39th Annual Report

OF THE CANADIAN PLANT DISEASE SURVEY 1959

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FOREWORD

The 39th Annual Report of the Canadian Plant Disease Survey conforms in format and content with previous Annual Reports. Twenty-three special reports are presented but the bulk of the information included is, as in former years, made up of short observations made by many observers on a wide variety of diseases.

This is the last of the series of Annual Reports. It has been felt for a number of years that the Reports, in their present form, had outgrown much of their usefulness and that a publication appearing more frequently would better serve the interests of Canadian plant pathologists. I am pleased to announce that the first number of such a publication will appear in September of 1960 and that subsequent numbers will follow at quarterly intervals.

The pages of "Canadian Plant Disease Survey", as the new publication will be called, are open to qualified observers for reports of research, surveys, reviews, summaries and opinions on matters pertaining to the occurrence of plant diseases in Canada. It is hoped that much of this material now being published elsewhere will find its way to the pages of the Survey.

I wish, at this time, to thank all who have contributed to the 39th and previous Annual Reports. I also wish to solicit their continued support to ensure the success of the Survey in its new form.

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New and Noteworthy Diseases

In 1959 as in 1958, wheat leaf rust (Puccinia recondita) was the most prevalent cereal rust in Western Canada. It is estimated that this rust caused a yield loss of 1,000,000 bushels in areas of Manitoba planted to Thatcher and other leaf-rust susceptible varieties. Wheat stem rust (Puccinia graminis tritici) infections were extremely light, as has been the case for several years.

Speckled leaf blotch (Septoria avenae f. sp. avenae) was widespread and severe on oats in Eastern Canada. There was a high incidence of barley yellow dwarf virus in some oat crops near Montreal, Quebec. Twist (Dilophospora alopecuri) was reported on oats from Quebec.

Soybean seed in Ontario was infected with Diaporthe phaseolorum var. sojae resulting in a seriously low germination rate in many lots of seed. Phytophthora stalk-and root rot (Phytophthora megasperma var. sojae) was also widespread and was serious in some districts. Purple seed-stain (Cercospora kikuchii) caused widespread injury.

Downy mildew (Plasmopara halstedii) was more prevalent on sunflowers in Manitoba than in 1958. Some affected fields were plowed under in June. Leaf spot (Septoria helianthi) was found for the first time since 1947.

Ring spot (Mycosphaerella brassicicola) was identified for the first time on rape stubble and rape seed in Saskatchewan. Leaf spot of sugar beets (Cercospora beticola) continued to increase in prevalence in southwestern Ontario, due apparently to the increased use of monogerm seed which lacks resistance.

Root-and stalk rot of field corn (Gibberella zeae, Fusarium moniliforme) was extremely severe in southwestern Ontario and caused heavy losses. Leaf spots (Alternaria longipes and Cercospora nicotianae) combined with the non-parasitic leaf spot, weather fleck, were responsible for losses in the tobacco crops in Ontario and Quebec.

Bacterial ring rot (Corynebacterium sepedonicum) and blackleg (Erwinia atroseptica) continue to be the principal causes of rejection of seed potato fields in Eastern Canada. Leaf roll reached epidemic proportions in British Columbia, primarily in the variety Netted Gem, and resulted in heavy losses in both seed and table stocks. Losses from late blight (Phytophthora infestans) were serious in Quebec and the Atlantic Provinces.

Black rot (Xanthomonas campestris) continued to cause considerable damage to cabbage crops in Manitoba. Cercospora carotae in association with Alternaria dauci caused damage to carrots in Quebec and Nova Scotia. Wilt (Verticillium albo-atrum) was severe in eggplant, pepper and tomato crops in southwestern Ontario.

Black mold (Aspergillus niger) reached serious proportions in stored onions in southwestern Ontario. White rot (Sclerotium cepivorum) was found in a planting of onions in Manitoba. This disease is new to Canada. Onion smut (Urocystis cepulae) was general and, in some cases, serious in Manitoba and the Okanagan Valley in British Columbia.

Parsnip canker (Itersonilia perplexans) was found, for the second time in Canada, in fields in New Brunswick. Anthracnose (Colletotrichum atramentarium) occurred on pepper fruits in Ontario. Skin rot (Rhizoctonia solani) is increasing in importance on swede turnips in Nova Scotia.

Leaf mold (Cladosporium fulvum) caused considerable damage to greenhouse tomato crops in Ontario. Anthracnose (Colletotrichum atramentarium) reached serious proportions in canning tomatoes in the same province. Bacterial canker (Corynebacterium michiganense) caused losses to tomatoes in Ontario and British Columbia. Double-virus streak was generally present in canning crops in Ontario.

Fire blight (Erwinia amylovora) is increasing in importance in most of the apple producing districts of Quebec. Heavy infections of Bull's-eye rot (Gloeosporium perennans) developed in apples in storage in British Columbia. Scab (Venturia inaequalis) was generally well controlled but all districts reported a considerable amount of late pin-point scab. The presence of the rubbery-wood and stem-pitting viruses was demonstrated in commercial orchard trees of a number of varieties in British Columbia.

Monilinia padi was recorded, for the first time in Canada, on sour cherry in Prince Edward Island. Powdery mildew (Podosphaera oxyacanthae) infections were heavy on sour cherry in British Columbia and Ontario.

Gray mold rot (Botrytis cinerea) caused appreciable losses in strawberry plantings in New Brunswick and Nova Scotia. Leaf spot (Septoria aciculosa) was more prevalent on strawberries in Nova Scotia than in any previous season. Wilt (Verticillium albo-atrum) is becoming a serious factor in strawberry production in the Niagara Peninsula, Ontario. Green petal of strawberry was reported for the first time in Ontario.

Heavy infections of powdery mildew (Sphaerotheca pannosa) developed on roses in greenhouses in Ontario. Anthracnose (Marssonina kriegeriana) was general and destructive on willows on Vancouver Island, British Columbia. Powdery mildew (Microsphaera alni) was very common on lilacs in western Nova Scotia.

Maladies Nouvelles ou d'importance notable

En 1959, tout comme en 1958, c'est la rouille des feuilles du blé (Puccinia recondita) qui a pris la vedette dans l'Ouest Canadien. On a évalué à plus de 1,000,000 de boisseaux les pertes dues à cette rouille dans les seules régions du Manitoba où l'on cultive le Thatcher et d'autres variétés sensibles. La rouille de la tige du blé (Puccinia graminis tritici) a été bénigne tout comme au cours des dernières années.

La tache ovale de l'avoine (Septoria avenae f. sp. avenaue) était très répandue et plutôt grave dans l'Est du Canada. La jaunisse-naine de l'orge, maladie virulente, était très commune dans certains champs d'avoine près de Montréal, P. Qué. On a signalé la torsade (Dilophospora alopecuri) de l'avoine dans le Québec.

La semence de Soya était contaminé par le Diaporthe phaseolorum var. sojae ce qui a eu comme conséquence de diminuer appréciablement la faculté germinative de bon nombre de lots de semence. Le pourridié (Phytophthora megasperma var. sojae) était fort répandu et a causé des dégâts importants dans certaines régions. La graine pourpre (Cercospora kikuchii) a également causé des dégâts importants.

Le mildiou du tournesol (Plasmopara halstedii) était plus répandu qu'en 1958 au Manitoba; quelques champs très malades furent labourés en juin. Depuis 1947 c'est la première fois qu'on observe la tache des feuillex du tournesol (Septoria helianthi).

C'est également la première fois qu'on note la présence de la tache annelée (Mycosphaerella brassicicola) sur les fanes et la graine de rayfort en Saskatchewan. La tache des feuilles de la betterave sucrière (Cercospora beticola) augmente sans cesse dans l'Ontario méridional à cause de l'usage de plus en plus répandu des variétés dont la semence est monogerme; ces variétés sont sensibles à cette maladie.

Le pourridié du maïs à grain (Gibberella zeae, Fusarium moniliforme) fut très grave dans l'Ontario méridional et y a causé des dégâts considérables. La récolte de tabac de l'Ontario et du Québec a subi des pertes à cause des taches des feuilles dues à Alternaria longipes et Cercospora nicotianae, à cause aussi de taches physiogéniques.

Dans l'Est du Canada, la flétrissure bactérienne (Corynebacterium sepedonicum) et la jambe noire (Erwinia atroseptica) des pommes de terre sont encore les deux principales causes de refus de certification de champs de semence. L'enroulement des feuilles a atteint des proportions épidémiques en Colombie-Britannique surtout avec la Netted Gem, et les pertes ont été sensibles tant chez les producteurs de semence que chez les producteurs de pommes de terre de consommation. Les pertes dues au mildious (Phytophthora infestans) furent considérables dans le Québec et les provinces de l'Atlantique.

La pourriture noire (Xanthomonas campestris), cette année encore, a causé des dommages considérables à la récolte de choux au Manitoba. Le Cercospora carotae en association avec l'Alternaria dauci ont endommagé les carottes dans le Québec et en Nouvelle-Ecosse. La flétrissure verticillienne (Verticillium albo-atrum) fut une maladie importante des cultures d'aubergine, de piment et de tomate dans l'Ontario méridional..

La moisissure noire de l'oignon (Aspergillus niger) a atteint des proportions inquiétantes dans l'oignon d'entrepôt dans l'Ontario méridional. On a observé la pourriture blanche (Sclerotium cepivorum) dans un champ d'oignon au Manitoba; c'est la première fois qu'on observe cette maladie au Canada. Le charbon de l'oignon (Urocystis cepulae) fut très répandu et quelquefois désastreux au Manitoba et dans la vallée de l'Okanagan en Colombie-Britannique.

On a observé une seconde fois au Canada le chancre du panais (Itersonilia perplexans) dans quelques champs au Nouveau-Brunswick. L'anthracnose (Colletotrichum atramentarium) s'est attaqué au piment en Ontario. La pourriture de l'épiderme du rutabaga (Rhizoctonia solani) prend de l'importance en Nouvelle-Ecosse.

La moisissure brune des tomates (Cladosporium fulvum) a causé des dégâts considérables dans les serres en Ontario. D'autre part, l'anthracnose (Colletotrichum atramentarium) a atteint des proportions épidémiques dans les tomates de conserverie. Le chancre bactérien des tomates (Corynebacterium michiganense) a causé des pertes en Ontario et en Colombie-Britannique. On a observé la rayure causée par une combinaison de deux virus dans la récolte de conserverie en Ontario.

La brûlure bactérienne du pommier (Erwinia amylovora) prend de l'importance dans toutes les régions fruitières du Québec. L'anthracnose (Gloeosporium perennans) des pommes a atteint des proportions sérieuses en entrepôts en Columbie. En général, au Canada, on a facilement contenu la tavelure des pommes (Venturia inaequalis); toutefois dans tous les districts on s'est plaint de la tavelure d'entrepôt qui, bien que tardive, s'est développée considérablement. On a confirmé la présence des virus responsables du bois-caoutchouc et de la tige-poinçonnée chez plusieurs variétés de pommiets dans des vergers commerciaux.

C'est la première fois qu'on observe au Canada (Ile du Prince-Edouard) le Monilinia padi sur la cerise sure; sur le même hôte le blanc (Podosphaera oxyacanthae) a été très grave en Colombie et en Ontario.

La moisissure grise (Botrytis cinerea) a causé des pertes considérables dans les fraisières du Nouveau-Brunswick et de la Nouvelle-Ecosse. La tache des feuilles du fraisier (Septoria aciculosa) était plus répandue que les années

dernières en Nouvelle-Ecosse. La flétrissure verticillienne (Verticillium albo-atrum) devient un des facteurs importants de la culture du fraisier dans la péninsule de Niagara en Ontario. Les pétales-verts du fraisier a fait son apparition en Ontario.

Le blanc du rosier (Sphaerotheca pannosa) a atteint des proportions alarmantes dans les serres en Ontario. L'anthracnose du saule (Marssonina kriegeriana) fut très répandue et dommageable su l'île de Vancouver en Colombie-Britannique. Le blanc de lilas (Microsphaera alni) fut très commun dans la partie occidentale de la Nouvelle-Ecosse.

The Weather and its Influence of Plant Disease

The winter of 1958-59 in the coastal areas of B.C. was moderate. Temperatures fell below 25°F on only three days in Jan., the coldest day being 3 Jan. with a minimum temperature of 11°F. The last spring frost occurred in March but cooler than average temperatures in May retarded the initial growth of annual vegetables and ornamentals.

