Co., Ont. Infection was severe in some fields and killed all the plants in a few by 1 Sept. This is the first time that the disease has occurred in epidemic proportions in Ont. (W. E. McKeen).

BACTERIAL LEAF SPOT (Pseudomonas syringae). Mod. infections were observed at Fort Garry and Morden, Man. The organism was isolated and proved to be pathogenic. The bacterium is apparently Ps. syringae but cultural study was incomplete (W. A. F. Hagborg).

RUST (Puccinia sorghi). Infection was mod. throughout Ont. and was not as severe as in 1950. For additional observations on the 1950 epidemic see U. S. D. A. Pl. Dis. Reporter 35(8):367. 1951 (W. E. McKeen). A mere trace was recorded in a field in Queens Co., P. E. I. (R. R. Hurst).

ROOT ROT (chiefly Pythium arrhenomanes) caused sev. damage in many fields in Ont. in 1951; all varieties were affected (W. E. McKeen).

STALK ROT (complex of organisms) caused mod. damage, affecting all varieties, in Ont. (W. E. McKeen).

A Phialophora species apparently previously unrecognized, was found on corn roots in soil near Chatham, Ridgetown, and Harrow, Ont. Due to its colour and parasite-host relations it may have been mistaken previously for Rhizoctonia solani or Rhizophagus. It can be isolated only when a piece of apparently healthy corn-root tissue with the adhering mycelium is removed from an infected root and placed on agar media. After 2-3 months of culture on nutrient and potato dextrose agar it lost its ability to sporulate, but this ability was revived when it was cultured on moist corn roots. No sexual stage of this organism has been found. The fungus may attack corn roots at any time throughout the season and its brown runner-hyphae or macro-hyphae grow parallel to the roots. The finer infection hyphae or micro-hyphae penetrate the outer root tissue and there infection threads are surrounded by "wall tubules". This fungus is quite aggressive, but not very pathogenic, and apparently it is followed by numerous secondary organisms. The similarity of this organism to Ophiobolus graminis is very marked (W. E. McKeen). The fungus is being described by R. F. Cain as Phialophora radicicola in Can. Jour. Bot. 30(3). May 1952 and an extended account of the disease by W. E. McKeen will appear in a separate paper in the same number (I. L. C.).

Other new diseases of corn found by W. E. McKeen at Harrow, Ont., have been described and illustrated by him: "A hitherto unreported corn disease" (U. S. D. A. Pl. Dis. Reporter 36(4):143-144. 1952) and "A seed-borne disease of corn" (ibid. 36(4):144-145. 1952). The first appears to be a genetic weakness; however, the necrotic lesions yielded Curvularia inaequalis and Alternaria sp. The second has much the appearance of a virus disease (I. L. C.).

SMUT (Ustilago maydis). A tr. infection occurred on all varieties throughout Ont. (W. E. McKeen). A single ear was infected in a planting at Woodville, N. S. (R. G. Ross). Traces were observed in Queens Co., P. E. I. (R. R. Hurst).

FLAX

Prof. T. C. Vanterpool, University of Saskatchewan, has prepared a special study on "Flax Diseases in Saskatchewan in 1951" which appears below.

Except very occasionally flax diseases were not generally conspicuous this year. The subnormal temperatures from June to the end of the season probably proved unfavourable for their development despite the above-normal rainfall and subnormal evaporation rates. These conditions, however, were responsible for the development of saprophytic black moulds (Alternaria, Cladosporium, Epicoccum) on the standing plants late in the season. Although the weathered grain has, on the average, a germination of 10-15% below that of early harvested grain, it was carrying an unusually low percentage of seed-borne pathogenic fungi. The lowered germination appears to be attributable to the physiological conditions imposed by weathering.

RUST (Melampsora lini). As usual, rust infection varied from none to severe, according to the field. Infection on Royal was the heaviest since 1948. Dakota flax on the prairie showed none to trace, but in the eastern park belt, particularly around Kamsack, several fields with moderate infections were recorded. It appears that the rust strains attacking Dakota are building up in the park belt. At Wadena and Kipling, deep rust lesions on the pedicels appear to have been responsible for noticeable breaking off of bolls. Hail was definitely not responsible. Pycnia and aecia first appeared on volunteer flax at Saskatoon on 31 May.

SEEDLING BLIGHT (Rhizoctonia solani). Two very severe cases of seedling blight was observed east of Sutherland. On one farm the flax stand on summerfallow was only 35% of that on adjoining cereal stubble; both pieces of land were sown with the same lot of seed and at the same time. On another farm the stand on summerfallow was 60% of that on cereal stubble. (cf. Sackston, P. D. S. 27:30-31). On the first farm, barley had been 'seeded into' the poor summerfallow flax stand. Elsewhere on a limited spring survey this disease was negligible.

