II. DISEASES OF FORAGE AND OTHER FIELD CROPS

A. FORAGE LEGUMES

ALFALFA

BLACK STEM (Ascochyta imperfecta). In n. Alta. 41/56 fields examined were diseased. Infections were sl. -mod, in the Edmonton region and mod.-sev. through the Peace River district (N. Colotelo), Trace infections were seen in 9/34 fields surveyed in the Lethbridge, Raymond-Magrath and Vauxhall-Taber areas of s. Alta. Little damage was observed,(E.J. Hawn), Damage was mod, in all 32 fields observed in Sask, Dry weather delayed the disease until late August when frequent rains were followed by a rapid development of black stem (H.W. Mead).

BACTERIAL WILT (Corynebacterium insidiosum) was sl. in 3/56 fields in the Fort Vermilion area of n. Alta, (N.C.). In s. Alta,, infections were 1-tr, -sl. 7-sl.-mod, 5-mod.-sev. and 6-sev./34 fields. There was considerable evidence of reduction in hay yield (E.J.H.). A mod. infection was recorded in a 6-year old plot of Grimm at Saskatoon, Sask, (H. W. M.). In test plots at Ste. Anne de la Pocatière, Vernal was healthy: Rambler, Rhizoma, Narraganset and Ranger had tr, infections: Alfa, M-50, Grimm, Poc. 2 and Dupuits were sev. affected (R. O. Lachance).

YELLOW LEAF BLOTCH (Leptotrochila medicaginis = Pseudopeziza jonesii). A sl. infection was seen in 1/34 fields observed in s. Alta. It was mod. on the variety Grimm at Ste. Anne de la Pocatière, Que. (R.O.L.).

Schüepp, (Phytopath, Zeitschrift 36:3. 213-269, 1959), discusses the genera Pseudopeziza, Leptotrochila and Pseudorhytisma, On the basis of morphological characters he assigns P. jonesii to the genus Leptotrochila as L. medicaginis (Fuck.) Schüepp (D. W, Creelman).

DOWNY MILDEW (Peronospora aestivalis) affected 15/56 fields surveye in n. - and c. Alta. Infections were tr.-sl. in the n. central area and sl.-mod. in the Beaverlodge district (N.C.). Three/34 s. Alta. fields were diseased, 2-tr.-sl. 1-sl.-mod. (E,J.H.). Ten % of the plants in a field at Yellow Creek in n. -e. Sask. were moderately infected (H, W. M.).

COMMON LEAF SPOT (Pseudopeziza trifolii f. sp, medicaginis sativae = P. medicaginis), was found in 41/56 fields in n.- and c. Alta, Infection was generally rated as tr.-sl. Two mod. infections were recorded near Fort St. John, B.C. (N.C.). In s. Alta. it was rated 10-tr.-sl., 1-sl.-mod./34 fields (E,J.H.). It was mod, in 8/32 fields surveyed in Sask, All the affected fields were in the n, -e. part of the province (H, W.M.).

Schüepp (see above) by infection and cultural experiments has established the existence of a number of formae speciales within P. trifolii. They are medicaginis sativae, medicaginis lupulinae, melloti, trifolii pratensis and

trifolii repentis. All are morphologically alike but physiologically different (D. W. C.).

CROWN BUD ROT (Rhizoctonia solani, Fusarium roseum, Ascochyta imperfecta). Twenty-seven/34 s, Alta fields were found affected, 7-tr.-sl. 10-sl.-mod. 5-mod.-sev. and 5-sev. A moderately diseased specimen was also seen from Kamloops, B.C. (E.J.H.).

WINTER CROWN ROT (low-temperature basidiomycete) affected 27/56 n. Alta. fields. It as sl. in the Fort Vermilion area, sl.-mod. in the region around Edmonton and mod.-sev. in the Peace River district (N.C.). It was sev. in large patches in 2 fields north of Tisdale, Sask. (H.W.M.).

BORON DEFICIENCY. Due to drought in May and June, symptoms of boron deficiency, which usually occur on the second crop, were severe on Grimm before the first cutting at St. Pacdme, Kamouraska Co., Que. (R.O.L.).

POTASSIUM DEFICIENCY. Slight-mod, symptoms were observed in 2/34 fields in s. Alta. (E. J.H.).

WINTER INJURY was found in specimens submitted from Kamloops and Agassiz, B. C,, and from Wildhorse, Alta, Severe damage was observed at Brooks, Alta. (E. J. H.).

Report on a co-operative field test to show susceptibility of alfalfa to Ascochyta imperfecta from natural infection

H. W. Mead, W.C. McDonald, J.B. Lebeau, E.B. Ward, N. Colotelo

Samples of twenty-two varieties and 20 polycross lines of Medicago sativa, 6 samples of M. falcata and 1 sample of M. glutinosa were planted in replicated plots at 2 locations in Man., 2 in Sask., and 3 in Alta. in 1956. In the fall of 1957 and 1958, these plots were sampled and the severity of infection of A. imperfecta was estimated at the co-operating laboratories by means of a scale from which percentage disease ratings could be calculated. The results of the 2 years' observations can be summarized as follows:

(1) At each station, only 10 to 15 per cent in disease rating separated the best from the poorest selections:
(2) There were large differences between replicates at each station
(3) There was little or no agreement between the results for 1957 and 1958 at any station
(4) There was very little agreement between the stations as to ranking of the 49 selections for susceptibility
(5) No worthwhile resistance to A. imperfecta was observed in the two years' work.