As a result of the moderate winter some aphids, Myzus persicae, may have survived in sheltered locations in the coastal areas. There was also a large overwintering egg population following the heavy peach aphid infestation in the fall of 1958. Many virus-infected volunteer potato plants also survived. The serious outbreak of potato leaf roll necrosis which occurred in 1959 is thought to have been influenced by the overwintering of the vector and infected hosts.

Spring and summer rainfall were above normal and the generally overcast, showery weather was probably responsible for the higher incidence of blackleg which was found in all areas of the province. Late blight occurred in slight to moderate amounts in central B.C., Lulu and Sea Islands and on Vancouver Island. The first killing frost at Vancouver was on 3 Nov. (N. Mayers, H.N.W. Toms).

Only three days of sub-zero temperatures were experienced in the Okanagan and Arrow Lakes districts. Fruit tree damage was confined to some spur and bud damage in the northern areas and upper valleys. Frost, however, occurred in most districts in central B.C. during the last week of April causing additional bud damage in many orchards. This resulted in a severe reduction in the sweet cherry crop and a marked reduction in the apple crop in some areas.

March and April were abnormally dry with a total rainfall, for the two months, of only 0.5 in. However, a period of wet, cloudy weather in mid-May, coinciding with temperatures of 42°-60°F, provided an adequate infection period for apple scab. In districts from Kelowna north, orchards which did not receive an eradicant spray at this time suffered moderate to severe scab outbreaks, whereas orchards in which an eradicant was used up to 5 days after the infection period were essentially free of scab. The wet weather did not coincide with the period of pear bloom hence, though fire blight was present in scattered orchards, it was not a critical problem.

Except for late June and the month of July, summer temperatures averaged below normal and skies were characteristically overcast. Most types of fruits were of lower quality than usual; soft, and susceptible to bruising.

Cool weather in the Arrow Lakes area prolonged cherry blossoming over a three-week period. Frequent rains occurred during the latter half of the bloom period and brown rot blossom blight was extensive in both sprayed and unsprayed orchards. Despite further rain, infection did not spread to green fruit. Unusually dry weather prevailed during harvest and brown rot of ripe fruit was negligible.

During the apple-harvesting season, the periods 13-26 Sept. and 7-13 Oct. were almost continuously damp. Pin-point scab developed abundantly on several varieties during storage. Bull's-eye rot also appeared in stored apples of an unusually wide range of varieties in the northern districts.

The relatively cool weather that prevailed in early summer favored the symptom expression of some virus diseases. Marked symptoms of leaf pucker of apple appeared in leaves formed before the end of June. The associated fruit symptoms were more severe than they have been for several years. Symptoms of sour cherry yellows were also pronounced. Surveys conducted in a number of plantings of Montmorency revealed a much more extensive incidence of yellows than previous observations had indicated (M.F. Welsh, L.E. Lopatecki).

Spring came early in 1959 in northern Alberta and warm, dry conditions prevailed in March and April. May and June were cool and dry. This sequence of weather did not favor an early development of disease. Wet weather in July and August favored the development of appreciable amounts of leaf diseases in cereal plots at Edmonton. Generally, disease was not a factor in crop production in northern Alberta in 1959 except stem-break of flax in the Fort Vermilion area and rust on the flax variety Redwing wherever it was grown in the Peace River district (W.P. Campbell).

Snowfall was heavy in southern Alberta during the winter of 1958-59 and the chinook winds caused ice sheeting in many fields. This condition was responsible for damage to forage crops. The weather during the summer was cool and cloudy and favored the development of some foliage diseases (J.B. Lebeau).

In Saskatchewan the early part of the growing season, up to July, was unusually dry. Soil moisture was inadequate for even germination in any but the northeastern area. At many points precipitation was only 40-50 percent of normal. The incidence of common root rot was much higher on wheat seedlings in the dry areas than in the northeast. Leaf and stem diseases of forage legumes, cereals and grasses developed very slowly but became common after the late-June rains. Stem rust of cereals was negligible because of lack of inoculum. Leaf rust of wheat was moderate in intensity and powdery mildew of clover developed rapidly after July. Blossom-end rot of tomatoes was unusually prevalent (H.W. Mead).

Temperatures were 2-6°F below normal in the Prairie Provinces in May. During June and July tempeatures favored rust development and averaged 2-4°F above normal over most of the area. In Aug., temperatures in the extreme southern parts of Manitoba and Saskatchewan were slightly above normal but elsewhere in the prairie area they were 2-4°F below normal.

During most of the growing season of 1959, except in some areas in eastern and northwestern Manitoba and in northeastern Saskatchewan, rainfall was much below normal. July was a very dry month with rainfall generally averaging about one-third to one-half of normal. August precipitation was rather erratic. Rainfall was quite deficient in southern Saskatchewan and southwestern Manitoba but above normal elsewhere in Manitoba and in northeastern Saskatchewan.

The pattern of cereal rust development during the summer of 1959 was determined to a large extent by the distribution of rainfall during the growing season (B. Peturson, G.J. Green, D.J. Samborski).

The prolonged cold winter in southwestern Ontario was responsible for serious winter-killing of peach trees in the Harrow-Leamington area. The higher incidence of winter-kill on the light, well-drained soils than on soils with a greater moisture-holding capacity indicated quite clearly that the dry soil condition at the time of freeze-up predisposed trees to winter injury.

Abundant sunshine in Jan. and Feb. favored excellent growth of tomato and cucumber crops under glass. The heavy, succulent growth that resulted produced conditions favorable to serious Botrytis infections which became evident in April and May. Exceedingly high summer temperatures over a prolonged period were injurious to the fall greenhouse tomato crop in southern Ontario. Setting was poor on the first three trusses, and in several houses the physiology of the plants was so altered that normal pollination and fruit setting failed to occur when cooler weather arrived.

The hot, dry summer favored the outbreak of black mold in cooking onions grown in the Erieau Marsh near Blenheim, Ont. The disease appeared characteristically after the onions had been in storage a few weeks. The disease was much less serious in the Leamington Marsh where precipitation was higher.

A combination of weather, plant growth and perhaps other factors militated against an early-season build-up of aphid populations on vegetable and tobacco crops. Consequently, serious virus epidemics in burley tobacco and vegetable crops did not occur in 1959 (C.D. McKeen).

Prolonged, near-zero temperatures beginning in December in the Niagara Peninsula of Ontario caused considerable damage to many fruit trees and vines. Grape vines suffered generally in all areas from considerable dying-back of canes and in some areas mature vines were completely killed. Deep ice covered many fruit farms for most of the winter causing severe damage to strawberry plantations (W.S. Carpenter, R. Wilcox).

The 1959 growing season in the Niagara Peninsula was characterized by dry, warm weather and disease development was meagre. Rainfall in May totalled 2.66 in. including a heavy shower of 1.25 in. on 31 May. Rain showers occurred on ten other occasions during the month but they were generally of short duration and not critical for infection. Warm temperatures, with a mean of 66°F, accompanied by light showers in the early bloom period for pears favored the development of fire blight blossom infection which later progressed to produce a scattering of spur-and twig blight. This infection was spread widely by a heavy wind and rainstorm on 6 July and in a few orchards the infection spread to fruits on the lower parts of the trees.

The June rainfall totalled only 0.88 in. Temperatures reached the high 80's to 90's on seven occasions with a maximum temperature of 91 on June 10 and 29. These conditions were most unfavorable for disease development. Apple scab, which is generally well established in early June, could be found only on a single leaf on unsprayed trees. This marked the lowest incidence of scab ever recorded in the St. Catharines laboratory orchard. Mild weather during the bud-break and blossom period of sour cherries influenced the symptom expression of cherry yellows. Yellowing and leaf casting were extremely slight.

Rainfall in July, at 1.27 in., was also below normal and high temperatures prevailed. An outstanding feature of the July weather was a damaging storm accompanied by hail, heavy wind and rain on 5 July. This storm battered the cherry crop, much of which was left unharvested; caused severe damage to grapes, splitting the berries and shattering clusters; and pock-marked apples, pears and peaches in a wide swath extending from Beamsville to the Niagara River.

In late July many reports were received concerning leaf scorch of pear foliage, a condition related to high temperature, prolonged dry weather, mite infestation and the use of certain acaricides. A similiar trouble occurred in 1958 under similiar conditions.

The weather in August continued very warm with a maximum temperature of 93°F recorded on the 14th and 15th. Scalding of peaches occurred and skin-cracking and dimpling of the skin appeared in sulfur-sprayed orchards. The rainfall was greater in August and there were periods of high humidity. This favored the development of powdery mildew of grapes and sour cherries. Brown rot was a minor factor during peach harvest but Rhizopus rot was common on fruit held for a few days in storage.

The development of sooty blotch was favored by late-season rains and cooler weather, particularly on late varieties such as Spy apples and Kieffer pears (G.C. Chamberlain).

The growing season in 1959 in the lower St. Lawrence River area was not especially favorable for plant disease development. Vegetation developed normally in May but growth was greatly retarded between 6 and 15 June when cold, raw weather prevailed. During this period serious damage was suffered by young leaves of trees, ornamentals and vegetable crops.

At the end of June apple scab was well established and by early July considerable infection of apples by Gymnosporangium rust was evident. Excessively warm weather and low precipitation in July checked both disease development and plant growth.

In August, temperatures cooled somewhat and precipitation increased considerably. The delayed development due to the prolonged July drought was followed by a very rapid growth which resulted in physiological disturbances such as blossom-end rot of tomatoes, head-cracking in cabbages and hollow heart of potatoes. In late August, late blight and anthracnose of tomatoes appeared. In spite of favorable conditions, apple scab did not make appreciable progress.

The high humidity in late August and early September favored outbreaks of Botrytis on herbaceous ornamentals. The disease was checked by a return to more normal conditions late in September (L.J. Coulombe).

In the Annapolis Valley of Nova Scotia, conditions were very favorable for apple scab development in 1959. The first ascospore discharge occurred on 27 April and discharges continued until 18 June. The first infection period was on 11-12 May and scab lesions appeared 28 May. There were 10 heavy, 4 moderate and 1 light infection periods during May, June and July. The duration of four heavy infection periods in June was 50, 68, 30 and 84 hours respectively. August and September were very wet and, where protection was inadequate, late or pin-point scab developed profusely. Despite the severe scab conditions most growers obtained good control of scab by applying extra sprays (R.G. Ross).

Winter and early spring conditions were such in Prince Edward Island that extensive winter-killing occurred in strawberry plantations and berry yields were drastically reduced. Clovers, alfalfa and other legumes were also practically eliminated from stands of hay.

Discharge of ascospores of the apple scab pathogen took place over a 22-day period beginning 1 June. Appreciable discharge was recorded 1-4 June, 9 June and 19 June. Smaller discharges occurred on three other occasions. The first infected leaves were seen 17 June.

The precipitation at Charlottetown for the July-September period, at 7.03 in., was 3.33 in. below the 38-year average. However, there were 45 days in which rain fell and, though many of these rains were only mists and unrecorded, the relative humidity was often high for long periods. From 4-11 August some rain or drizzle fell every day and the mean relative humidity for the period was 93.1 percent. Similarly, the week 12-18 August had a mean humidity of 87.6 percent and the last week of August and the first week of September had relative humidities of 85.1 and 81 percent respectively. Late blight of potatoes was first reported on 15 July. It developed rapidly in August due to adequate free moisture and the long periods of high humidity. Yield was reduced by an estimated 15 percent.

Club root of crucifers presented little or no problem in 1959 and this could be correlated with the below-average rainfall. However, a bacterial rot originating at or near the crown in swede turnips and in the above ground portion of the stem of cauliflower was quite prevalent. Infection ranged from 50-80 percent in some turnip fields. The high humidities during August, together with lower than average sunshine, seemed to favor the establishment of the pathogen in growth cracks and mechanical wounds (J. E. Campbell).

Plant Parasitic Nematodes in Southwestern Ontario - 1959

W.B. Mountain, R.M. Sayre and J. L. Townshend.