ALTERNARIA SEEDLING BLIGHT (Alternaria linicola). The most definite case of seedling damage by A. linicola ever observed was found at Clair on flax sown on new breaking. The seed came from Kipling in the southeast park belt where A. linicola is known to occur. The characteristic red lesioning of hypocotyls and cotyledons and the slow killing of the seedlings make it readily distinguishable from seedling blight caused by Rhizoctonia solani. From 17 flax-seed samples selected for their low germination, A. linicola was the parasite that appeared most frequently on plating, but it occurred only slightly more frequently than usual. Polyspora lini, Fusarium spp. and Botrytis cinerea were present only in traces.

BROWNING and STEM BREAK (Polyspora lini) was reported from Hershell, Stranraer, Kindersley, west, north and east of the Quill Lakes, Sheho, Theodore, and Marshall. Infection on the open prairie was slight and did not affect yield, although the seed may be carrying the fungus. At Marshall, in the park belt, two fields intended for registration were examined for disease on 22 Aug. One sown with 1950 Elite Royal seed carrying over 20% P. lini had developed about 30% typical stem break, and surprisingly few leaf and stem lesions, but showed severe boll lesioning, which probably became worse later in the season. The other sown with 1949 Elite Royal lightly contaminated with P. lini showed about 5% stem break, traces of leaf and stem lesions, and moderate boll lesioning. Isolations from infected bolls from both these fields yielded P. lini. Another field on fallow in the same district sown

with Dakota free of P. lini, showed a light infection of the bolls from which P. lini was cultured; the source of inoculum in this field is unknown. Also in the park belt, south of Wadena, 5% of stem break was found in one field and 10% in another; both showed slight stem and boll lesioning. These findings add further support to my contention that flax used for seeding should come from the open prairie; seed from the park belt should always be examined for seed-borne pathogens before being used for seed.

PHOMA FOOT ROT. In experimental plots a 40% reduction in germination of flax was produced by strains of Phoma lini when they were used to inoculate the soil. Stem lesions with good pycnidial development were common on surviving plants. Under the same conditions, strains of Phoma exigua caused 75% reduction in germination, but no basal stem or other lesioning was detected on the survivors. Victory was the most resistant variety and Redwing the least to these Phoma species; of the fibre varieties, Gossamer was more resistant than Liral Dominion. The moist, cool season was favourable for these tests at Saskatoon.

HEAT CANKER (physiological). None encountered.

2,4-D INJURY. Growth of flax sown on a portion of a wheat-stubble field was delayed by spraying with 2,4-D, thus reducing its competitive power against volunteer wheat plants, which tillered well. In the unsprayed portion, the wheat plants were mostly one-stemmed. The difference in appearance of the two portions of the field was very conspicuous from a distance. Here, we have an anomalous situation in which a 2,4-D application has increased weeds! Spray injury of the stem-bending and distortion type was found at Bruno, Laura, and at two places west of Regina.

LIME-INDUCED CHLOROSIS has only been observed before on small areas where the soil was slightly alkaline or high in total salts (cf. P. D. S. 23:23 and 25:31). This year in one field north of the Quill Lakes, about 75% of the plants were pale yellow to light green with slight stunting; in another field east of the Quill Lakes, about 30% were affected, but there was no apparent decrease in height. The trouble was also observed at Lanigan. When the Quill Lake fields were visited before harvest the plants had recovered their colour. The prolonged cool weather in June presumably delayed the availability and absorption of certain nutrient elements.

MISCELLANEOUS. Browning and stem break, and pasmo were again absent in the Irrigation Nursery at the University. No pasmo was encountered on the fall survey in e. and s. e. Sask. Late root rot (Fusarium spp. and Rhizoctonia solani) was not conspicuous.

W. E. Sackston has also summarized his observations in a special report, "Flax Diseases in Manitoba in 1951".

Flax acreage in Man. in 1951 was 594,000 acres, almost double the figure for 1950. There was a severe drought over much of the flax area during June and July, but the crop was saved by good moisture reserves from 1950 and by unusually

cool weather throughout the dry period. Yields averaged only about 7 1/2 bu. per acre. Rains fell at harvest time and at frequent intervals from harvest time until freeze-up. A period of clear weather permitted harvesting much of the standing flax in southern Manitoba after freeze-up, but part of the crop in the north was covered with snow. The dry weather during the growing season restricted the occurrence of most diseases, but the wet weather at harvest was favourable for the growth of saprophytes with consequent severe discoloration of flax stems, and weathering and discoloration of the seed.

A survey was made from 23 July to 1 Aug. through Man. and e. Sask. as far north as Yorkton; 91 fields were examined. Most of the fields were in bloom, but some were still in the seedling stage, and the flax was ripening in others. During a limited survey in s. w. and s. Man. 29-30 Aug., 20 fields were examined. Most of the flax examined was ripe or ripening at the time of the late survey, but the bolls were just turning colour in a few fields.