COMMON CLOVER

LEAF SPOT AND BLACK STEM (Ascochyta meliloti). Infection by A. meliloti was sev, on leaves of red clover at Lac aux Sables, Portneuf Co., Que. The perfect stage of the fungus, Mycosphaerella lethalis, developed on the stems (D. Leblond).

POWDERY MILDEW (Erysiphe polygoni). Slight infections were seen in plots at Edmonton and Beaverlodge, Alta., (N. Colotelo). It was common in n.-e. Sask. even during the dry weather, Slight infections were recorded in 8/12 fields observed. One/3 fields of alsike was also slightly affected (H. W. Mead).

NORTHERN ANTHRACNOSE (Kabatiella caulivora) occurred generally as tr.-sl. infections throughout n. and c. Alta. Thirty-four/36 fields surveyed were affected (N.C.). Trace infections were seen in 2/12 fields north of Tisdale, Sask. (H.W.M.).

BROWN ROOT ROT (Plenodomus meliloti) was observed in 2 fields north of Edmonton (N.C.),

LEAF SPOT (Stemphylium botryosum), One/36 fields suxveyed in n. Alta. showed a trace infection near Smith, Alta. (N.C.).

LEAF SPOT (Stemphylium sarcinaeforme) affected 8/12 fields seen in Sask. It was common in the Nipawin area in the n.-e. portion of the province. Average damage was moderate (H. W. M.).

RUST (Uromyces tsifolii). A trace infection was recorded in 1 field near Pincher Creek, Alta. (E,J. Hawn).

WINTER CROWN ROT (low-temperature basidiomycete). One field on the Fort Vermilion Experimental Farm was severely affected (N. C.).

DECLINE AND PHYLLODY (virus) was found to be present on ladino clover in several counties in the Eastern Townships of Que. but was more prevalent in Eastern Que. and the Lower St. Lawrence Valley (R.O. Lachance). It was sev. in plantings of alsike close to strawberries at Ste, Foy, Que. (D.L.). Trace infections were found in white, alsike and red clovers at the Research Station, Kentville, N, 6. (C.O. Gourley).

MOSAIC (virus). Various strains were found in white, red and alsike clover and in chickweed and lambs quarters in the Vancouver, B.C. area. It is apparently spread by mower blades (M.J. Pratt).

SWEET CLOVER

BLACK STEM (Ascochyta meliloti), Slight infections were observed in plots at Beaverlodge, Alta, (W.P. Campbell)

COMMON LEAF SPOT (Pseudopeziza trifolii f. sp, melliloti) caused slight defoliation in 3/8 Sask. fields (H.W. Mead). (See discussion under Common Leaf Spot of Alfalfa (D. W. C.).

B. OIL SEED CROPS

FLAX

Flax Diseases in Saskatchewan in 1959

T. C, Vanterpool

The flax acreage in Saskatchewan in 1959 was 1,162,000 and the average yield was 7.5 bu./ac. Largely because of the dry, warm, and bright conditions prevailing in May, June and July, diseases of a pathogenic nature were scarce and did not affect yields in any part of the province. However, these same meteorological conditions were responsible for severe non-pathological heat canker which was widely distributed on the open plains. Conspicuous heat canker damage was recorded from Colonsay, Kindersley, Madison, Milden and Swift Current.

Rhizoctonia seedling blight, caused principally by R. praticola, was well below the average despite the occurrence of the warm, dry conditions which usually favor its development.

Aster Yellows was first recorded as a trace infection at Naicam on 30 July and did not develop to more than a trace in the province as a whole, Leafhoppers were unusually scarce.

Two suspected mineral deficiency disorders were encountered:

(1) On a semi-degraded soil at Goodsoil, a condition was noted in which leaves developed yellow tips which graded into a region with brown to dark brown necrotic flecks, Nitrogen deficiency was suspected.

(2) A white leaf-spotting and general stunting occurred at Kindersley. The high soil pH suggested a deficiency, possibly of zinc.

Chemical injury from herbicides was observed in one field, The growing points were damaged and growth of side branches stimulated, resulting in a late crop.

Flax Diseases in Manitoba in 1959

J. W. Martens and W. E, Sackston

About 625,000 acres were sown to flax in Manitoba in 1959. It was dry early in the season in the western part of the province, but rains fell in time and the yield forecast in September was over 9 bushels per acre. Excessive rainfall

in September, followed by snow in early October, prevented harvesting of much of the flax crop in the fall.

Fifty-dne fields of flax were examined at various times in 1959. Seven fields were checked for the presence of aster yellows on July 15; 25 fields were searched for the same disease July 31 and August 1; 17 fields in the Elm Creek to Rathwell area were examined, primarily for rust, on August 26; and 2 fields were checked for pasmo development, on September 15.