Root Knot Nematode in Field Crops

There is little doubt that the northern root knot nematode, Meloidogyne hapla, has become considerably more prevalent in southern Ontario, particularly on sandy and muck soils. In the Bradford, Thedford and Port Colborne marshes this nematode was a serious problem on carrots in 1959. On one farm in the Bradford marsh affected carrots were more prevalent along an irrigation ditch, suggesting the possibility of spread by irrigation. According to Mr. W.S. Carpenter, Extension Specialist, Ontario Department of Agriculture, "a few hundred acres" in the Port Colborne marsh were heavily infested in 1959 and indeed, populations of 3000 larvae of M. hapla per pound of muck soil were recovered. On one farm in the Thedford marsh the grower was obliged to plough up four acres of infested carrots and a further six acres were seriously affected. The grower stated that he had observed trace amounts of root knot in previous years but the problem was much more serious in 1958 and 1959.

In the Burlington area on sandy soil, celery, lettuce and carrots were found to be infested by M. hapla in seven of fourteen farms examined. On two of these farms root knot was a serious problem in 1959. In young celery plants the foliar symptoms of root knot, stunting and chlorosis, somewhat resemble aster yellows. The presence of root galls and the absence of twisting of the petioles with root knot, however, readily separate these two diseases.

Near Milton, Ontario, a planting of strawberries of mixed varieties was severely attacked by M. hapla with the most seriously affected plants growing on sandy soil. There is some evidence to suggest that infestation of this field resulted from planting infested strawberry varieties imported from Maryland, U.S.A. five years ago.

Root Knot Nematode in Greenhouse Crops

Root knot nematode continues to be a serious pest in greenhouses. In 1959 the root knot nematodes Meloidogyne hapla, M. javanica and M. incognita var. acrita were recovered from various crops. In a Fonthill greenhouse geranium plants were affected by M. hapla and at Grimsby African Violet and Philodendron were attacked by M. incognita. In a greenhouse at St. Catharines M. incognita and M. javanica were recovered from galls on the roots of cucumber and tomato. A greenhouse crop of lettuce near Leamington was found to be infected with M. hapla. In other greenhouses in the same area, M. incognita and M. incognita var. acrita were recovered from tomato and cucumber roots.

In general, the presence of the southern forms, M. incognita, M. incognita var. acrita, and M. javanica, may be suspected when large, massive galls occur on the roots of affected plants, whereas small galls are usually caused by the northern root knot nematode, M. hapla.

Root Lesion Nematodes in Field Crops

Tobacco. The populations of Pratylenchus penetrans were very much lower throughout flue-tobacco soils in Ontario than they have been for several years. The lower populations could be due to a combination of two factors: (1) a lower initial population due to extensive killing by ice, of the rye cover crop upon which the nematode builds up during the preceding winter; and (2) the higher than average soil temperatures immediately following transplanting of the tobacco to the field resulting in a reduced rate of reproduction of the nematode. As a result, brown root rot was much less serious than usual in tobacco in 1959.

Peach. Failure of a one-year old peach orchard near Cedar Springs was associated with a high soil population of Pratylenchus penetrans. Previously this land had been planted to strawberries for three years.

Eggplant. Large populations of Pratylenchus penetrans were recovered from the roots of eggplant at Harrow. However, the nematodes did not appear to be causing any damage to the crop.

Sour Cherry. A sour cherry replant problem occurs in the Niagara Peninsula where cherries are planted on either former cherry or peach orchard sites. Because of lower than average rainfall during the past two years the problem has become more conspicuous. Some trees fail to become established, whereas others live but remain stunted. Foliar symptoms suggest drought and potash deficiency. Feeder roots are almost completely lacking and the trees do not respond normally to fertilizer. The root lesion nematode, Pratylenchus penetrans is prevalent in affected orchards. From 100 to 900 P. penetrans per gm. of dried root have been recovered from roots of affected trees with the soil populations of the nematode varying from 100 to 650 per pound.

Celery. In the Burlington area ten out of fourteen farms surveyed showed that celery was being affected by high populations of Pratylenchus penetrans. Increased application of fertilizer and irrigation have helped to offset the effects of the nematode but soil fumigation is necessary to restore normal yield.

Strawberry. A survey carried out at Vineland in 1959 showed that fifteen commercial varieties of strawberries were infested with Pratylenchus penetrans. The populations varied from 60 to 3500 per gram.

Root Lesion Nematodes in Greenhouse Crops

In two greenhouses near Leamington chrysanthemums have been stunted by high populations of Pratylenchus penetrans. In both cases the nematode apparently was introduced in unsteamed soil which had been obtained from tobacco or tomato fields.

Pin Nematodes in Field Crops

Paratylenchus sp. continues to affect the growth of celery in several areas in the Thedford marsh and in a clay loam soil near London. Stunted rhubarb growing in the same area near London might also have been affected by high soil populations of the pin nematode.

Bulb and Stem Nematode in Onion

In the Leamington marsh Ditylenchus dipsaci, first discovered in 1957, continues to be a problem on only one or two farms where growers still refuse to follow the rotation recommendations made in 1957. On several farms where soybeans have replaced onions for two seasons the nematodes could not be recovered from soil samples submitted recently.

Some Records of Nematodes Encountered on Plant Material in Canada in 1959

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Root-knot Nematodes

The northern root-knot nematode, Meloidogyne hapla Chitwood, 1949, was found on Japanese barberry from Oakville, Ont., on Clematis tangutica from Toronto, Ont., on Clematis from Michigan, U.S.A., on alfalfa at Ottawa (greenhouse), on Sansevieria from Florida, U.S.A., on tomato from Virginia, U.S.A., on strawberry from Maryland, U.S.A., on rose from British Columbia, from Texas and Michigan, U.S.A., and from Holland, on peony from Michigan, U.S.A., and on barberry from Tennessee, U.S.A.

The peanut root-knot nematode, Meloidogyne arenaria (Neal) Chitwood, 1949, is recorded on rose from Texas, U.S.A., from Denmark, from Belgium, from North Ireland, from Holland, from France, from Toronto, Ont., and from Michigan, U.S.A. It was also found on Clematis from Michigan, U.S.A., on tomato from Georgia, U.S.A., on potato from British Columbia, on Sorbus americana from Holland, on Philadelphus virginalis from France, and on Sansevieria from Florida, U.S.A.

The southern root-knot nematode, Meloidogyne incognita (Kofoid & White) Chitwood, 1949, is recorded on carrot from Holland Marsh, Ont., on fibrous begonia from Toronto, Ont., on rose from Texas, U.S.A., on Ligustrum vulgare from Iowa, U.S.A., on Hoya from St. Laurent, Que., on Sansevieria from Florida, U.S.A., on baby palms from New York (shipping point), and on tomato from Calgary, Alta., and from Georgia, U.S.A.

The cotton root-knot nematode, Meloidogyne incognita acrita Chitwood, 1949, was found on Sansevieria from Florida, U.S.A., and on tomato from Georgia, U.S.A.

The javenese root-knot nematode, Meloidogyne javanica (Treub), was found on tomato from Georgia, U.S.A., and Meloidogyne sp. on Hibiscus from from Jamaica, B.W.I.

Root-lesion Nematodes

Pratylenchus penetrans (Cobb, 1919) Filipjev & Stekhoven, 1941, is reported on strawberry from Prince Edward Island, on lily-of-the-valley from France, and in a bulb shipment from England. Pratylenchus pratensis (de Man, 1880) Filipjev, 1936, was found on strawberry from Verdun, Que., on rose and in conifer soil from Holland, on ivy from Belgium, on lily-of-the-valley from

France, and in shipments of chrysanthemum, Cyclamen, and Fuchsia from the United Kingdom. Pratylenchus vulnus Allen & Jensen, 1951, was found in an importation of Thuja from Holland, and a form closely allied to this species in fibrous begonia from Toronto, Ont. Pratylenchus hexincisus Taylor & Jenkins, 1957, was identified on geranium from Poland. Pratylenchus subpenetrans Taylor & Jenkins, 1957, was found on rose from Italy. Pratylenchus minyus Sher & Allen, 1953, was found on alfalfa and white clover from Kars, Ont., on alfalfa from Hearts Desire, Ont., from Belgium, and in a hayfield at Burritt Rapids, Ont., and a possible new species on cactus from France. Pratylenchus spp. were found in a shipment of greenhouse plants from Poland, and on bromeliads from France.

Stunt Nematodes

Tylenchorhynchus maximus Allen, 1955, is reported on wild iris from Galetta, Ont., in a hayfield at Burritt Rapids, in vetch, grass, alfalfa, and timothy sod in Marchurst Township, Ont., on oat from Carp, Ont., on alfalfa from Hearts Desire, Ont., on oak seedlings from Dunrobin, Ont., on white clover from Kars, Ont., and on carnation from England.

Tylenchorhynchus brevidens Allen, 1955, was found in a hayfield at Burritt Rapids, Ont., on alfalfa from Marchurst Township, Ont., from Kars, Ont., and from Hearts Desire, Ont., on white clover from the Ottawa district, and from Kars, Ont., on clover from North Gower, Ont., on apple from Germany, on mint from England, and in some greenhouse plant soil from Poland.

Tylenchorhynchus dubius (Buetschli, 1873) Filipjev, 1936, was taken from strawberry from Prince Edward Island, rose from Holland, apple from Germany, carnation and bulbs from England, ivy from Belgium, Pinus mughus from Belgium, and plant packing from Hungary.

Tylenchorhynchus quadrifer Andrassy, 1954, was found in some shipments from Hungary and from Poland. T. parvus Allen, 1955, is reported on cactus from France, and on apple from Germany. T. macrurus (Goodey, 1932) Filipjev, 1936, was found on carnation from England, and on chrysanthemum and Cyclamen from the United Kingdom.

Spiral nematodes

Rotylenchus robustus (de Man, 1876) Filipjev, 1936, was found on Pinus mughus from Belgium, on ivy from Belgium, and in a plant shipment from Holland.

Gottholdsteineria goodeyi (Loof & Oostenbrink, 1958) Andrassy, 1958, was found on alfalfa from Kars, Ont., on strawberry from Verdun, Que., on carnation and bulbs from England, on ivy from Belgium, in a shipment of chrysanthemum and Cyclamen from the United Kingdom, in a shipment of geranium, lily and Crassula from Italy, on ox-eye daisy from Kemptville, Ont.,

on wild iris from Galetta, Ont., and in some plant soil from Poland. G. buxophila (Golden, 1956) Andrassy, 1958, was located on rose from Italy, and Gottholdsteineria spp. on mint from England, and on Dracena from Poland.

Helicotylenchus erythrinae (Zimmermann, 1904) Golden, 1956, was found on Thuja from Holland, in conifer soil from Holland, on ivy from Belgium, in a shipment of geranium, lily, and Crassula from Italy, and a shipment of plant material from Poland. Helicotylenchus spp. were noted as follows: in plant washings from France, on Asparagus plumosus from Poland, on bulbs and soil from France, on nursery stock from Holland, on white clover and alfalfa from Kars, Ont., on red clover from the Ottawa district, on alfalfa from Marchurst Township, Ont., from west of Prescott, Ont., and from Hearts Desire, Ont., on alfalfa and clover from North Gower, Ont., on oak seedlings from Dunrobin, Ont., on vetch and grass from Marchurst Township, Ont., on fibrous begonia from Toronto, Ont., on Cyclamen and nursery stock from Brampton, Ont., and on alfalfa and timothy sod from Murphys Side Road, Ont.

Scutellonema brachyurum (Steiner, 1938) Andrassy, 1958, was found on Hoya and African violet from St. Laurent, Que.

Ring Nematodes

Criconemoides lobatum Raski, 1952, was found in bulbs and soil from France, in a hayfield at Burritt Rapids, Ont., on alfalfa from Hearts Desire, Ont., on strawberry from Verdun, Que., on wild iris from Galetta, Ont., and in alfalfa and timothy sod from Murphys Side Road, Ont., C. curvatum Raski, 1952, was located in a shipment of geranium, lily and Crassula from Italy. Criconema sp. was noted on African violet from St. Laurent, Que.

Pin Nematodes

Paratylenchus macrophallus (de Man, 1880) Goodey, 1934, was found on carnation from England, on mint from England, on ivy from Belgium, on Thuja from Holland, on Asparagus plumosus from Poland, on Dracena from Poland, on Fuchsia from the United Kingdom, in a hayfield at Burritt Rapids, Ont., on strawberry from Prince Edward Island, and on ox-eye daisy from Kemptville, Ont. Paratylenchus sp. was encountered on African violet from St. Laurent, Que.