RUST (Melampsora lini) was again the outstanding disease of flax and was much more severe than in 1950. Although weather was not particularly favourable for rust development, inoculum from 1950 was abundant and large areas were sown to the susceptible variety Dakota. Dews were sufficiently frequent even during the drought period to permit spore germination and development of heavy infections. No rust was found in fields of Rocket or Sheyenne. Of the 91 fields examined in July, 28 were free of rust. Of these fields, 15 were identified as Rocket or Sheyenne, while the others were either unidentified resistant varieties or else escaped infection. Traces of rust were found in 24 fields, 1-5% in 18, 10-25% in 14, 50% in 5, and 75% in 2 fields, the estimates being of the uredinial infections on the leaves. Uredinia were found on stems in a few fields, and the telial infections were about 10% on the stems in four of the most heavily diseased fields. Several of the worst fields were located across the fence or across a road from fields where flax was rusted in 1950. One grower reported that rust was relatively light on Dakota sown early in May, whereas it was very heavy in a field sown late in May.

Four of the 20 fields examined at the end of August were free of rust. Three of these were resistant varieties. Telial infection was a trace on the stems in 1 field, 5-10% in 6, 15-20% in 6, and 25-35% in 3 fields. Stem-rot lesions associated with rust telia were conspicuous in several fields. Plated tissues yielded mostly Alternaria tenuis and Fusarium spp.

PASMO (Septoria linicola). Pasmo was found in only 10 of the 20 fields examined during the late survey. There were traces of the disease in 9 fields, and 5% in 1 field, of the susceptible variety Viking. Very heavy infections were obtained in inoculated plots, however, indicating that the dry, cool weather prevented disease spread rather than development.

BOLL BLIGHT (cause unknown). Traces were seen in three fields in the early survey. Drought apparently caused blighting in these fields. Observations made during the late survey apparently fitted the hypothesis that boll blight is caused by unfavourable weather conditions following conditions that favour formation of flower primordia. There were traces to 10% of boll blight in 8 fields, 15-25% in 9, and

35% and 50% in one field each. Rust was responsible for part of the blighting and of boll and bud abscission in the 35% field. The 50% field was extremely late. There was very little boll blighting, and a full complement of seeds per boll, but few bolls per plant, in fields showing evidence of early and protracted drought. The low boll set is in marked contrast to the greater numbers of bolls per plant when moisture conditions are favourable in June and July, and the much higher incidence of boll blight when the favourable weather is followed by a hot, dry period subsequent to flower and boll formation.

MISCELLANEOUS. A trace of Seedling Blight was found in one field, and scattered blighted seedlings were found in the experimental plots at Winnipeg. Rhizoctonia solani was isolated from the Winnipeg material. Traces of Wilt were found in three farm fields. Severe wilting occurred in a plot of German flax at the Flax Pilot Plant, Portage la Prairie, Man., sown where flax straw had been stacked in previous years. Fusarium oxysporum f. lini was isolated from the wilted material, and from a few wilted plants in plots at Winnipeg. Top Discoloration, attributed in 1951 to early drought that killed the tissues, and late rains that favoured the growth of microorganisms in them afterwards, was seen in 15 of 20 fields in the late survey. There were tr.-5% of top browning in 3 fields, 25-50% in 10, and 75% in 2 fields. Rust and stem rot contributed to the discoloration in one of the two last fields. There were traces to 5% of Heat Canker in 7 fields examined in July, and about 10% in one field reported by a grower in June. Injury caused by 2,4-D was observed in a few fields. Terminal growing points were killed and numerous branches formed in apical whorls in three fields, and maturity was delayed by 10-14 days. Traces of leaf spot was seen in 7 fields, and 5-30% of the leaves were spotted in 5 fields. Much of the leaf spotting may have been caused by drought. Drought was definitely responsible for the premature ripening and death of plants in large patches on light soils in s.w. Man. Hail Damage, with 25-50% of the bolls broken off or shelled out, was seen in 2 fields.

Other Observations

WILT (Fusarium oxysporum f. lini). A few plants of Stormont Gossamer L 26 were affected in the plots at Ottawa, Ont. (R. V. Clark). In a survey in Yamachiche Co., Que., tr. of plants were wilted in 4 fields, tr.-5% in 2, and 5-10% in 6/12 fields examined. At the Station, Ste. Anne de la Pocatiere, 25% of the plants of Liral Dominion were affected in a plot on a low spot (R. O. Lachance).

BROWNING and STEM BREAK (Polyspora lini). A sl. infection was observed in a field near Burdett, in s. Alta. (P. M. Halisky); infection was 3-tr./9 fields examined in the Peace River District (T. R. D.)

RUST (Melampora lini). Infection was 2-tr. 1-sl. 1-mod./15 fields surveyed in s. Alta. (M. N. Grant) and a trace was seen in one field in the Peace River District (T. R. D.). Some lines of Stormont Cirrus were sl. affected at Ste. Anne de la Pocatiere, Que., while most were rust-free. The same lines were severely rusted at Winnipeg and Saskatoon (R. O. Lachance).

MUSTARD

WHITE RUST (Cystopus candidus). Severe infection resulted in pronounced malformation of scattered plants in several fields of cultivated mustard south of Lethbridge, Alta. Infection was also observed on wild mustard in the area (M. W. Cormack). Specimens of yellow cress, Rorippa islandica (Older) Borbás, were collected by J. E. Campbell in Queens Co., P. E. I., 24 July 1951 (I. L. C.).