Yellows (Aster yellows virus, California strain) was not significant on flax in 1959. The flax was too young for symptoms to be apparent in 3 of the fields examined in mid-July, and in 2 of the fields in late July. Yellows was present in trace amounts in 20 fields in the first two surveys; affected 1 to 3 per cent of the plants in 6 fields, and 8 per cent in 1 field, In the late August survey, 5 fields were free of yellows, 9 fields showed a trace, 2 fields had 5 per cent, and 1 field 10 per cent. All 4 fields with 5 per cent or more yellows were in the Haywood - St. Claude area.

Rust (Melampsora lini) was found in only 4 fields, all in the Haywood - St. Claude area, Only 1 rusted plant was fodnd in 1 field, and traces in 1 field, Forty per cent of the plants had some rust in 1 field, and 90 per cent of the plants were rusted in 1 field. Infections were not heavy on individual plants and all the rust was in the telial stage.

Pasmo (Septoria linicola) affected from trace to 5 per cent of the stem area in 9 fields, 10 to 20 per cent in 5 fields, and 30 to 40 per cent in 2 fields.

Boll Blight (physiologic) affected 5-15 per cent of the bolls in 5 fields, and 20-30 per cent in 10 fields.

Flax Diseases in Alberta in 1959

W. P. Campbell and J. S. Horricks

A limited flax disease survey was carried out in Alberta with the senior author surveying 14 fields in the north and central areas and the junior author observing 6 fields in the south.

Rust (Melampsora lini) was observed only at Fort Vermilion where it was severe in 1 field of Redwing. Resistant varieties planted nearby were unaffected.

Browning and Stem Break (Polyspora lini) occurred only in the northern areas. One field showed moderate browning near Grand Prairie and a trace of stem break was seen in a field near Peace River. Up to 10 per cent of the plants were affected in 6 fields near Fort Vermilion,

Seedling Blight (Rhizoctonia solani) was recorded in 4 of the 6 fields surveyed in southern Alberta, Two showed trace infections, 1 was slightly affected and one had a severe infection.

RAPESEED?

Rape Diseases in Saskatchewan in 1959

T. C. Vanterpool

Estimates place the rape acreage in Saskatchewan for 1959 at 171,000 acres with an average yield of 848 lb. per acre. Most of the acreage is situated in the parkbelt in the north and east portions of the province. The low soil moisture prevailing in May was largely responsible for uneven germination, especially in many fields on the open prairie. Continued drought during June and July, together with above-normal sunshine and temperatures, resulted in heat and drought damage in the same area, Fungus diseases were negligible on the prairie but were more prevalent in the parkbelt where moister conditions favor both the rape and the diseases which attack it. In general, because of the disease and frost hazards in the northern areas, prairie grown seed is superior. The early maturing Polish type of rape appears to escape some diseases which affect the later Argentine type.

White Rust (Albugo cruciferarum S, F. Gray = A, candida (Pers. ex Chev.) Kuntze) was present throughout the parkbelt, usually as trace infections but with a few fields showing moderate infection, The hypertrophies present were due entirely to A, cruciferarum, Moderately affected fields occurred at Brooksby, Armley, Shipman and in the Meadow Lake area, Trace to slight infections were recorded in 20 other fields. In the drier prairie area the disease was observed in only one field at Saskatoon. Here the variety Golden showed slight leaf lesioning while the earlier maturing Arlo had escaped infection.

Aster Yellows occurred as a trace in six fields and was slight in one field in the parkbelt, This latter field, at Meadow Lake, also contained stinkweed (Thlaspi arvense) with yellows.

Powdery Mildew (Erysiphe polygoni) developed on plants in the greenhouse at Saskatoon. It seems not to have been previously reported on this host from Saskatchewan.

Ring Spot (Mycosphaerella brassicicola), This fungus, which was first collected on rape stubble near Annaheim and Lake Lenore in Sept., 1958, has now been identified, The causal organism has been obtained in culture from diseased stems and seed, The finding of ring spot in east-central Saskatchewan is interesting in view of the fact that the disease is recorded as being limited to moist coastal areas of the world and that there is still uncertainty as to whether or not it may be seed-borne. (Nelson and Pound. Phytopathology 49: 633-640, 1959). This is the first report of this fungus from Saskatchewan and of its occurrence on rape in Canada.

Black Spot (Alternaria spp.) was observed as trace infections only in the August survey.

Black Mold (Alternaria spp.) developed in profusion on Albugo hypertrophies in late maturing fields in the north and northeast portions of the province. The hypertrophies were then very conspicuous and readily noticed by growers who may have missed them earlier, The development of black mold, following the late August and early September rains, suggests that black spot would increase the areas where it was present in traces earlier, thus increasing seed-borne infections by Alternaria.

Stem Rot (Sclerotinia sclerotiorum) was present in trace amounts in some fields in the Aylsham area, This disease must pass unnoticed in most years as it flares up suddenly in moist seasons, when it can become the most serious disease on rape in the province.