Cyst Nematodes

Heterodera rostochiensis Wollenweber, 1923, was found on a shipment of shamrock from Ireland, and some cyst remains resembling this species in a shipment of ivy and lavender from England. H. avenae Wollenweber, 1924, was also found in the shipment of ivy and lavender from England. H. trifolii Goffart, 1932, has been found in soil samples from New Brunswick, Nova Scotia, and Prince Edward Island.

Other Tylenchids

Gall nematodes, Anguina spp., have been noted on bentgrass from Oregon, U.S.A., and from British Columbia on Agropyron inerme, and on red top grass. A species of Ditylenchus was noted on a rose plant from Poland.

Aphelenchids

Aphelenchus avenae Bastian, 1865, was found on apple from Germany, on Viburnum lantana, and in conifer soil from Holland, on Rhus from Denmark, on Primula from Ireland, on ivy from Belgium, on Ficus from Poland, and on Lilium bulbs, on rhizome calla, and on glaiolus bulbs from Italy, on gooseberry and currant from Russia, on Fuchsia from the United Kingdom, on bulbs and soil from France, in herbaceous plants from Australia, on strawberry from Prince Edward Island, and in onion soil from Manitoba. Specimens resembling A. macrobolus Steiner, 1942, were noted on gooseberry from Russia. Paraphelenchus pseudoparietinus (Micoletzky, 1922) was found on mushroom from Lennoxville, Que.

Aphelenchoides parietinus (Bastian, 1865) Steiner, 1932, is reported on dahlia and on Viburnum lantana from Holland, and on strawberry from Prince Edward Island and Russia. Forms closely resembling A. fragariae (Ritzema Bqs 1890) were found on strawberry from Russia. Aphelenchoides spp. were noted amongst greenhouse plants from Europe, on currant from Russia, on Fuchsia from the United Kingdom, and on rose from Belgium.

Dorylaimids

Xiphinema americanum Cobb, 1913, is reported from a hayfield at Burritt Rapids, Ont., on clover from Kars, Ont., and on alfalfa from Hearts Desire, Ont. Xiphinema index Thorne & Allen, 1950, was found in a shipment of greenhouse plants from Italy.

Tylencholaimellus striatus Thorne, 1939, has been found on alfalfa from North Gower, Ont., on apple and in timothy sod from Murphys Side Road, Ont., in vetch and grass from Marchurst Township, Ont., and on ox-eye daisy from Kemptville, Ont.

Phenological Data - 1959

At Winnipeg the 1959 season was somewhat late for the most part. Excessive moisture on the heavy clay soil delayed seeding of wheat considerably and it matured about two weeks later than normal. At Saskatoon the season was quite early at the start but was delayed for a period around the first of May. Most of the flowers recorded bloomed a few days earlier than normal. Wheat sown 9 days early matured 3 days early. It was delayed somewhat by drought in June. The season opened very early at Edmonton but was delayed by cold weather in May and June. During the latter part of the season most of the species recorded bloomed late. Wheat sown 11 days later than normal matured 12 days later than normal. (R.C. Russell).

At Ottawa, first anthesis dates for plants under observation were late early in the season but after mid-May the trend was towards earlier than normal flowering (I.J. Bassett).

Table I Phenological Data at Ottawa, Ontario - 1959

Species	No. of Years of Observation	First Dates of Anthesis 1959	No. of Days Departure from Average
Alnus rugosa	8	14/4	8L
Acer saccharinum	24	15/4	5L
Corylus cornuta	7	20/4	4L
Populus tremuloides	19	20/4	3L
Populus grandidentata	8	25/4	2L
Poa annua	8	28/4	3L
Ulmus americana	24	28/4	3L
Acer rubrum	8	29/4	3L
Acer negundo	19	4/5	1E
Betula papyrifera	8	6/5	4L
Acer saccharium	24	9/5	N
Celtis occidentalis	7	9/5	3E
Prunus pensylvanica	18	12/5	1E
Fagus grandiflora	7	No flowering on marker trees in 1959	
Alopecurus pratensis	8	13/5	1E
Smilacina stellata	18	20/5	N
Quercus macrocarpa	8	21/5	1E
Pinus sylvestris	24	22/5	5E
Rumex acetosella	8	27/5	7E
Dactylis glomerata	8	29/5	11E
Poa pratensis	8	30/5	2L
Anemone canadensis	18	1/6	2E
Juglans nigra	8	3/6	4E
Carya cordiformis	15	5/6	6E
Bromus inermis	18	18/6	N
Corylus cornuta	8	Plant did not flower in 1959	
Phleum pratense	18	22/6	3E
Tilia americana	18	23/6	12E
Rhus typhina	13	25/6	1E
Catalpa ovata	16	27/6	5E
Cephalanthus occidentalis	14	12/7	6E
Ambrosia trifida	8	15/7	3L
Artemisia vulgaris	5	No observation in 1959	
Cassia hebecarpa	12	31/7	4E
Ambrosia artemisiifolia	7	11/8	4L
Hamamelis virginiana	16	14/9	5E

Table II. Phenological Data taken at Winnipeg, Saskatoon and Edmonton - 1959

Species	Winnipeg		Saskatoon		Edmonton	
Pulsatilla ludoviciana	17/4	6L	10/4	8E	10/4	16E
Corylus rostrata	--	--	--	--	13/4	15E
Phlox hoodii	--	--	16/4	13E	--	--
Populus tremuloides	19/4	6E	15/4	10E	13/4	13E
Acer negundo	4/5	3E	1/5	6E	27/4	6E
Salix petiolaris	--	--	--	--	13/4	18E
Sheperdia canadensis	--	--	--	--	13/4	20E
Betula papyrifera	--	--	14/5	3L	20/4	17E
Prunus americana	16/5	2L	--	--	--	--
Amelanchier alnifolia	21/5	3L	15/5	1L	13/5	3E
Prunus pensylvanica	--	--	16/5	3E	15/5	3E
Viola rugulosa	--	--	18/5	3E	28/5	6L
Smilacina stellata	1/6	8L	23/5	1E	19/5	7E
Crataegus chrysocarpa	1/6	8L	--	--	21/5	9E
Prunus melanocarpa	2/6	8L	26/5	2E	21/5	7E
Cornus stolonifera	3/6	2L	1/6	2L	6/6	4L
Viburnum lentago	6/6	3L	--	--	--	--
Elaeagnus commutata	--	--	1/6	3E	4/6	N
Lonicera glaucescens	--	--	2/6	6E	4/6	3E
Hedysarum americanum	--	--	4/6	3E	--	--
Thalictrum turneri	--	--	--	--	10/6	6L
Maianthemum canadense	--	--	--	--	8/6	3L
Achillea lanulosa	--	--	5/6	5E	--	--
Anemone canadensis	9/6	3L	9/6	2E	24/6	1L
Viburnum opulus	11/6	2L	--	--	--	--
Viburnum pubescens	10/6	N	--	--	--	--
Galium boreale	--	--	12/6	2E	28/6	6L
Rosa blanda	15/6	N	--	--	--	--
Rosa alcea	--	--	21/6	1L	8/6	1E
Campanula petiolata	--	--	21/6	1E	12/7	2L
Bromus inermis	22/6	1L	22/6	2E	5/7	7L
Zizia aurea	8/6	2E	--	--	--	--
Spiraea alba	--	--	24/6	6E	--	--
Symphoricarpos occidentalis	27/6	1E	3/7	N	9/7	4L
Chamaenerion spicatum	--	--	--	--	13/7	4L
Lactuca pulchella	--	--	4/7	4E	--	--
Psoralidium argophyllum	--	--	25/6	15E	--	--
Phleum pratense	--	--	--	--	15/7	7L

Species	Winnipeg		Saskatoon		Edmonton	
Apocynum androsaemifolium	--	--	--	--	19/7	5L
Solidago missouriensis	--	--	16/7	1L	--	--
Solidago canadensis	18/7	3E	--	--	24/7	3L
Grindelia perennis	--	--	23/7	N	--	--
Oligoneuron canescens	--	--	24/7	1E	--	--
Aster conspicuus	--	--	--	--	26/7	2L
Aster laevis	--	--	28/7	1E	3/8	4L

Wheat Records

	Winnipeg		Saskatoon		Edmonton	
Wheat sown	20/5	21L	21/4	9E	12/5	11L
emerged	29/5	18L	8/5	5E	18/5	7L
headed	16/7	15L	4/7	2L	14/7	10L
mature	24/8	15L	7/8	3E	31/8	12L

First observation of leaf rust of wheat at Winnipeg, Man., June 15
" " " stem " " " " " " June 18
" " " crown rust of oats " " " June 30
" " " stem " " " " " " July 23

1. DISEASES OF CEREAL CROPS

WHEAT

LEAF SPOT (Ascochyta sorghi) affected 10/20 spring wheat fields in s. Alta.; 6-tr. 1-sl. 2-mod. 1-sev. Infection was mod. on Thatcher near Coutts (J.S. Horricks, T.G. Atkinson).

COMMON ROOT ROT (*Bipolaris sorokiniana and Fusarium spp.) was 7-tr. 5-sl./14 winter wheat fields at Creston, B.C. (J.S.H.); it was 6-tr. 7-sl. 2-mod./17 n. Alta fields (W.P. Campbell), 10-tr. 7-sl. 3-mod. /20 in spring wheat and 15-tr. 24-sl. 8-mod. 7-sev./54 in winter wheat in s. Alta. (J.S.H. and T.G.A.). Common root rot was relatively light in the n., n.-e. and e. parts of Sask. and relatively sev. in the c., s., and w. areas. Average disease ratings for crop districts 1-3 and 5-9 were: 8.35, 9.60, 12.29, 6.53, 10.52, 11.96, 3.95 and 6.26 respectively. Estimates of wheat yields in the respective districts were: 15.7, 12.5, 11.2, 24.5, 15.9, 12.7, 25.3 and 16.2 bu./ac. The average disease rating for the province was 9.14 (B.J. Sallans).

LEAF BLIGHT (*Drechslera tritici-repentis) was 1-tr./54 winter wheat fields in s. Alta. (J.S.H.).

POWDERY MILDEW (Erysiphe graminis) occurred as 1-tr. 1-mod./20 spring wheat and 2-tr. 1-sl./54 winter wheat fields in s. Alta. (J.S.H.).

HEAD BLIGHT (Fusarium spp.). Specimens of Mindum wheat from Normandin, Que. were lightly infected by F. avenaceum. Marquis wheat from Charlottetown, P.E.I. was similiarly slightly infected by F. graminearum (W.L. Gordon).

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*In a recent paper, (Can. J. Botany, 37, 879-887 (1959), R.A. Shoemaker proposed certain changes in the nomenclature of some graminicolous fungi formerly classed in the genus Helminthosporium. He took up the generic name Drechslera, proposed by Ito in 1930, for those species with cylindric conidia that germinate from all cells. For the other major group of graminicolous species with fusoid phragmospores that exhibit biopolar germination, he proposed the generic name Bipolaris. The ascigerous stages of species of Drechslera, where known, are in the genus Pyrenophora. Those of Bipolaris species are in Cochliobolus. The nomenclature proposed by Shoemaker is followed in this issue of the Survey (D.W. Creelman).

TAKE-ALL (Ophiobolus graminis) was 3-tr./14 fields at Creston, B.C. (J.S.H.). It was 1-tr. 1-sl./17 in n. Alta. (W.P.C.), and 2-tr./54 winter wheat fields in s. Alta. (J.S.H.).

STEM RUST (Puccinia graminis). At Creston, B.C. stem rust was 2-tr./14 winter wheat fields. It was 2-tr./20 spring wheat and 7-tr./54 winter wheat fields in s. Alta. (J.S.H.). Tr. infections were found in 2 fields in s.-e. Sask. late in the growing season (B.J.S.).