SAFFLOWER

RUST (Puccinia carthami) was first observed on 27 July in the variety plots at Lethbridge, Alta. Infection was tr. -mod. in both the dry-land and irrigated plots by mid-September. See also Table 3 (F. R. Harper).

Table 3. - Disease Ratings in Safflower Variety Tests, 1951
Dominion Experimental Station, Lethbridge, Alta.

Variety	Av. Rust Infection	Av. Root Rot Damage %
N3	sl.	0
N5	tr.	0
N8	mod.	0
N472	sl. -mod.	0
Indian	mod.	1
N805	mod.	38
N6	tr. -sl.	40
N10	sl. -mod.	83
N852	tr.	98
N9	tr.	100

ROOT ROT (Pythium sp.) caused an estimated damage of 0-100% in the different varieties in the irrigated plots at Lethbridge in spite of the plots being in a new location over 1/2 mile from any land previously sown to safflower. No infection was observed in the same varieties in the dry-land plots. For individual varietal reactions see Table 3 (F. R. Harper, M. W. Cormack).

HEAD ROT (Sclerotinia sclerotiorum) was found affecting the flower heads of safflower in the University plots, Saskatoon, Sask. The infected heads dropped off easily when touched or blown by the wind. In some lines, over half the heads were diseased and no line was immune. Isolations from affected peduncles and receptacles yielded the organism; isolations for 3 partially developed seeds yielded Botrytis cinerea. Both fungi were highly pathogenic to safflower seedlings on agar plates. Isolations of S. sclerotiorum made in 1950 from rape and sweet clover were also pathogenic (T. C. Vanterpool).

SOYBEAN

Dr. A. A. Hildebrand has submitted a special report, "Diseases of Soybeans in southwestern Ontario in 1951 ".

During the current year, the disease situation in soybeans in s. w. Ont., was again assessed through surveys not only of commercial plantings but more especially of stands being grown for seed, of varietal trial plots scattered through the area, and of the experimental plots, including a 'disease garden' at the Harrow laboratory.

STEM and ROOT ROT (Pythium ultimum). In early July a stem and root rot of soybeans was found almost simultaneously in Essex and Kent Counties. Affected plants, occurring singly or in small groups are dwarfed and usually wilt; later they become necrotic, brown and dry out. It was demonstrated experimentally that the disease is favoured by low soil temperature (11-12°C.), although if the organism is plentiful in the soil, it is capable of destroying the seed over a relatively wide range of soil temperature (11-27°C.). The corelation observed between low soil temperature and pathogenicity of the fungus is the probable explanation for mortality of the seedlings in the field being confined to the earlier, cooler part of the growing season. Although losses in the field this year due to this new disease were negligible, its discovery adds another organism to the growing list of pathogens that must be combatted for the successful culture of soybeans in Ont.

STEM CANKER (Diaporthe phaseolorum var. batatis) and POD and STEM BLIGHT (D. phaseolorum var. sojae). From the evidence to date, the most important disease of soybeans in Ont. should be definitely designated Stem Canker rather than Pod and Stem Blight as formerly. In the last 2 years, isolations from affected plants have yielded in pure culture the perfect stage of fungus readily identifiable as a Diaporthe. Single ascospore isolates of some 20 strains obtained to date, produce, in turn, the perfect stage, thus indicating the homothallic nature of the fungus. Pycnidia have never appeared in any cultures originating from single ascospores. On steamed soybean stems, the perithecia are produced in caespitose heads. On the basis of its sexual behaviour, morphological characteristics, and pathogenic capability, this fungus seems to be indistinguishable from the perithecial strain of D. phaseolorum var. batatis described by A. W. Welch and J. C. Gilman in 1948 (Phytopath. 38:628-637). If this diagnosis is correct, then D. phaseolorum var. batatis is being isolated almost to the exclusion of D. phaseolorum var. sojae.

In only 9 occasions have pycnidial strains been obtained from diseased stems. Three were obtained in 1950 and the other six only recently. Experiments are in progress to determine whether or not these strains are heterothallic and possibly identical with D. phaseolorum var. sojae (cf. Welch and Gilman, ibid).

Stem canker was found first in 1951 on 27 July. As the season advanced, the disease became epidemic throughout most of the soybean-growing area in s. w. Ont, including Pelee Island. Since the same thing has happened for the last 3 years, the disease is apparently now thoroughly established. No variety escaped infection, but marked varietal differences in incidence of the disease were noted. In the soybean disease-nursery, the incidence of stem canker on varieties under conditions of

natural infection was as follows: Harman, 3.5%; Harosoy, 4.5%; A.K. Harrow, 5.1%; Adams, 5.2%; Harly, 6.5%; Richland, 7.6%; Earlyana, 9.8%; Lincoln, 9.9%; Monroe, 12.7%; Hawkeye, 15.2%; and Blackhawk, 24.3%. Counts made in commercial stands and in the varietal test plots revealed that infection levels often differed from the figures given above, but where comparison could be made the varieties tended to retain their relative positions. Hawkeye and especially Blackhawk, were often more severely infected than indicated above. The apparent high degree of resistance of Harman is in striking contrast to the almost complete susceptibility of Blackhawk. Stands of Harman were examined in which not a single infected plant could be found and in only a single case did infection run as high as 9%. In Blackhawk, on the other hand, heavy infection was the rule and in not a few instances the yield was seriously reduced. Hawkeye, from the same cross as Blackhawk (Mukden x Richland), was slightly less susceptible than the latter variety. It may be noted that among the first five of the most resistant varieties indicated four, namely, Harman, Harosoy, A.K. Harrow, and Harly, are of Canadian origin.