Seed samples from widely scattered points on the Canadian Prairies

obtained in culture: Alternaria spp., Botrytis cinerea, Fusarium acuminatum, F. poae, Mycosphaerella brassicicola, Penicillium spp., Rhizoctonia praticola, R. solani, Rhizopus nigricans and miscellaneous saprophytes,

A suspected mineral deficiency of unknown cause occurred in a crop on a podsol soil north of North Battleford. The leaves were pale yellowish-green with darker green areas near the veins.

SAFFLOWER

LEAF SPOT (Alternaria carthami). A sl, infection was seen on a specimen from the Edmonton, Alta. area (E.J. Hawn).

RUST (Puccinia carthami) was presept in irrigated test plots at Lethbridge, Alta, (E.J.H.).

SOYBEAN

Diseases and Disorders of Soybeans in Ontario in 1959

A, A, Hildebrand

Soybean pathology in southwestern Ontario in 1959 was highlighted by three points of more than usual interest and significance.

(a) the extremely low and variable germination of 1959-harvested seed,
(b) the widespread and frequently locally serious incidence of Phytophthora-incited stalk-and root rot.
(c) the localized high incidence of purple stain of seed.

Of the above phenomena, the first is by far the most important. In fact, the low germinability of 1959 seed is without precedent in Ontario and threatens

both a serious shortage and a high price of soybean seed for 1960 planting.

Low Germinability of 1959 Seed

Reports of low germination of 1959-harvested seed have been received from over the entire soybean-growing area of southwestern Ontario, From the evidence available to date no correlation between germinability on the one hand and variety, location, or date of harvesting on the other, is indicated; nor does phenology yet seem to offer. more than the suggestion of a clue as to the cause of the trouble.

The phenomenon involves more than non-germination of seed; there is also a biotic factor. In many seed lots, a fairly high proportion of seeds germinate but the radicles are soon infested with the mycelia of fungi, some of which appear to be parasitic, Among the latter is a species of Diaporthe. Because of the ready and abundant development of an imperfect stage the species might be D. phaseolorum var. sojae, the organism which causes the pod-and-stem-blight disease of soybeans. For the past 18 years that diseases has never been of economic importance in Ontario, mostly because it appears on plants too late in the season to produce really harmful effects. A possibility given some prominence is that some "quirk" in the weather of the past season was conducive to rendering soybeans susceptible to attack by this fungus early enough in the season to be of unusual significance, Such a "quirk" may have been the unusually hot, humid weather that persisted in southwestern Ontario from about August 5 until September 9. It is surmised also that the continuous high temperatures during that period may have adervsely affected certain growth-promoting substances in the seeds. Neither of the above theories has been verified. 11m

Phytophthora Root and Stalk Rot

The results of a study of this disease by the author, from 1956 until early in 1959, were published in Can, J. Botany, 37: 927-957, 1959, under the title "A root and stalk rot of soybeans caused by Phytophthora megasperma Drechsler var. sojae var. nov." The abstract of that paper is as follows:

> "Since 1954, a destructive root and stalk rot of soybeans, identical with one reported from several of the soybean-growing areas in the United States, has been prevalent in southwestern Ontario, It is proposed that Phytophthora megasperma Drechsler var. sojae replace P. cactorum (Lib. and Cohn) Schroet., and P. sojae Kaufman and Cerdemann, as the more correct taxonomic designation of the casual fungus. P. megasperma var. sojae comprises strains, which though indistinguishable morphologically, differ physiologically and pathologically. Artificial inoculation of varieties and of breeding lines and selections of soybeans with the causal fungus, chiefly by the highly reliable toothpick method, indicated two well-defined types of disease reaction, resistance and susceptibility, Harosoy, the variety which currently is grown most extensively in Ontario is highly susceptible to the disease, Pathogenicity trials involving many possible wild and cultivated

hosts emphasized the marked specificity of P. megasperma var. sojae to Clycene max (L.) Merrill. The soybean Phytophthora, having been called P. cactorum and thereby associated nomenclaturally with a representative of that species causing a root rot of sweet clover in Ontario, was found to be quite different from the sweet clover pathogen"

Since the above results were published, some additional observations have beeh made relative to the incidence and severity of the disease, During the 1958-59 winter season, a considerable acreage of the wheat which had been planted in the autumn of 1958 and had made its ushal late-season growth, was covered with ice for several weeks, As a result, much of it was so badly damaged that it was disced under in the spring. In mosl: of such instances, soybeans were planted to replace the wheat. Almost invariably the incidence of Phytophthora root and stalk rot was much more severe in the disced-down wheat fields than in other fields of soybeans in which the pre-seeding practice had been different. The reason for this is thought to be as follows.

When the wheat was disced under, only a few inches of the soil were loosened and aerated, Beneath this was left, undisturbed, a non-aerated, wet compact soil, on/or shallowly within which; the soybeans were planted. Such an environment would seem ideal for the development and multiplication a species of Phytophthora. The possibility that the degradation of the wheat residue in the soil might have been a factor contributing to the increased severity of the disease was at first considered but was rejected after the obtaining of further evidence supporting the soil-compactness theory. In soils where wheat had not been disced down, the disease was often worse on the headlands where the soil had been compacted by the turning of the tractor and other implements. In some cases where a farmer, early in the season, had driven an implement across a soybean field, the pattern of the disease followed the wheel ti-acks, Such was the evidence on which the correlation between severity of the disease and compactness of the soil was made,

Purple Stain of Seed

More soybeans were harvested under adverse weather conditions in 1959 than in many years previously. When harvesting operations should have been at their maximum, there was a succession of rainy periods with only short intervals suitable for harvesting. Always, under such conditions, there is higher incidence of purple stain of seed caused by Cercospora kikuchii. This year the occurrence of purple stain created a problem both for growers and seed dealers. In many instances the latter rdfused to accept seed lots because of the unusually high incidence of purple staid, which in one case 'exceeded 20 per cent.