LEAF RUST (Puccinia recondita = P. triticina) affected 7/14 winter wheat fields at Creston, B.C., 4-sl. 1-mod. 2-sev. It was 1-tr./20 in spring wheat and 1-tr./54 in winter wheat fields in s. Alta. (J.S.H.). Leaf rust was found in 105/174 fields surveyed in Sask. It was sev. in local areas in the e. and n.-e. parts of the province from Yorkton to Nipawin and Prince Albert. Tr.-sl. infections were common in the central areas and most fields were free from leaf rust in w. and s. Sask. (B.J.S.). In the Rust Nurseries at Charlottetown, P.E.I. it was observed on the varieties McMurachy, Lee, Kenya Farmer, Marquis, Mindum, Thatcher, Selkirk, Canthatch, Exchange and Pembina. Infection ranged from tr.-60% (J.E. Campbell).

STRIPE RUST (Puccinia striiformis = P. glumarum) was 3-sl. 1-mod. 1-sev./14 winter wheat fields at Creston, B.C. (J.S.H.).

BROWING ROOT ROT (Pythium arrhenomanes). Specimens from Eston and Leney, Sask. were received at Saskatoon (B.J.S.).

GLUME BLOTCH (Septoria nodorum). Low-lying areas of 1 field near Vulcan, Alta., showed sev. infections (J.S.H.). Two fields at Elstow, Sask., had tr.-sl. infections (B.J.S.).

SPECKLED LEAF BLOTCH (Septoria spp.). At Creston, B.C. infection was 1-tr. 3-sl. 2-mod./20 winter wheat fields (J.S.H.). Three/17 n. Alta. fields were affected, 2-tr. 1-sl. (W.P.C.). In s. Alta. it was 3-tr./20 spring wheat and 1-tr. 2-sl./54 winter wheat fields (J.S.H.). Tr. infections at Francis and Whitewood and sl. infections at Carlyle and Kincaid were seen in Sask. (B.J.S.). It was sl. in the Rust Nurseries at Charlottetown, P.E.I. (J.E.C.).

COMMON BUNT (Tilletia caries and T. foetida) was found in 9/54 winter wheat fields in s. Alta. Five-tr. 3-1%, 1-2% (J.S.H.). It was seen in only 1/177 fields examined in Sask. (R.C. Russell).

DWARF BUNT (Tilletia contraversa) was 6-tr. 1-5%, 1-10%, 1-15%/20 winter wheat fields at Creston, B.C. It was 3-tr./54 s. Alta. fields (J.S.H.).

LOOSE SMUT (Ustilago tritici) Eleven/14 fields examined at Creston, B.C. showed tr. infections (J.S.H.). It was 5-tr. 1-sl./177 fields in Sask. Several of the affected fields were durum wheat. Loose smut was less prevalent than usual in Sask. (R.C.R.).

BACTERIAL BLACK CHAFF (Xanthomonas translucens) was 1-tr./20 spring wheat fields in s. Alta. (J.S.H.). About 25% of the leaf area of 10% of the plants was destroyed in a field near St. Norbert, Man. Infection apparently followed hail damage (W.A.F. Hagborg).

WHEAT STREAK MOSAIC (virus). In s. Alta. it was 1-tr./20 spring wheat and 1-tr. 1-sev./54 winter wheat fields (J.S.H.)

CHLOROTIC LEAF BANDING (high soil-surface temperatures) was seen early in June at Wynyard, Indian Head, Kamsack and Saltcoats in Sask. Conditions were favorable for this disorder in 1959 (T.C. Vanterpool). Specimens from Antler and Kipling, Sask. were examined (B.J.S.).

NECROTIC SPOT (cause unknown). More than 40% of the leaf area of all the plants of the variety Israeli 676 was destroyed in the World Wheat Collection at Winnipeg, Man. The condition was also sev. on Cyprus 591 (W.A.F.H.).

LEAF BLOTCH (physiological) was tr. on durum wheat varieties at Carlyle and Francis and mod. on 50% of the plants at Q'Appelle, Sask. It was sl.-mod. on varieties at Indian Head (B.J.S.).

SEED STAIN. Sap from Russian Thistle seed caused some staining of wheat from the 1958 crop at Odessa, Sask. (T.C.V.). (see C.P.D.S. Ann. Rep't. 20:10, 1940 [1941]. (D.W. Creelman).

LOW GERMINATION. Mechanically injured seed sown in dry soil at Weyburn, Sask., became infected with Penicillium spp. Germination was greatly reduced (T.C.V.).

CHEMICAL INJURY. Mod. damage from 2,4-D was seen in 1 field at Elrose and in 1 at Stonehenge, Sask. (B.J.S.).

OATS

BLACK MOLD (Alternaria spp., Cladosporium spp.). Infected samples were received from Stockholm, Sask. (T.C. Vanterpool).

TWIST (Dilophospora alopecuri). A sl. infection was seen in Fundy oats on the Experimental Farm at St. Charles de Caplan, Que. (D. Leblond). This disease has apparently not been previously reported on oats. Sprague (Diseases

of Grasses and Cereals in North America. 538 pp. 1950) lists barley, rye and wheat among the hosts but states (p. 169) that it is not of economic importance. It has been reported (C.P.D.S. Ann. Rep't. 5:17, 1924 [1925]) on barley at Carlyle, Sask. and also (C.P.D.S. Ann. Rep'ts. 16, 17, 25 and 30) on Holcus lanatus from Vancouver Island and the Fraser Valley in B.C. Specimens on both hosts are deposited in DAOM (D.W. Creelman).

ROOT ROT (Fusarium spp.). Infections were 4-tr. 2-sl./79 fields in n. Alta. (W.P. Campbell).

HALO BLIGHT (Pseudomonas coronafaciens). A specimen was seen from Melfort, Sask. (B.J. Sallans).

BACTERIAL SPOTTING (Pseudomonas spp.) followed hail damage in some fields in the Winnipeg, Rosser and Carman areas of Man. in June. Leaf area destruction ranged up to 30% (W.A.F. Hagborg).

CROWN RUST (Puccinia coronata) occurred as tr.-sl. infections in the eastern counties of P.E.I. It was also present in the Rust Nurseries at Charlottetown (J.E. Campbell).

STEM RUST (Puccinia graminis). The varieties Bond, Trispernia, Exeter, Clinton and Landhafer were affected in the Rust Nurseries at Charlottetown, P.E.I. Infection ranged from tr.-60% (J.E.C.).

SPECKLED LEAF BLOTCH (Septoria avenae). Trace infections were seen at McLean and Whitewood, Sask. (B.J.S.). The disease was quite general throughout P.E.I. Infections were severe and considerable damage resulted. It was also present on practically all the oat varieties in the Rust Nurseries at Charlottetown (J.E.C.).

SMUTS (Ustilage avenae and U. kolleri). Neither loose nor covered smut was encountered in 9 fields surveyed in Sask. (R.C. Russell). In n. Alta. combined readings were 3-tr. 1-5%, 1-8%, 1-15%, 1-18%/79 fields (W.P.C.).

RED LEAF (virus). Trace - sl. infections were seen in experimental plantings at Ste. Anne de la Pocatière, Que. (R.O. Lachance).

GRAY SPECK (Manganese deficiency) was 9-tr. 12-sl. 3-mod. 5-sev. /76 fields in n. Alta. It was sev. in many poorly drained fields in the Edmonton area (W.P.C.).

BLAST (physiological) affected 43/76 n. Alta. fields, 16-tr. 18-sl. 5-mod. 4-sev. (W.P.C.).

CHLOROTIC LEAF BANDING (high soil-surface temperatures) was observed at Indian Head, Sask. This disorder is not common on oats (T.C. Vanterpool).

BARLEY

Manitoba Barley Disease Survey - 1959

H.A.H. Wallace

A survey was made of 75 barley fields in southern Manitoba. Due to the wet season leaf and stem rusts and mildew were much more prevalent in this area in late ripening fields than is usually the case. They were absent in early ripening fields. Most of the stem rust infection occurred on Montcalm, the mildew on Parkland, and leaf rust on both varieties. Bacterial blight was not seen in farmers' fields but was severe on early ripening varieties of barley in experimental plots at Winnipeg. Table 1 shows the relative importance of each disease. Smuts were not recorded.

Table 1. Manitoba Barley Disease Survey - 1959

Disease	Amount of Infection (75 fields)			
	Trace	Light	Moderate	Severe
Net Blotch *(*D. teres*)	15	10	19	21
Spot Blotch *(*B. sorokiniana*)	19	1	2	0
Speckled Leaf Blotch (*Septoria passerinii*)	7	2	4	1
Powdery Mildew (*Erysiphe graminis*)	2	3	3	1
Leaf Rust (*Puccinia hordei*)	7	14	6	3
Stem Rust (*Puccinia graminis*)	12	7	8	2
Yellow Dwarf (Virus)	1	0	1	0
False Stripe (Virus)	1	0	0	0

* See footnote, page 1 (D.W.C.).

SPOT BLOTCH (*Bipolaris sorokiniana) was recorded as 2-tr. /8 s. Alta. fields (J.S. Horricks). It was sl. in Rust Nurseries at Charlottetown, P.E.I. (J.E. Campbell).

COMMON ROOT ROT (*Bipolaris sorokiniana and Fusarium spp.). In n. Alta. 30/38 fields surveyed were affected, 14-tr. 13-sl. 3-mod. (W.P. Campbell). All 8 fields examined in s. Alta. had root rot, 2-tr. 6-sl. (J.S.H.). Thirteen fields surveyed in Sask. had an average root rot rating of 11.45. This rating, as usual, was higher than that observed for wheat (B.J. Sallans).

NET BLOTCH (*Drechslera teres) was 7-tr./38 fields in n. Alta. (W.P.C.). It was 5-tr./8 in s. Alta. (J.S.H.), and tr. at Watrous, Holdfast and Regina, mod. at Leross and Annaheim; and sev. at Meadow Lake and Waldron in Sask. (B.J.S.).

STEM RUST (Puccinia graminis). Traces of stem rust were seen at Regina, Waldron and Saskatoon, Sask. (B.J.S.).

LEAF RUST (Puccinia hordei). Trace - sl. infections were present at Watrous and Saskatoon, Sask. by mid-August (B.J.S.).

SCALD (Rhynchosporium secalis) was 7-tr. 4-sl. 3-mod. 2-sev./38 fields surveyed in northern B.C. and n. Alta. The mod-sev. infections were in the Dawson Creek, B.C. area (W.P.C.). A trace was found in 1/8 fields seen in s. Alta. (J.S.H.).

SPECKLED LEAF BLOTCH (Septoria passeniniì). Twelve/38 n. Alta. fields were diseased, 8-tr. 3-sl. 1-mod. (W.P.C.). In s. Alta. it was 1-tr./8 (J.S.H.).

COVERED SMUT (Ustilago hordei) was 1-tr./8 in s. Alta. (J.S.H.). Traces were found in 3/21 fields examined in Sask. (R.C. Russell).

LOOSE SMUT (Ustilago nuda and U. nigra). Eleven/38 fields examined in n. Alta. had loose smut, 8-tr. 2-1%, 1-2% (W.P.C.). One field/8 in s. Alta. showed a trace (J.S.H.). In Sask., 15/21 fields surveyed were affected. The percentage of fields affected was about average but the severity of infection was lighter than usual (R.C.R.).

BACTERIAL STREAK (Xanthomonas translucens). One field at High Prairie in n. Alta. showed a tr. infection (W.P.C.) and it was 1-tr./8 fields examined in s. Alta. (J.S.H.).

FALSE STRIPE (virus). Four/8 fields in s. Alta. showed tr. infections (J.S.H.).

* See footnote, page 1 (D.W.C.).

YELLOW DWARF (virus) was tr.-sl. in plantings at Ste. Anne de la Pocatière, Que. (R.O. Lachance).

CHLOROTIC LEAF BANDING (high soil-surface temperatures) caused mod. damage to seedlings at Madison, Sask. (B.J.S.).

PHOSPHORUS DEFICIENCY resulted in stunted plants with purplish leaves on high land at Bickleigh, Sask. (T.C. Vanterpool).

RYE

STEM RUST (Puccinia graminis). Trace amounts occurred on Prolific rye in the Rust Nurseries at Charlottetown, P.E.I. (J.E. Campbell).

LEAF RUST (Puccinia recondita) was mod. on Prolific rye at Charlottetown, P.E.I. (J.E.C.).

CEREAL RUSTS IN CANADA IN 1959

B. Peturson, G.J. Green and D.J. Samborski

The following report is a condensed form of Report #15 issued in January, 1960 by the Plant Pathology Section, Canada Department of Agriculture Research Station, Winnipeg, Man.