As has been stated in previous reports, it is impossible to assess with accuracy the losses due to this disease. In the aggregate, they must be serious. From mid-July until the end of the growing season, there is a period of approximately two months during which the disease increases in intensity and becomes more widespread. Not only the yield but also the quality of the seed from affected plants, because of their hastened maturity, is reduced.

BROWN STEM ROT (Cephalosporium gregatum) was first noted in 1951 in the laboratory plots on 17 August on which date it was affecting varieties with maturity dates differing as widely as those of Earlyanna and Lincoln. Later, in September, the disease was found in so many commercial stands that there is little doubt of its widespread occurrence in s.w. Ont. Harman, which shows appreciable resistance to stem canker is, unfortunately, very susceptible to brown stem rot.

VIRUS DISEASES. Three virus diseases encountered more frequently this year than in 1950 were Soybean Mosaic (Soja virus 1), Yellow Mosaic (Phaseolus virus 2), and Bud Blight (virus of tobacco ring-spot group). In previous reports no differentiation was made between soybean mosaic and yellow mosaic but, during the past summer, the two were differentiated on the basis of selective host reaction. Of the three virus diseases, bud blight is the most serious.

BROWN SPOT (Septoria glycines). In most years brown spot, after appearing early in the season on the pair of unifoliate or first true leaves, disappears and is not seen again until the next season. This year, on 10 Sept., diseased specimens were sent to the laboratory by a grower from Komoka, Middlesex Co., who stated that the disease was causing considerable loss of plants in localized areas in his field. The disease, which was affecting both leaves and pods, was found to be brown spot. On 21 Sept., leaves on plants in the laboratory plots showed brown spot lesions. Whether these late-season findings of brown spot are significant is unknown. They might mark the beginning of a trend similar to that which developed in Illinois a few years ago. According to D.W. Chamberlain (Soybean Digest 8:18. 1948) "Brown Spot, once a minor leaf spot, has become the most damaging of the leaf spots in Illinois".

MISCELLANEOUS. Manganese Deficiency which, during the years 1948, 1949, and 1950, was the cause of concern to many growers over widespread areas, was scarcely apparent in 1951. Downy Mildew (Peronospora manshurica) and Bacterial Blight (Pseudomonas glycinea) were noted in the surveys but were relatively unimportant.

Following a series of electrical storms in early July, Lightning Injury, which can easily be mistaken for a parasitic disease, was observed in three different fields. Hail Damage caused considerable loss in certain areas. Abrasions, received by plants when they were young, later developed excrescences and so weakened stems as to result in excessive lodging. Sun Scald (non-parasitic) was present as usual.

Other Observations

BACTERIAL BLIGHT (Pseudomonas glycinea). Mod. infection was observed on Black Eye at Brandon, Man. (W. A. F. Hagborg). The disease was found occurring in isolated patches in soybean fields in the Guelph area, Ont. (E. H. Garrard). A mod. infection was recorded in Early Blackeye in the plots at Ottawa (K. M. Graham).

SUDAN GRASS

BACTERIAL LEAF SPOT (Pseudomonas syringae). Sl. infection observed at Lacombe, Alta. (L. E. Tyner).

SUGAR BEET

LEAF SPOT (Cercospora beticola) was more prevalent in s. w. Ont. this season than for several years (A. A. Hildebrand).

LEAF SPOT (Phoma betae). Sl. leaf infection was found in several fields in s. Alta. Usually the pathogen only attacks the roots, but leaf infection may have been favoured by the prevailing wet conditions in 1951 (F. R. Harper).

BLACK ROOT (various fungi) was found in all of the 43 representative fields sampled before thinning in s. Alta. The level of infection this year was much the same as in 1950 (P. D. S. 30:42-43) and the differences between districts were not significant. Most of the infected plants were eliminated during thinning and no further development of root rot was observed during the season. Phoma betae was the predominant isolate as material from 79% of the fields yielded the organism. Aphanomyces cochlioides occurred more commonly than in previous years, being demonstrated in material from 51% of the fields; its greater occurrence was probably owing to the unusually wet season (F. R. Harper, M. W. Cormack).

Black root of sugar beet seedlings was in general sporadic in its occurrence in s. w. Ont. However, in districts that had been flooded, following continuous, heavy rains, the disease was more prevalent and a large number of growers suffered severe losses. There was a tendency also in these districts for the disease to become chronic and to persist after blocking and thinning had been completed (A. A. Hildebrand).