Diaporthe phaseolorum ,in Soybean Seed

V. R. Wallen

Diaporthe phaseolorum, the cause of stem canker and pod-and-stem blight of soybeans was found to occur in high percentages of the soybean seed grown in the Ontario counties of Essex, Kent, Lambton, Middlesex and Elgin in 1959, A survey of elite, registered and commercial seed from those areas revealed that D. paseolorum was present in 139 of 150 seed samples examined, Infections ranged from one to 85 per cent with an average infection of 29 per cent.

In greenhouse trials the average emergence of seed was 77 per cent. Among the emerged seedlings, 10.5 per cent showed above-ground symptoms of the disease, The average emergence of healthy seed samples was 92 per cent. It is apparent, from the results obtained, that the fungus is causing a reduction in germination and subsequent emergence in addition to building up the supply of inoculum in the soil.

It is thought that the extremely hot, humid weather that prevailed during the latter part of the growing season induced early maturity of the soybean crop, In normal years the fungus attacks the crop late in the season and does not have sufficient time to establish itself within the seed.

SUNFLOWER

Sunflower Diseases in Manitoba in 1959

W. E. Sackston

Sunflowers were sown on 25,000 acres in Manitoba in 1959, Although the area devoted to this crop was reduced sharply from the 1958 seeding of 45,000 acres, preliminary estimates indicated that yields would be about 800 pounds of seed per acre,, the highest average since 1955,

Forty fields were examined in mid-September; 33 of them in the central area, and 7 in outlying areas. Mr. John Hildebrand, Cooperative Vegetable Oils, Ltd., Altona, assisted in locating fields and took part in the survey for 1 day,

Rust (Puccinia helianthi) was found in 36 of the 40 fields. Although inoculum was plentiful in the fall of 1958 the rust outbreak, that might have occurred if conditions had been favorable in 1959, did not develop. Infections were generally lighter than in 1958. There were traces of rust in 18 fields; from 2 to 10 per cent rust on the middle leaves in 14 fields, and from 15 to 35 per cent rust in 4 fields. Only 1 field of Beacon showed more than a trace of rust (10 per cent), The other fields with appreciable amounts of rust were of Mennonite and some of Advance in the central area, and 1 of Advance in the outlying area near Carberry.

Leaf Mottle (Verticillium albo-atrum). No leaf mottle was found in 18 fields, including all those in the outlying areas. It would have been difficult or impossible to distinguish leaf symptoms in the outlying fields, as all had suffered some frost damage before they were examined. There were traces of the disease in 8 fields; from 1 to 10 per cent of the plants were affected in 7 fields; 15 to 30 per cent in 4 fields; 75 per cent in 1 field; and 90 per cent in 2 fields. One of the fields with 90 per cent infection was a field in which leaf mottle was conspicuous in 1949 and severe in 1954, Although the disease has been most conspicuous in an area with relatively light soils, the pathogen has become well established in an inoculated nursery on heavy clay soil at the Winnipeg laboratory.

Stalk Rot (various causes). Plants with variously discolored stems were observed in a number of fields, There were traces of dark brown to black stem discoloration, in most cases on plants with internal stalk rot, in 4 fields: 1 per cent in 6 fields; 5 per cent in 2 fields; and 10 per cent in 1 field. This condition, as in previous years, was associated with Verticillium leaf mottle. V. albo-atrum pseudosclerotia were seen in some stems in the field, and the fungus was isolated from samples of stem tissue. The fields with 5 and 10 per cent of stalk rot were those with 30, 75, and 90 per cent of leaf mottle.

Plants with the elongate, pale brown stem lesions described for the first time in 1958, **(C.P.D.S. 38:41.)** were found in 7 fields. As in $958, plants of the variety S37-388 were much more severely affected than'those of Sunrise; Beacon also appeared to be susceptible, There were traces of the disease in 6 fields; 10 per cent in 1 field; and 75 per cent in 1 field (a crossing block.) In the field with 75 per cent of the plapts affected, symptoms were severe on about 25 per cent, and about 5 per cent of the plants were broken over at a lesion, the break usually occurring along the lower half of the stem.