Prevalence of Air-borne Rust Spores in Western Canada

Slides were exposed in stationary spore traps at several localities in Man. and e. Sask. in 1959 to determine the prevalence of air-borne rust spores.

North winds prevailed over the Great Central Plains area during most of May and conditions were unfavorable for the northward movement of rust spores except for about a three day period centering on May 24th when strong south winds were general. During that period (May 22 - 25) several leaf rust spores were caught on slides exposed at Morden and Winnipeg. During the remainder of this month no spores appeared on any of the slides exposed.

During June and July south winds prevailed and there were several periods when wind movements were very favorable for northward spore dispersal. Rust spores, particularly leaf rust spores, were much more prevalent in the air over Man. than during the last few years. The spore-trap data indicate that the early spore showers were centered over Man. and extended westwards as far as Brandon, but not as far west as Indian Head and Regina in Sask.

In 1959, cereal rusts first appeared in the Prairie Provinces in the southern part of the Red River Valley, and gradually spread northward and westward throughout most of Man. and n.-e. Sask. The advance of the rusts westward into the dry areas of s.-w. Man., Sask., and Alta. was greatly retarded by lack of moisture and only trace amounts of rust developed in these areas.

Leaf Rust of Wheat (Puccinia recondita)

As in 1958, leaf rust was the most prevalent cereal rust in Western Canada. It was first observed in Man. on June 15, two weeks earlier than in 1958. It developed rapidly on Thatcher and other susceptible varieties and spread northwestward into n.-e. Sask. where moderately heavy infections developed on Thatcher. In the Red River Valley an 85 per cent infection developed on Thatcher before the end of the season. In a 12-acre experimental field of Thatcher near Winnipeg in which portions of the field were protected by a good rust control fungicide there was a substantial increase in yield in the treated parts of the field over the unprotected parts. In the protected parts of the field, where leaf-rust infection amounted to 10 per cent, the per acre yield was 31.3 bushels, while in the untreated parts of the field, where leaf-rust infection averaged85 per cent, the yield was 22.1 bushels per acre, indicating a yield loss of 9.2 bushels per acre due to leaf rust. The actual yield loss owing to leaf rust in this field was probably 10 bushels per acre or higher as complete rust control was not achieved with the fungicidal treatment. In several other controlled experiments leaf rust caused as great or greater yield losses to Thatcher. Since about 100,000 acres were sown to Thatcher wheat and other leaf-rust susceptible varieties in Man. in 1959, a yield loss of 1,000,000 bushels is indicated for Man. this year owing to the use of leaf-rust susceptible varieties. In the main wheat crop, consisting largely of the leaf-rust resistant variety Selkirk, infection was light and did not get firmly established until late in the season and appeared to cause only an unimportant yield loss.

In n.-e. Sask. the leaf rust infection on Thatcher, although moderately heavy in some fields, came later and probably caused only minor damage. Only trace amounts of leaf rust occurred in the dry areas of Sask. and in Alta. and caused no appreciable damage there.

Stem Rust of Wheat (Puccinia graminis tritici)

Wheat stem rust was found first in the Red River Valley in 1959, on June 19, about the normal date for its appearance. However, 85 per cent of the wheat acreage in Man. was sown to the highly stem-rust resistant variety Selkirk. All but a fraction of 1 per cent of the remainder was sown to durum wheat and to the varieties Thatcher, Lee, Redman and Regent, which are resistant to the prevalent races of stem rust except race 15B. This race was not very common in Western Canada and very little stem rust developed on these varieties in Man.

Extremely dry conditions in much of the rust area of Sask. and the culture of Thatcher wheat there precluded stem rust damage. As stem rust did not spread westward into Sask. and Alta. where considerable acreages of susceptible wheats are grown, the entire wheat area of Western Canada escaped stem rust damage in 1959. Had susceptible wheat varieties been grown in the rust area of Western Canada it seems certain that heavy rust damage would have occurred in the localities where rainfall was plentiful as high percentages of stem rust developed on wild barley and on susceptible varieties in experimental plots in

c. and e. Man. For example, 75 per cent infection of leaf rust and upwards of a 60 per cent infection of stem rust developed in a 12-acre experimental field of Marquis near Winnipeg. This summer-fallowed field yielded 10.4 bushels per acre of wheat that weighed 53 pounds per bushel, whereas, a field of Selkirk wheat on similar land on an adjoining farm yielded 35 bushels per acre.

Light rust infections occurred on the durum variety Ramsey and on some barley varieties but not in sufficient amounts to cause appreciable damage. Only trace amounts of stem rust developed on these crops in Sask. and Alta.

Stem Rust of Oats (Puccinia graminis avenae)

Oat stem rust was not found until July 23, at Rosenfeld, in the Red River Valley. Subsequent development was slow, and late in the season only small amounts of rust were present on susceptible varieties in experimental plots and on wild oats in Man. Traces of stem rust were present on oats as far west as Indian Head, Sask.

Crown Rust of Oats (Puccinia coronata)

A few widely scattered pustules of crown rust were observed on oats in the Red River Valley on June 30. Apparently air-borne crown rust spores were scare during June and early July for crown rust increased very slowly (much slower than leaf rust of wheat) and only a light sprinkling of this rust was present on oats in the Red River Valley by early Aug. In this area, oat crops that ripened by mid-August were infected only slightly and were not damaged by rust. However, oat fields that did not ripen until early Sept. carried a crown rust infection averaging about 40 per cent and suffered small yield reductions. Most oat fields ripened before crown rust became prevalent and the total damage caused by crown rust in e. Man. was minor. Outside the Red River Valley light infections of crown rust occurred only in w. Man. and e. Sask.

Leaf Rust of Barley (Puccinia hordei)

A light infection of leaf rust was present on barley throughout Man. and westward into Sask. as far as Saskatoon. Although considerable amounts occurred in some fields in e. Man. it arrived late and did not cause much damage.

Leaf Rust of Rye (Puccinia recondita)

A trace of rye leaf rust was found in the Red River Valley in Man. but it was not found in w. Man. or in Sask. and Alta.

Flax Rust (Melampsora lini)

Ninety-five per cent of the flax acreage in Man. was sown to highly rust resistant varieties. An extensive rust survey failed to detect any rust on the resistant varieties. However, a light infection of rust was found on Redwing, a susceptible variety, in one locality in the western part of the Red River Valley. In Sask., a high percentage of the flax acreage was sown to resistant varieties. Virtually no rust was present on flax in that province in 1959. Rust was not found on flax in s. Alta. in 1959. However, trace amounts of rust on flax were found in the Ft. Vermilion area. One field of Redwing was severely infected.

Cereal Rusts and Other Diseases in the Rust Nurseries in 1959

In 1959 rust nurseries were grown at 32 locations in Canada. At least one nursery was located in each province.

The varieties grown in the rust nurseries are: Wheat: McMurachy, R.L. 1313; Lee, R.L. 2477; Kenya Farmer, R.L. 2768; Marquis, R.L. 84; Mindum, R.L. 1344; Thatcher, R.L. 1945; Selkirk, R.L. 2769; Canthatch, R.L. 2936; Exchange, R.L. 1803; Frontana, R.L. 2336; Ramsey, Ld. 369; Pembina, R.L. 2814. Oats: Bond, R.L. 1130; Trispernia, R.L. 3; Exeter, R.L. 53; Garry, R.L. 1692.27; Clinton, R.L. 66; Landhafer, R.L. 91; Rodney, R.L. 2123; R.L. 2278. Barley: Montcalm, C.A.N. 1135; Vantage, Br. 1356; Parkland, Br. 3833. Rye: Prolific. Flax: Bison, Dakota and Raja.

Wheat Stem Rust (Puccinia graminis tritici)

Wheat stem rust infections were generally light in the rust nurseries in 1959 as has been the case for several years. The amount of rust, as indicated by the infection on the susceptible variety Marquis, was greatest at Creston, B.C. and in the Red River Valley in s. Man. Lighter infections occurred at most locations in Ont. and Que. although some varieties in the nursery at Mindemoya, Ont., were severely infected. There was little or no rust in nurseries in Sask., Alta. and the Atlantic Provinces.

Most of the rust in the Creston nursery was race 11, but in the rest of the country race 56 predominated. The return to predominance of race 56 has greatly affected the amount of rust found on varieties such as Lee and Thatcher. While race 15B predominated these varieties were susceptible and were often severely attacked but since 1956 they have been lightly infected. The moderate infections on McMurachy in Ont. and Que. were caused by races 29-1 (Can.) and 48A. Selkirk and the new varieties Canthatch and Pembina were nearly free from rust in all nurseries.

Wheat Leaf Rust (Puccinia recondita)

Heavy leaf rust infections occurred in nurseries in all provinces except Alta. The heaviest infections were recorded in Man. and n.-e. Sask. The leaf rust reaction of the varieties in the nurseries was the same as in 1958. Rust reactions on Mindum, Ramsey and Exchange at Creston were of a moderately resistant type. All rust reactions on Selkirk were of a resistant or moderately resistant type. Exchange and Frontana were highly resistant to all locations.

Oat Stem Rust (Puccinia graminis avenae)

Oat stem rust infections were absent or quite light in all nurseries except those at Winnipeg, Man., Appleton, Ont., and Ste. Anne de la Pocatière, Que. The scarcity of this rust probably resulted from the very late arrival of inoculum from the south. Oat stem rust was not observed in s. Man. until July 23. The severe infection at Winnipeg may have originated from nearby artificially inoculated plots. There is a possibility that barberry was responsible for the severe infections at Appleton and Ste. Anne de la Pocatière.

The infections on the variety Garry at Winnipeg were of a resistant type but a 10 per cent infection on Rodney was of a susceptible type and was caused by race 7A. The infections on these two varieties at Kemptville, Merrickville, Appleton and Ste. Anne de la Pocatière were of a susceptible type and were caused by races such as 8A, 6A and 13A.

Oat Crown Rust (Puccinia coronata avenae)

In Western Canada a trace infection of crown rust occurred at Melfort, Sask. and at Brandon, Man. A very slight infection was present on most of the varieties at Christie in s. Man. and a light to moderate infection occurred on Bond, Exeter, Garry and Rodney at Morden, Man. Crown rust was not found in any of the nurseries west of Melfort, Sask. In Eastern Canada, moderate to heavy infections developed on some of the varieties at Merrickville, and Mindemoya, Ont., at Ste. Anne de la Pocatière, Que., and at Brule, N.S. A light infection was present at Normandin, Que. Elsewhere in Eastern Canada, crown rust was either absent or occurred in trace amounts in the nurseries.

The Rusts on Barley and Rye

The distribution of the leaf and stem rusts attacking barley and rye is much like the distribution of the wheat rusts. Stem rust infection on the susceptible barley variety Montcalm was severe only in the nurseries in s. Man. Moderate or light infections occurred at Creston, B.C. and in several nurseries in Eastern Canada. The stem rust resistant varieties Vantage and Parkland were not severely attacked in any nursery. More than the usual amount of barley leaf rust occurred in nurseries at Brandon and Morden in Man.

Flax Rust

Flax rust was found in only the nurseries at Beaverlodge and Edmonton in Alta., and at Kapuskasing and Merrickville in Ont. Nowhere did the infection exceed 1 per cent on Bison and Dakota and no rust was observed on Raja. Flax rust was scarce or absent in all flax fields examined in Western Canada, except in one field of Redwing near Fort Vermilion, Alta., where infection was severe.

Diseases other than rusts

A summary of the incidence in the nurseries of diseases caused by Erysiphe graminis, Septoria spp. and *Bipolaris and Drechslera spp. appear in Table 2 along with a summary of the rust nursery data for the rusts. Mildew

* See footnote, page 1 (D.W.C.).