BORON DEFICIENCY is attracting more and more attention each year in s.w. Ont. This year the effects of the deficiency were evident over a wider area than usual and were particularly severe along the advancing northern and eastern fringes of the sugar beet area. Boron deficiency may well become more important than black root in the successful growing of the crop (A. A. Hildebrand).

SUNFLOWER

A special report "Sunflower Diseases in Manitoba in 1951" was prepared by Dr. W. E. Sackston.

Sunflowers were sown in 1951 on only about 21,500 acres in Man., largely as a result of relatively low yields and prices in 1950. Drought in June and July, and low temperatures throughout the growing season, made weather conditions again unfavourable for the crop. In all, 37 fields were examined for disease 14-17 Aug., when the plants were anywhere from early bloom to a week past full bloom and 40 others, 17-20 Sept., when most fields were 7-10 days from maturity; some, 15-20 days from maturity; and a few, prematurely ripe. Dr. E. D. Putt, Cooperative Vegetable Oils, Altona, and Sr. Mario Astorga, Santiago, Chile, assisted in the early survey; and W. A. Russell, Dominion Experimental Station, Morden, and J. A. Fehr, Coop. Vegetable Oils, Altona, assisted in the late survey.

RUST (Puccinia helianthi). Rust infections were heavier, and damage more severe, in 1951 than in the 3 previous years. Weather conditions were not particularly favourable for rust development, but inoculum from 1950 was abundant, and dews were adequate, even during the drought period, for spore germination and infection. In fields seeded early, rust damage was in some cases aggravated by drought injury. Some of the late-sown fields, which were sufficiently immature to benefit materially from the August and September rains, appeared to escape the heaviest rust infections and injury.

The inbred female parent S37-388 of the hybrid variety Advance again proved extremely susceptible to rust; the hybrid, although heavily rusted or even killed by rust in some fields, was in no case as severely infected as the inbred plants which occurred in every hybrid field. Sunrise, the male parent of Advance, rusted less heavily than the hybrid. Only one field of Mennonite was examined; it appeared to be comparable to Sunrise. The heaviest rust infections observed were all in the main sunflower area. Even in the main area, however, some fields were seen with light to moderate infections.

The importance of volunteer sunflowers in fields and along roadsides in initiating severe outbreaks of rust was noted again in 1951. On 14 June, A. M. Brown found open aecia on many volunteer sunflowers along the edges of Highway 14, the main road through the centre of the sunflower area, and in adjacent fields. He stated, "There is no doubt that aeciospore inoculum in this area is a potential threat, and if favourable weather conditions for rust development prevail, a sunflower rust epidemic can be expected". On 12 July he found uredinia on many leaves of every plant examined in a field near Rosenfeld where no rust was present 14 June.

Volunteer sunflowers along the roadside and in a nearby stubble field had open aecia on the leaves.

Only one field examined in the early survey was free of rust. It was in the outlying area. There were traces of rust in 9 fields, all outlying; 5-15% on the lower leaves, traces on the upper leaves, in 7 fields (Advance in the main area, S37-388 in outlying areas); 25% on the lower leaves, 2% on the upper, in 1 field; 40-50% rust on the lower leaves, tr.-10% on the upper, in 12 fields; 60% or more on the lower leaves, 20-50% on the upper, in 2 fields; lower leaves killed by rust, 60% or more on upper leaves, in 5 fields.

In the late survey, only traces of rust were present in 3 fields all in outlying areas. There was 15% rust on the lower leaves, tr. on the upper, in 3 (outlying); 25-30% on lower leaves, 10-15% on upper, in 8 (Advance in the main area, S37-388 in outlying areas); 40-65% on lower leaves, 20-50% on upper, in 12 (S37-388 in outlying areas, Advance and Sunrise in central area); lower leaves killed by rust, 30-60% on upper, in 6 (S37-388 in outlying areas, Advance in central area); plants killed by rust, in 8 fields. Three fields of Advance were among those killed by rust; 2 crossing blocks (with the S37-388 killed), in outlying areas, with volunteer plants in adjacent fields as the source of inoculum; 2 fields of S37-388 foundation stock, with yields sharply reduced; and 1 field of S37-388 foundation, in which no seed could be harvested.

WILT (Sclerotinia sclerotiorum) was found in 28 of 37 fields examined in the early survey. There were traces in 23 fields; 1-2% in 3, 35%, and 50% in 1 field each. Infection apparently started at or near the ground line in most cases. Only two plants were found with a Sclerotinia infection originating in the midstem portion. In the field with 35% wilt, sunflowers followed several crops of field peas. In the field with 50% wilt, sunflowers followed six successive grain crops.

Wilt was found in 20 of 40 fields examined in the late survey. There were traces of wilt in 18 fields, 1% in 1 field, and 50% in 1 field, a crossing block, in which 35% wilt was found in the early survey. The grower observed that Sunrise seemed to show wilt infection earlier in the season than S37-388, and the percentage of Sunrise affected in September seemed somewhat higher.