New symptoms were observed, in addition to the apparently superfacial, elongate, pale brown lesions spreading from 2 to 4 inches up and down from the base of dead petioles, and extending from 3/4 to 1 inch around the stem, Many darker lesions were found in 1959, Apparently they darken with age, The lesions extended from 1 to 5 inches along the stem; most were from 3/4 to 1 1/2 inches wide but many completely encircled the stems, The lesions were invariably associated with petiole traces. Severe wilting of the leaves was associated with the stem lesions. Leaves above the lesioned part of the stem also wilted; the wilting apparently progessing apically. Wilted leaves died and turned brown. The leaf necrosis differs from Verticillium leaf mottle as it involves the whole leaf, not primarily the intepveinal areas. There was pronounced vascular discoloration in severely lesioned stems, and slight discoloration in only lightly lesioned stems. The root systems of affected plants were slightly to severely reduced in size and vigor. There was some external and internal discoloration of the roots, Plants which were apparently affected early were! prematurely ripe, shorter than healthy plants, the heads were small, and the seeds were light.

Three fields had a trace of the plants affected by miscellaneous stalk discolorations.

Downy Mildew (Plasmopara halstedii), Downy mildew was heavier in 1959 than in 1958, possibly because of plentiful early season moisture in the central sunflower area. There were traces of the disease in 7 fields; 1 per cent in 2 fields; 5 per cent in 7 fields; and 20 per cent and 30 per cent in 1 field each. In addition to the fields seen during the survey, systemic infection of 5 per cent of the plants were seen in 1 field, and 10 per cent in another, early in July. Two fields were reported to have been plowed down in June because of very heavy mildew attack, In both cases, sunflowers happened to follow sugar beets, another important crop in the sunflower area. As in previous years, no evidence of secondary leaf infections was seen.

Leaf Spot (Septoria helianthi) was found in the fall survey for the first time since 1947. The disease was found in trace amounts in 5 fields. It is difficult to explain the failure to find Septoria leaf spot in the fall surveys for the past 11 years. It was extremely prevalent in the autumn of 1947, but has been identified positively only once since then, causing lesions on the cotyledons of volunteer seedlings in a disease nursery at the Winnipeg laboratory in the spring of 1955,

An unidentified leaf necrosis affected almost 50 per cent of the lower leaves of Rust Resistant S37-388 in a crossing block. Spots about 5 to 10 mm. in diameter apparently enlarge, coalesce, and involve the whole leaf.

Wilt and Root Rot (Sclerotinia sclerotiorum) was present in trace amounts in 16 fields, and affected 1 per cent of the plants in 6 fields, Head Rot (Sclerotinia, Rhizopus, etc.) affected one or a few heads in 6 fields, Head Drop (Cause unknown; possibly snout beetles in some cases) was found on 1 or a few plants in 15 fields, and on 1 per cent in 1 field. Yellows (Aster yellows virus) was present in trace amounts in 19 fields, and on 1 per cent of the plants in 1 field.

Powdery Mildew (Erysiphe cichoracearum) was present on a few plants in 4 fields, and on 75 per cent of the plants in 2 fields.

Other Observations

ROOT ROT (Rhiaoctonia solani) was 2-tr.-sl. 1-sl.-mod./7 fields surveyed in s. Alta. (E'J. Hawn).

ROOT ROT (Sclerotinia sclerotiorum) was 1-tr.-sl. 1-sev./7 fields examined in s, Alta. (E. J. H.).

C: ROOT CROPS

SUGAR BEET

Diseases and Disorders of Sugar Beets in Ontario in 1959

A. A, Hildebaand

Phosphorus Deficiency

In the first week of August 1959, sugar beets in areas of Kent and Essex Counties, in which no appreciable rain had fallen since June, began to show a striking symptom picture that had not been encountered previously. On affected plants the tip and edges of the leaves and then the tissues between the veins died and turned black, Concurrently, the affected tips and edges rolled inward and upward. An early investigator described the condition as resembling a paralytic hand and for this reason the trouble was designated the "paralytic disease", From the information and description in the two following papers, the disorder was diagnosed as being due to phosphorus deficiency,

Coons, G. A. Some problems in sugar beets, U. S, D. A. Yearbook of Agriculture 1953, p. 512.

Afanăsiev, M. M. Phosphate deficiency of sugar beets in Montana, Pl. Disease Reptr, 25: 414-415. 1941,

As Afanasiev points out, the development of the symptoms of phosphorus deficiency in sugar beets is believed to be due not only to the amount of available phosphorus in the soil, but also to the amount of available nitrogen. Sugar bebts planted in soils which are poorly supplied with both these nutrients in the proper ratio to one another usually do not develop symptoms of phosphorus deficiency. However, beets planted in soils which have sufficient nitrogen but are very low in phosphorus usually develop these symptoms because plants well supplied with nitrogen require a proportionately higher amount of phosphorus,

Sugar Beet Root Louse

In the areas referred to above, the soil was so dry that it was extensively and deeply cracked. The sugar beet aoot louse gained access, by way of the cracks to the toots and heavily infested them, The source of the aphids was the alternate host, a poplar species in the vicinity of the infested fields, The feeding of the aphids and the deleterious effects of the phosphorus deficiency both superimposed on the drouth conditions that prevailed in the affected areas combined to render considerably less productive a number of sugar beet fields.