Table 2. Incidence[1] of certain pathogenic fungi on wheat, oats, barley and rye at 32 locations in Canada in 1959

	WHEAT				OATS			BARLEY						RYE	
	P. gr. tritici	P. recondita	Erysiphe graminis	Septoria spp.	P. gr. avenae	P. cor. avenae	S. avenae f. sp. avenae	P. graminis	P. hordei	Erysiphe graminis	S. passerinii	D. teres	B. sorokiniana	P. gr. secalis	P. secalina
Agassiz, B.C.	0	3	0	2	0	0	2	0	0	0	0	0	2	1	3
Creston, B.C.	4	4	0	2	2	0	0	3	0	0	0	0	1	2	0
Beaverlodge, Alta.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Edmonton, Alta.	0	2	0	0	0	0	0	0	2	0	1	0	0	0	2
Lethbridge, Alta.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Lacombe, Alta.	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
Scott, Sask.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melfort, Sask.	2	4	0	1	0	1	0	0	0	0	0	1	0	0	0
Indian Head, Sask.	1	3	0	0	1	0	0	1	0	0	0	0	0	0	0
Brandon, Man.	3	4	- [2]	-	2	1	-	4	2	-	-	-	-	1	3
Morden, Man.	4	4	0	-	2	3	0	4	3	0	4	-	-	2	3
Christie, Man.	3	4	0	2	1	2	0	-	-	0	0	-	4	0	1
Winnipeg, Man.	4	4	0	-	4	-	-	2	2	-	4	-	-	1	2
Fort William, Ont.	3	4	-	-	2	1	-	1	1	-	-	-	-	1	2
St. Catharines, Ont.	1	2	2	1	0	0	-	1	0	-	-	-	-	0	2
Guelph, Ont.	3	3	0	1	1	2	3	2	0	4	0	0	0	1	2
Kemptville, Ont.	-	-	-	-	3	0	3	2	-	4	-	-	-	2	-
Ottawa, Ont.	1	1	-	-	0	0	-	0	0	-	-	-	3	0	0
Merrickville, Ont.	2	1	3	-	2	4	4	2	0	4	-	-	-	2	2
Mindemoya, Ont.	4	4	0	-	3	4	0	3	1	3	0	0	0	3	3
Appleton, Ont.	3	2	2	2	4	1	3	2	0	3	-	0	3	4	3
Macdonald College, Que.	2	3	1	0	2	0	0	1	1	2	1	0	1	1	3
Lennoxville, Que.	2	3	0	0	2	1	2	0	0	0	1	0	1	2	4
Ste. Anne de la Poc., Que.	3	3	0	3	4	3	4	1	0	0	1	-	2	1	3
Normandin, Que.	3	3	0	3	3	2	4	0	1	-	4	0	2	1	2
L'Assomption, Que.	3	4	0	0	2	0	2	2	1	0	0	0	0	0	3
Fredericton, N.B.	1	3	0	3	0	0	4	1	1	0	1	0	1	2	3
Kentville, N.S.	2	3	-	4	3	1	3	0	0	0	0	0	4	3	2
Brule, N.S.	0	3	-	-	1	4	-	0	0	-	0	0	3	0	0
Nappan, N.S.	0	4	-	1	0	1	4	0	0	0	1	0	2	0	0
Charlottetown, P.E.I.	0	4	0	2	4	1	4	0	0	0	0	0	2	1	3
St. John's West, Nfld.	0	2	0	1	0	0	3	0	0	0	4	0	0	0	2

[1] 1 = trace, 2 = light, 3 = moderate, 4 = heavy.
For the rusts 1 = tr. - 1%, 2 = 2 - 20%, 3 = 21 - 50%, 4 = over 50%

[2] A dash signifies no observation was made.

(Erysiphe graminis) infections were light except on barley in Eastern Canada. Oats were severely attacked by Septoria avenae f. sp. avenae throughout Ont., Que. and the Atlantic Provinces. Speckled leaf blotch (Septoria passerinii), net blotch (*Drechslera teres), and spot blotch (*Bipolaris sorokiniana) occurred sporadically on barley. Scald (Rhynchosporium secalis) occurred in trace amounts only at Creston, B.C. Usually this disease is common in Alta. and w. Sask.

Distribution of Physiologic Races

Puccinia graminis f. sp. tritici

Twenty races and subraces of wheat stem rust were identified in Canada in 1959. These races, number of isolates in brackets, are: 10 (1), 11 (5), 11-1 (Can.) (5), 15 (4), 15B-1 (Can.) (7), 15B-1L (Can.) (20), 15B-4 (Can.) (40), 17 (3), 29-1 (Can.) (21), 29-3 (Can.) (1), 29-5 (Can.) (1), 32 (3), 34 (1), 38 (4), 48A (13), 56 (113), 56A (2), 59 (3), 87 (1), 97 (1).

The distribution of races in 1959 was similar to that in 1958. The greatest change was an increase in the prevalence of race 56 from 32.2 per cent of the isolates in 1958 to 45.4 per cent in 1959. Race 56 has been increasing in prevalence since 1955. The subraces of 15B were about as prevalent as in 1958 but the prevalence of the other more common races diminished, probably because of the increased predominance of race 56. Races 29-1 (Can.) and 48A continued to be more common in Eastern Canada than in the Prairie Provinces.

An appreciable number of 1959 collections were from susceptible hosts. The distribution of races from these hosts is probably a more accurate indication of the relative prevalence of some races than from the data which includes isolates from resistant and hence selective varities. Race 56 appears to have constituted about 60 per cent of the rust in Canada in 1959, not 46 per cent as indicated above.

Puccinia recondita

Twelve races of wheat leaf rust were identified in the 1959 physiologic race survey. The races isolated are (number of isolates in brackets): 1 (10), 5 (87), 9 (27), 11 (42), 15 (132), 28 (11), 30 (5), 35 (12), 52 (2), 58 (32), 126 (15), 140 (2).

In 1957 and 1958, races 1 and 11 were predominant in Sask. These races are characteristic of the western coastal areas and of s. Alta. In 1959, the races prevalent in Sask. were similar to those in Man. This represents a return to the usual pattern of race distribution. The race distribution in other parts of Canada was similar to that observed in recent years.

* See footnote, page 1 (D.W.C.).

The commercial variety Selkirk was resistant to all cultures tested. Different cultures produce (0; to 1$^-$) or (2) reactions on Selkirk but no culture virulent on Selkirk (type 4 reaction) has been isolated in Canada.

Puccinia graminis f. sp. avenae

Eleven races of oat stem rust were found in Canada in 1959. The races, with the number of isolates in brackets, are: 1 (3), 2 (3), 6 (4), 6A (35), 7 (28), 7A (30), 8 (3), 8A (2), 10 (1), 11A (2), 13A (4). The letter "A" indicates races virulent on Rodney.

The distribution of oat stem rust races in 1959 differs in several respects from the 1958 distribution. In 1958 race group 1, 2, 5, race group 3, 7, 12 and race group 4, 6, 13 were about equally prevalent. In 1959 races 1, 2, 6, 8, and 10 occurred rarely but race 7, the predominant race from 1953 to 1957, again was the most common of the older races. Race 7A, which is virulent on the variety Rodney has steadily become more prevalent since its discovery in 1952. Its prevalence increased from about 15 per cent of the isolates in 1958 to 26 per cent in 1959. The 1959 figure probably over-estimates the prevalence of this race because many of the isolates were obtained from selective varieties. Despite the apparent exaggeration of the prevalence of race 7A it is reasonably certain that its prevalence has increased. It was overwhelmingly predominant on completely susceptible varieties at Macdonald College and Indian Head. The most important feature of the 1959 survey was the appearance for the third consecutive year in Eastern Canada of races virulent on Garry. Races 8A and 13A have been isolated in each of the last three years, race 6A in the last two years and race 11A for the first time in 1959. Seven of 10 isolates of race 6A from Que. were collected on different varieties at Ste. Anne de la Pocatiere and the remaining 3 isolates came from Riviere Quelle. Twenty-one of the 25 Ont. isolates were collected on different varieties at Appleton and the remaining 4 isolates were from Merrickville. The isolates of races 8A, 11A and 13A also came from these 4 locations. The distribution of races isolated from susceptible varieties supports the conclusion that race 7 predominated in 1959.

Puccinia coronata f. sp. avenae

Collections of crown rust of oats (leaf rust) were obtained from various scattered localities in Eastern and Western Canada in 1959. Twenty-six races and subraces of crown rust were isolated from these collections. Only seven races and subraces (with the percentage of each given in brackets) were isolated in Western Canada: 201 (1.4), 211A (2.7), 213 (2.7), 216 (35.6), 237A (1.4), 274 (52.0), and 279 (4.2). In this area races pathogenic on the variety Victoria and its derivatives predominated. These races have increased greatly in prevalence in the past several years. None of the races pathogenic to Landhafer and Santa Fe were found in Western Canada.

Twenty-four crown rust races and subraces were isolated from the collections originating in Eastern Canada. These were (with percentage of each race given in brackets) as follows: 201 (1.7), 202C (1.7), 203 (3.4), 209 (3.4), 210 (1.7), 210A (3.4), 211 (3.4), 211A (8.5), 212 (1.7), 212B (3.4), 216 (8.5), 228 (1.7), 231 (3.4), 238 (3.4), 239 (1.7), 264 (1.7), 274 (13.5), 276 (1.7), 279 (1.7), 284A (1.7), 290 (3.4), 293 (6.8), 294 (16.8) and 295 (1.7).

In Western Canada 94.5 per cent of the crown rust races isolated are highly pathogenic to oat varieties with resistance from Victoria, while in Eastern Canada only 23 per cent of the isolates are pathogenic to Victoria. However, in the east, six of the races isolated (264, 276, 290, 293, 294 and 295) comprising 32.1 per cent of all isolates are pathogenic to Landhafer and Santa Fe which have been extensively used in Canada and the United States in breeding for resistance to crown rust. Apparently, in both Eastern and Western Canada most of the crown rust present is pathogenic to the commonly grown oat varieties.

Puccinia hordei

Eleven collections of barley leaf rust were studied in 1959. Race 4 (6 isolations) and race 44 (5 isolations) were the only races identified. All collections studied were obtained from Man. and Sask.

Cereal Diseases at 24 Locations in Alberta and British Columbia

W.P. Campbell and D.W. Creelman

The following report was compiled from data submitted by W.P. Campbell and represents the results of a disease survey on varieties of barley, oats and wheat at 22 locations in north and central Alberta and 2 locations in B.C. For the purposes of this report the stations will be grouped as follows: Central Alberta 13 stations south, to Calgary, of a line extending through Vermilion, Vegreville, Edmonton and Fallis; North Alberta and B.C., 11 stations north of a line extending from Bonnyville through Beaverlodge and including Baldonnell and North Pine in B.C.

Barley Diseases

Eight barley varieties were grown at most c. Alta. stations but additions to and deletions from the basic list resulted in a range of 5-9 varieties. The standard list of varieties was: Wolfe, Parkland, Olli, Traill, Gateway, Husky, Nord and Pirkka. Most n. Alta. and B.C. stations had 7 varieties with Wolfe deleted from most tests. The following barley diseases were recorded.

SCALD (Rhynchosporium secalis), in c. Alta., Acme, 8 - sl./9; Airdrie, 1-mod. 8-sev./9; Bentley, 8-sev./8; Castor, 0/6; Cheddarville, 8-sev./8; Drumheller, 2-tr. 2-sl./6; Evansburg, 1-mod. 7-sev./8; Fallis, 8-sl./8; Leslieville, 6-sl. 2-mod./8; Metiskow, 0/6; Olds, 7-sl./8; Vegreville, 2-tr. 6-sl./8; Vermilion, 2-tr./5.

In n. Alta. and B.C., Athabasca, 1-sl. 2-mod. 5-sev./8; Beaverlodge, 2-tr./7; Blueberry Mtn., 4-tr. 1-sl./7; Bonnyville, 3-tr. 2-sl./8; Fairview, 2-tr./7; Goodfare, 2-tr./7; High Prairie, 1-tr. 1-sl./7; McLennan, 1-tr./7; Wanham, 3-tr. 1-sl./7; Baldonnell, B.C., 5-mod. 2-sev./7; North Pine, B.C., 5-tr./7.

Scald was generally more serious at the central than at the northern stations. Drought conditions and poor growth of barley at Castor and Metiskow would explain the general absence of diseases at those two locations.

NET BLOTCH (*Drechslera teres), in c. Alta., Acme, 7-sl. 1-mod./9; Airdrie, 3-tr. 4-sl./9; Bentley, 1-tr. 2-sl./8; Castor, 0/6; Cheddarville, 0/8; Drumheller, 2-tr. 2-sl./6; Evansburg, 2-tr. 1-sl./8; Fallis, 0/8; Leslieville 7-tr./8; Metiskow, 0/6; Olds, 4-tr. 2-sl./8; Vegreville, 1-tr. 6-sl./8; Vermilion, 1-tr./5.