HEAD and NECK ROT (Sclerotinia sclerotiorum and Botrytis cinerea). Traces of head and neck rot were found in 22 fields in the late survey. In 15 fields, only Sclerotinia sclerotiorum was found associated with the rot. In 4 of these fields, no Sclerotinia wilt was found, and in only 1 field was there more than a trace of wilt. In 4 fields some of the head and neck rot was caused by Sclerotinia, while others of the rotted heads were covered with the sporulating Botrytis. In 3 fields all the head rot was apparently caused by Botrytis. Bacterial rot of the necks and heads was seen in 1 field of Sunrise foundation, in which a jelly-like rot, possibly bacterial, of the stems was present. The relative abundance of head and neck rot in 1951 may be attributable at least in part to the low temperatures and frequent rains during August and September. Such weather conditions may have been favourable for the production of ascospores of Sclerotinia, as well as for sporulation and infection

by Botrytis. The rare occurrence of Sclerotinia infections anywhere except on the basal portions of sunflower plants in most years indicates that wilt is usually initiated by soil-borne inoculum. The occasional occurrence of Sclerotinia rot of sunflower heads in Man. has been attributed to chance transfer of sclerotia, possibly by birds. Most of the wilt infections in 1951 apparently occurred fairly early in the growing season, while the weather was still dry, and therefore presumably were initiated by soil inoculum, as usually postulated. Although no apothecia of Sclerotinia were found, ascospore infection of the heads in 1951 seems fairly probable, as sclerotial infection seems to be an inadequate explanation of the numerous infections observed.

DOWNY MILDEW (Plasmopara halstedii) was found in one crossing block in the early survey. There were traces of mildew on the Sunrise plants, but approximately 1% of the S37-388 plants were diseased. The amount of mildew in this crossing block had not increased noticeably by the time of the late survey. Traces of downy mildew were found in two other fields in the late survey. Affected plants were stunted by early systemic infection. No localized infections on leaves of adult plants were found. Downy mildew was also quite conspicuous in the plots of Cooperative Vegetable Oils, Altona, and some was seen in plots at Morden.

STALK ROT (cause unknown). Stalk rot and premature dying and drying of stems was found in 17 of 40 fields in the late survey. Most of the fields free of the disorder were in outlying areas; in none of the clean fields was rust very heavy. Traces of stalk rot were found in 6 fields; in 2 of these, in addition to the premature browning of stems, and fungal discoloration of the pith, there was a blackening of stems, petioles, and peduncles, occasionally involving the heads as well. The blackened tissues, particularly the peduncles, shrivelled and dried out. A jelly-like, black rot of the pith was present in all the blackened plants. Bacteria predominated in isolates from the rotted tissues. One per cent of the plants in a field of Sunrise foundation was affected by the black jelly rot. Numerous plants in plots at Altona were also diseased. Sunrise apparently is more subject to this disease than is S37-388. The more common premature browning and dying of stalks was associated with severe rust injury in 10 fields. In several of the fields, the external browning was apparently caused by rust infection and drought, as the pith was still fairly sound and clean in many of the plants, and borer infestation was moderate. In other fields, borer tunnels were numerous in the stems, and the pith was discolored or destroyed by fungi. Five to 10% of the stalks were broken over in two fields of Advance killed by rust, and 25% of the plants were broken over in a field of S37-388 foundation destroyed by rust.

MISCELLANEOUS. Powdery Mildew (Erysiphe cichoracearum) was found on a few leaves in two fields in the late survey. Necrotic Leaf Spots were seen in 6 fields in the early survey, and in 4 fields in the late survey. Some of the early spotting may have been caused by soil drifting or other mechanical injury. Considerable necrosis was observed around rust pustules. No Septoria Leaf Spot was found. Leaf Mottle (cause unknown) was found on a few plants in 5 fields, and on about 2% of the plants in 1 field, in the early survey. The field with 2% had about

50% of the plants destroyed by Sclerotinia wilt. In the late survey, leaf mottle may have been present in 1 field of Mennonite sunflowers, seeded in check-row hills. One plant per hill was dead in about 50% of the hills, and 2 or 3 plants were dead in several hills. The stems and roots of the dead plants appeared sound. Mottling was detected on a few leaves. Slight 2,4-D Damage was seen in several fields. Fasciation of Sunrise plants was conspicuous in 1 crossing block. The upper stems were divided into 2 to 5 or 6 branches, formed at very sharp angles to the perpendicular. Head Drop (cause unknown) was identified with the assistance of Senor Astorga, who has seen up to 10% in commercial fields in Chile. Affected plants cannot be distinguished from normal in any way until the head drops off at flowering time. Abscission takes place at about two inches below the head. The break is clean and even, looking as though the head had been removed with a knife. Often a short piece of epidermal tissue is torn from the remaining stem as the head drops, or, rarely, the head may remain attached to the stem by such a strip of epidermis. Several cases of head drop were seen in plots at Altona, in 8 farm fields, and in plots at Winnipeg.