Leaf Spot

Leaf spot of sugar beets caused by Cercospora beticola contined to increase in prevalence this year; the increase being thought to be due to the wider acceptance and use of monogerm seed, Apparently the degree of resistance bred into the monogerm seed is not as high as was anticipated,

Other Observations

BLACK ROOT (Rhizoctonia solani, Pythium sp,, Phoma sp,). R. solani was identified as the cause of tr. -sl. root rot in fields in the Raymond and Taber areas of Alta. Pythium sp, was isolated from plants in a Lethbridge field showing sl.-mod. infection. Phoma sp. caused tr. infection in 1 field at Lethbridge (E. J. Hawn).

BORON DEFICIENCY was reported in a single field at Raymond, Alta, (E.J.H.).

D. MISCELLANEOUS CROPS

BUCKWHEAT

BACTERIAL INFECTION (causal organism unknown). About 40 per cent of the plants in 1 field in Man, were affected, Pathogenicity tests with the bacterial isolates are being made (W.A.F. Hagborg).

FIELD CORN

Field Corn Diseases in Ontario in 1959

N. J. Whitney

Root and stalk rot of field corn, a complex disease caused primarily by Gibberella ~~zeae~~ and Fusarium moniliforme, was exceptionally severe in south-western Ontario in 1959, due mainly to advanced maturity and delayed harvest brought about by wet weather. Early in November, a survey was made of corn in Essex County for damage by this disease, In 16 fields surveyed, 49 per cent of the plants were affected by root-and-stalk-rot and 11 per cent of them suffered stalk breakage as a direct result of the disease. Ten per cent of the ears were in contact with the ground as a result of stalk breakage. With approximately 50 per cent of the corn still to be harvested at the time the survey was made, considerable loss was anticpated from ear spoilage as well as from ears not picked.

In October, a survey was made of 24 fields in the counties of Essex and Kent for the incidence of smut and ear rots, Only three diseases were encountered: smut (Ustilago zeae, 1.7%; Diplodia ear rot (Diplodia zeae), 1.0%; and Pink ear rot (Fusarium moniliforme), 0.8%.

TOBACCO

Tobacco Diseases - 1959

Z.A. Patrick and L.W. Koch

Seedbed Diseases

Blue Mold or Downy Mildew (Peronospora tabacina). The occurrence of this disease in the tobacco belts of Ontario is becoming less frequent and only 2 cases of blue mold were recorded in 1959. They were noted in the Chatham area around the end of May. Although losses due to this disease have been negligible in the past 5 years, nevertheless, because the disease can assume epidemic proportions almost overnight, most of the growers follow a regular spray program as a preventative measure. To date this disease has not appeared in Quebec.

Damping-off or Bed Rot (Pythium spp, and Rhizoctonia spp.). This disease as in the past, continues to be the most common trouble in tobacco seedbeds. In most instances, however, the disease occurs only in small patches where drainage is poor or where the plants are too crowded. The overall losses are consequently very light.

Yellow Patch (excessive nutrients), This disorder* which is not caused by any parasitic organism, is still one of the most common seedbed disorders of tobacco. This is especially true in burley tobacco where the groundbed type of seedbed is commonly used for growing seedlings. The disorder appears to be mainly due to over-fertilization and the accumulation of salts in the beds, With this disorder, characterized by irregular patches of yellow .stunted seedlings, recovery often occurs when the excess fertilizer is leached out,

Black Root Rot (Thielaviopsis basicola). A few cases of black root rot occurred in tobacco seedbeds. This was found to be due to improper steaming of the soil and the use of the highly susceptible burley variety, Green Briar,

Field Diseases

The outstanding feature in the tobacco disease picture during 1959 was the continued and increasing importance of leaf spot diseases. Two general types of leaf spots were encountered, namely: parasitic leaf spots caused by known pathogenic organisms, and the non-parasitic types, the precise causes of which are still unknown. Total damage to tobacco due to leaf spots is difficult to estimate since in most instances the quality and grade as well as the yield are affected. It is suspected, however, that damage due to leaf spot diseases is becoming serious, Of the non-parasitic type, the disease which is called "weather fleck" continues to cause extensive losses to growers, especially along the shore of Lake Erie, The precise 'cause of this disease is still unknown but it appears to be due to the interaction of genetic, nutritional and environmental factors. The only known remedial measure is the use of the tolerant variety, Delcsest, Varieties such as White Gold and Hicks appear to be especially susceptible to this disorder.

Brown Spot (Alternaria longipes). This disease, along with "weather fleck" and "frogeye" caused considerable damage to flue cured tobacco, Brown spot is usually confined to maturing leaves but, because of the warm weather during the early part of the growing season, it occurred early and persisted, with increasing severity, throughout the whole growing season. In many areas the leaves were completely covered with the large, circular, brown spots characteristic of this disease,

Frogeye (Cercospora nicotianae] was widespread in 1959, and was more common on maturing leaves,

Soft Rot (Pythium spp.) and Sore Shin (Rhizocton'ia spp.) were confined to the new transplants in the early part of the season, They were moderately serious in 1959 because of the widespread occurrence of the seed corn maggot which provided numerous infection courts for the two pathogens.

Brown Root Rot (Pratylenchus spp,), Damage due to brown root rot was lighter than usual during 1959. This may have been because of weather conditions which were unfavourable for the root-ledion nematodes, This disease has been increasing in severity over the years and a number of growers have begun fumigating their soil.