Other Observations

DOWNY MILDEW (Plasmopara helianthi) affected 20% of the plants and WILT (Sclerotinia sclerotiorum) was a trace in a planting of Mammoth at Ste. Anne de la Pocatiere, Que. (R. O. Lachance).

CULTIVATED and OTHER GRASSES

AEGILOPS SQUARROSA

Leaf Rust (Puccinia triticina). Infection was mod. in test plots at Lethbridge, Alta. (P. M. Halisky) and severe on this species in Rust Laboratory plots, Winnipeg, Man. (A. M. Brown).

AGROPYRON - Wheat Grass

Stem Rust (Puccinia graminis) See under Rye: Stem Rust.

Snow Mould (Sclerotinia sp. indet.) Extensive damage was reported by R. G. Savage in the grass plots at the Station, Prince George, B. C. The disease was estimated to have destroyed 10-100% of the plants in strains of Agropyron, Bromus, Elymus, Festuca, Phleum, Poa, and other grasses. Similar damage was also reported on winter wheat in the area. Numerous sclerotia were produced in the culms of the dead grasses and the damage was first ascribed to a Typhula. All samples, however, have yielded a low temperature Sclerotinia, which is being studied (M. W. Cormack).

AGROSTIS

Rust (Puccinia rubigo-vera). A 20% infection was found on A. tenuis growing along a roadside at Centerville, N. S. (KP1687) (D. W. Creelman).

Bunt (Tilletia pallida G. W. Fischer, Mycologia 30:393. 1938). Bunt balls replaced about 5-7% of the seed in a sample of velvet bent grass, A. canina, from East Baltic, P. E. I. As the seed was supposed to have been cleaned the infection in the field was probably higher (W. G. Sallans). T. pallida was known previously on A. canina in N. J., Ohio, and R. I. and on seaside bent, A. palustris, in Oregon. The pale colour of the spores in mass, smaller size of the spores and the deep irregular reticulations readily separate it from T. decipiens, which occurs on brown top, A. tenuis in N. S., on St. Pierre and in Europe., but not apparently in the United States (I. L. Conners).

BROMUS

Leaf Spot (Selenophoma bromigena). Plots of B. inermis at the station, Lethbridge, Alta., showed a sl. infection (E. J. Hawn).

DACTYLIS GLOMERATA - Orchard Grass

Crown Rot (Fusarium culmorum) caused the death of 5-10% of the plants in rod rows at the Station, Saanichton, B. C. The fungus sporulated freely on the necrotic leaves, and its identity was verified by W. L. Gordon. The roots were apparently not affected (W. Jones).

Purple Leaf Spot (Mastigosporium rubricosum) was common at the Station, Saanichton, B. C.; the fungus was in abundant fruit 5 April (W. Jones).

Brown Stripe (Scolecotrichum graminis) was heavy at Kentville, N. S. 4 Oct. (D. W. Creelman).

DESCHAMPSIA FLEXUOSA

Ergot (Claviceps purpurea). A tr. was observed at Port aux Choix, Nfld. (Savile 3057). The host is probably highly resistant. The only record of ergot noted for Deschampsia is its occurrence on D. caespitosa in Oregon by Sprague and by Weiss (D. B. O. Savile).

HIEROCHLOE ODORATA

Ergot (Claviceps purpurea). A trace was found at St. Anthony, Nfld. (Savile 2849). The only previous record on this host is from N. D. by Sprague (D. B. O. Savile).

HORDEUM JUBATUM

Stem Rust (Puccinia graminis). A trace infection of over-wintered uredinia was observed at Charlottetown, P. E. I. on 12 April. The viability of the spores was not checked, but previous repeated trials were without success. A trace was observed on the same host on 10 Aug. (R. R. Hurst). See also under Rye: Stem Rust.

PHALARIS ARUNDINACEA

Rust (Puccinia sessilis). A trace was observed at Mavillette, N.S. (KP1666) (K. A. Harrison).

PHLEUM PRATENSE - Timothy

Stem Rust (Puccinia graminis var. phlei-pratensis). Severe infections were observed at Creston, B.C. (M.N. Grant), and in a field in Queens Co., P.E.I. (R.R. Hurst).

POA

Powdery Mildew (Erysiphe graminis). A sev. infection was observed on P. pratensis at the University, Fort Garry, Man. (A. M. Brown).

Rust (Puccinia poae-sudeticae). Sl. infection on P. arida observed at Lacombe, Alta. (L. E. Tyner).

PUCCINELLIA

Leaf Rust (Puccinia rubigo-vera). A 25% infection was seen at Canning, N.S., on P. maritima (KP1682) (D. W. Creelman).

SPARTINA

Rusts (Uromyces acuminatus and Puccinia sparganioides). Both rusts were found heavily infecting S. pectinata at the Canning Dyke, Kings Co., and at Bridgeport, Annapolis Co., N.S. (KP1670 and 1672) (D. W. Creelman).

LAWNS

Fairy Rings (Marasmius oreades) have become very common in lawns on the B.C. coast; the disease is sufficiently serious to require investigation with a view to its practical control (W.R. Foster).