Black Root Rot (Thielaviopsis basicola). Because most of the tobacco varieties used in Canada are moderately resistant, this disease was confined to low-lying parts of the field where growing conditions were unfavorable for tobacco. Light losses only were encountered.

Frenching (? soil toxins) was confined to fields where the soil types are marginal and unfavourable for growing tobacco. Losses from this disease were negligible.

Angular Leaf-Spot and Wildfire (Pseudomonas angulata and P. tabaci). A few fields were noted in which the, tobacco leaves were damaged by these two diseases. Only a few plants were affected in each instance,

Mosaic (virus), Injury from TMV was widespread throughout the tobacco-growing areas of Ontario and Quebec but losses were heavy only in fields where the growers failed to take proper sanitary precautions in their transplanting operations. In most instances, however, only a few plants in each field were affected and most of the damage was confined to a few top leaves.

Etch (virus), Damage from the etch viruses were not as severe as in 1958. Moderate to severe damage was noted in a few fields in the Leamington - Harrow areas where this disease has been serious since 1955. To date etch has been severe only on burley tobaccos, whereas symptoms on flue tobaccos have always been mild.

Other Virus Diseases. Tobacco is a host for a relatively large number of viruses, several of which were observed occurring in the field. In most instances, however, only a few scattered plants were affected and losses were negligible. Among the viruses noted, the most common were those of the cucumber mosaic group and certain of the potato viruses. Others encountered were the streak, ring spot, vein banding, curly top and mottle viruses.

Hail Injury. A number of hail storms which occurred in the Delhi area caused considerable damage to a few isolated tobacco fields.

Frost Damage. Due to early frosts at harvest time up to 20 million pounds of tobacco were lost in the tobacco growing areas of Ontario and Quebec.

House Burn, As a consequence of prolonged wet weather during harvesting and curing, considerable losses resulted from rotting of tobacco in the curing barns, This disorder is most serious in burley tobacco where the air curing method is followed, It results in rotting of the stalks, midribs, veins and leaves while the tobacco is hanging in the barns. The rotting is caused by saprophytic organisms among which are species of Penicillium, Aspergillus, Fusarium, Cladosporium, Rhizopus and Botrytis, as well as the bacterial soft rot producing Erwinia spp. which attack the tobacco when the humidity is above 85%. This trouble is not serious on flue-cured tobacco where heat is used for curing and the tobacco is not kept at high humidity,

E. CULTIVATED AND OTHER GRASSES

AGROPPRON

Stem Smut (Ustilago spegazzinii) is becoming increasingly prevalent on A. repens in the Trout Creek Point section of the Summerland, B.C. district (G.E. Woolliams). It affected over 50% of the plants in patches at Selkirk, Man. This is apparently the first report of stem smut on Agropyron from Man. (W, J. Cherewick).

This smut has been reported under the binomial U. hypodytis from the Okanagan district of B.C. and from St. Catharines, Ont. (D. W. Creelman).

Brittle Dwarf (virus) was sl. on A. cristatum var, 'Fairway' and sev. on var. 'Summit) in plots at Saskatoon, Sask. It was also sev, on A. intermedium (H. W. Mead),

AGROSTIS

Winter Crown Rot (low-temperature basidiomycete). Damage ranging from sl.-sev. was observed at Calgary, Red Deer and Lethbridge, Alta. (J.B. Lebeau).

BROMUS

Ergot (Claviceps purpurea) was sl, in 2/15 fields examined in Sask. (H.W.M.).

Leaf Spot (Selenophoma bromigena) caused sl.-mod. damage to leaves in one stand at Lethbridge, Alta. (E.J. Hawn). A mod.-sev. infectian occurred

in plots at Saskatoon, Sask, There were distinct differences in the susceptibility of different clones (H, W ,M.).

CALAMAGROSTIS

Anthracnose (Colletotrichum graminicola), Moderate infections were on C. canadensis in Laurentide Park, Que. (D, Leblond).

DACTYLIS

Purple Leaf Spot (Mastigosporium rubricosum) caused slight damage in a stand of D. glomerata at Agassiz, B. C. (E,J.H.).

Brown Stripe (Passalora graminis) was tr. in 2 fields at Lethbridge, Alta, Damage was negligible (E.J.H.).

DIGITARIA

Smut (Ustilago syntherismae) was extremely heavy on D, ischaemum in a lawn at Ottawa, Ont. (S.J, Hughes, D.B.O. Savile), Although this represents the first report of this smut to the Survey, there is a collection in DAOM, also from the Ottawa area (D. W.C.).

HORDEUM

Smut (Urocystis agropyri), A tr, infection was seen on H. jubatum at Selkirk, Man. This is the first report, to the Survey, of this smut on Hordeum (W.J.C.).

POA

Rust (Puccinia graminis), Four lawns of Merion bluegrass (P. pratensis) were severely attacked at Lethbridge, Alta. (J.B.L.).

Winter Crown Rot (low-temperature basidiomycete) caused mod, -sev. damage to a lawn in Calgary and sev. damage to a lawn in Lethbridge, Alta., ... (J.B.L.).