In n. Alta. and B.C., Athabasca, 3-tr. 2-mod./8; Beaverlodge, 1-tr./7; Blueberry Mtn., 2-tr./7; Bonnyville, 2-tr. 6-sl./8; Fairview, 2-tr./7; Goodfare, 0/7; High Prairie, 2-tr. 1-sl. 2-mod./7; McLennan, 0/7; Wanham, 0/7; Baldonnell, B.C., 2-tr. 1-sl./7; North Pine, 0/7.

Net blotch was not serious at any station in n. or c. Alta. and no differences in intensity of the disease were apparent between the 2 areas.

ROOT ROT (*Bipolaris sorokiniana, Fusarium spp.), in c. Alta., Acme, 4-tr. 4-sl./9; Airdrie, 7-tr. 2-sl./9; Bentley, 2-tr./8; Castor, 3-tr. 1-sl./6; Cheddarville, 3-tr./8; Drumheller, 2-tr./6; Evansburg, 3-tr./8; Fallis, 4-tr./8; Leslieville, 3-tr./8; Metiskow, 1-tr./6; Olds, 1-tr./8; Vegreville, 1-tr./8; Vermilion, 1-tr./5.

In n. Alta. and B.C., Athabasca, 2-tr. 1-sl. 3-mod. 1-sev./8; Beaverlodge, 2-tr. 2-sl./7; Blueberry Mtn., 0/7; Bonnyville, 1-tr./8; Fairview, 0/7; Goodfare, 4-tr./7; High Prairie 2-tr. 1-sl. 2-mod./7; McLennan, 0/7; Wanham, 1-tr. 5-sl. 1-mod./7; Baldonnell, B.C., 2-tr. 5-sl./7; North Pine, B.C., 3-tr. 3-sl./7.

Root rots were slightly more severe in intensity at the northern stations than at the stations in c. Alta.

LOOSE SMUT (Ustilago nuda), in c. Alta., Acme, 2-tr. 3-1%/9; Airdrie, 1-1%/9; Bentley, 3-1%/8; Castor, 1-tr./6; Cheddarville, 1-1%/8; Drumheller, 0/6; Evansburg, 1-tr. 1-1%/8; Fallis, 1-tr./8; Leslieville, 2-tr./8; Metiskow, 3-tr./6; Olds, 4-1%, 1-2%/8; Vegreville, 3-tr./8; Vermilion, 3-tr. 1-1%/5.

* See footnote, page 1 (D.W.C.).

In n. Alta. and B.C., Athabasca, 1-3%/8; Beaverlodge, 1-tr. 1-3%/7; Blueberry Mtn., 1-tr. 2-1%/7; Bonnyville, 1-tr./8; Fairview, 1-2%/7; Goodfare, 1-2%/7; High Prairie, 0/7; McLennan, 0/7; Wanham, 0/7; Baldonnell, B.C., 2-tr. 2-3%/7; North Pine 1-tr. 1-3%/7.

Loose smut was generally somewhat more severe at the northern stations although it was not recorded at 3 of them.

SPECKLED LEAF BLOTCH (Septoria passerinii) was not recorded from the c. Alta. stations. It was recorded from 10/11 northern stations as follows: Athabasca, 1-tr. 1-sl. 2-mod. 1-sev./8; Beaverlodge, 1-tr./7; Blueberry Mtn., 4-tr./7; Bonnyville, 0/8; Fairview, 6-tr. 1-sl./7; Goodfare, 4-tr./7; High Prairie, 1-tr. 2-sl. 2-mod. 2-sev./7; McLennan, 1-tr./7; Wanham, 1-tr./7; Baldonnell, B.C., 2-tr. 2-sl./7; North Pine, B.C., 4-tr. 1-sl./7.

BACTERIAL STREAK (Xanthomonas translucens) was found at only 1 c. Alta. station, Olds, 4-tr./8. On the northern stations it occurred at Athabasca, 1-sl. 2-mod./8; High Prairie, 1-tr. 1-sev./7; and Baldonnell, B.C., 2-tr. 3-sl./7.

BARLEY FALSE STRIPE (virus) occurred at 3 c. Alta. stations, Acme, 1-5%/9; Airdrie, 1-5%/9; and Drumheller, 1-5%/6. These three stations were the most southery surveyed and in each case the affected variety was Compana.

POWDERY MILDEW (Erysiphe graminis) was recorded only from the n. Alta. station, High Prairie, 2-sl./7.

Oat Diseases

Five oat varieties comprised the plantings at most c. Alta. stations but some contained 8 and one, only 4. The standard oat varieties were Rodney, Glen, Eagle, New Garry and Fundy. Most n. Alta. and B.C. locations had 6 varieties, Garry, Abegweit, 60-day, Glen, Fundy and Victory.

GRAY SPECK (Manganese deficiency) occurred in c. Alta. at 12/13 stations, Acme, 1-sl. 2-mod./5; Airdrie, 0/5; Bentley, 3-sl./5; Castor, 1-sl. 2-mod./5; Cheddarville, 5-sl. 1-mod./8; Drumheller, 1-mod. 3-sev./4; Evansburg, 2-sl./8; Fallis, 2-sl. 1-mod./8; Leslieville, 1-sl. 1-mod. 6-sev./8; Metiskow, 2-mod./5; Olds, 2-sl. 1-mod./5; Vegreville, 2-sl. 1-mod. 2-sev./5; Vermilion, 2-sl. 1-mod. 2-sev./5.

In n. Alta. and B.C., it occurred in only 5/11 locations, Blueberry Mtn., 4-tr. 1-sl. 1-mod./6; Bonnyville, 3-mod. 2-sev./5; Fairview, 3-tr./6; High Prairie 1-mod. 5-sev./6; North Pine, B.C., 1-sl./6.

BLAST (non-parasitic) was recorded only from the northern stations, Beaverlodge, 1-tr. 3-sl. 2-mod./6; Blueberry Mtn., 2-sl. 4-mod./6; Fairview, 3-tr./6; Goodfare 4-tr. 1-sl./6; High Prairie, 2-sl. 3-mod./6; McLennan, 3-tr./6; Wanham, 2-tr. 2-sl./6; Baldonnell, B.C., 2-tr. 2-sl. 2-mod./6; North Pine, B.C., 2-tr./6.

HALO BLIGHT (Pseudomonas coronafaciens) was recorded only from the northern location Athabasca, 4-tr. 1-sl./8.

Wheat Diseases

Wheat was surveyed only at the 11 northern stations where the following varieties were involved: Thatcher, Selkirk, Saunders, C.T. 229 and C.T. 233. The diseases recorded were:

ROOT ROT (*Bipolaris sorokiniana, Fusarium spp.), Athabasca, 2-tr. 2-sl./5; Beaverlodge, 3-tr./6; Blueberry Mtn., 5-sl./5; Fairview, 1-tr./5; Goodfare, 3-sl. 2-mod./5; High Prairie, 2-tr. 2-sl./5; Wanham, 4-tr. 1-sl./5; Baldonnell, B.C., 2-tr. 2-sl./5; North Pine, B.C., 3-tr. 2-sl./5.

SPECKLED LEAF BLOTCH (Septoria spp.), Beaverlodge, 1-sl./6; High Prairie, 5-tr./5; North Pine, B.C., 1-tr./5.

Cereal Diseases in Cooperative Variety Tests in Alberta in 1959

W.P. Campbell

Twenty-nine plots of 6-rowed varieties of barley and 16 plots of 2-rowed varieties grown at Lacombe were surveyed for disease. In addition, 16 plots at Fallis and 16 at Airdrie were surveyed. The barley diseases were rated as follows:

On 6-rowed barley at Lacombe, scald (Rhynchosporium secalis), 14-tr. 10-sl. 2-mod./29; speckled leaf blotch (Septoria passerinii), 2-tr. 16-sl. 8-mod. 3-sev./29; net blotch (*Drechslera teres), 14-tr. 7-sl./29; root rot (*Bipolaris sorokiniana, Fusarium spp.), 9-tr. 2-sl./29; loose smut (Ustilago nuda), 4-tr. 3-1%. 1-3%/29; covered smut (U. hordei), 1-4%/29.

On 2-rowed barley at Lacombe, scald, 5-tr. 9-sl. 1-mod. 1-sev./16; net blotch, 4-tr. 3-sl./16; root rot, 3-tr. 8-sl./16; speckled leaf blotch, 3-tr. 6-sl. 1-mod./16; loose smut, 1-tr. 1-1%/16; barley false stripe, 1-tr./16.

At Fallis, scald, 4-sl. 12-sev./16; net blotch, 2-tr. 2-sl./16; root rot, 6-tr. 1-sl./16; loose smut, 3-tr. 1-1%/16; and at Airdrie, scald, 3-mod. 13-sev./16; net blotch, 6-tr./16; root rot, 7-tr. 1-sl./16.

Twenty-five plots of wheat and 24 of oats were also surveyed at Lacombe. The disease ratings for wheat were: root rot, 10-tr. 2-sl./25; speckled leaf blotch (Septoria spp.), 10-tr. 1-sl./25; loose smut (Ustilago tritici), 4-1%, 1-3% /25.

Oat disease ratings at Lacombe were: gray speck, 5-tr. 8-sl. 3-mod./24; and blast, 12-tr. 10-sl./24.

* See footnote, page 1 (D.W.C.).

Notes on Cereal and Grass Viruses in 1959

J. T. Slykhuis

Barley yellow dwarf virus (BYDV) was transmitted by aphids from overwintered winter wheat, winter rye, timothy, brome grass, perennial ryegrass, red fescue, Kentucky bluegrass and intermediate wheatgrass at Ottawa, thereby demonstrating that winter reservoirs of the virus are common in the area.

The bird cherry oat aphid (Rhopalosiphum padi L.), an efficient vector of common strains of the virus, passed the winter in the egg stage on cherry trees. By late April it appeared that this aphid species could become abundant and important in spreading BYDV from perennial grasses to young spring grains, but coccinelid beetles become abundant on the cherry trees and the aphids disappeared in early May before spring grains emerged. They were not found again until mid-June and were scarce until August and thus did not appear important in the spread of BYDV. The English grain aphid, (Macrosiphum avenae (Fab.)) was observed in spring oats as early as May 14, before it was found in perennial grasses. The first BYDV infections in spring grains were associated with this aphid and were scattered in patches over the entire field rather than occurring at the edges. It appears that the vector had settled on the fields after prolonged flight and did not come from local sources.

BYDV spread to a limited extent in the Ottawa area during June and July. By mid-July 1 to 5 per cent of the plants in most fields showed yellow dwarf symptoms, but the diseased plants occurred principally in small patches. In these patches the yields were reduced as much as 42 per cent below the yields of the surrounding healthy areas.

BYDV was also isolated from barley leaves sent to Ottawa by Dr. H. A. H. Wallace from Winnipeg. It is also believed to be the cause of a high incidence of chlorotic leaf symptoms on barley and oats, samples of which were sent to Ottawa from Fort William. There was a high incidence of the disease on some oat crops near Montreal, and it was identified on oats at Fredericton, New Brunswick.

Agropyron mosaic virus (AMV), which occurs on Agropyron repens in most areas in southeastern Ontario, spread slowly to immature wheat in experimental plots during the summer of 1959. By early September all plants in a 1/4-acre plot of Cornell winter wheat, sown in late May, were infected with the virus. Although the spread of the virus appears to be associated with eriophyid mites, none of the 3 species of mites usually present with the virus has been proved to be a vector.

Symptoms like wheat striate mosaic were found on a timothy plant collected in October, 1958. The painted leafhopper (Endria inimica Say), which is a vector of the wheat striate mosaic virus, is common in the Ottawa area each summer, and transmission tests were made with this insect. In one such test, Kent wheat plants on which E. inimica fed after feeding for one week on the diseased timothy, developed symptoms resembling mild striate mosaic. Similar

symptoms were also observed in August, 1959 on spring-sown Cornell winter wheat that remained vegetative all summer and fall. Further experiments are needed to verify the presence of wheat striate mosaic in southeastern Ontario.

Virus-like symptoms, including severe rolling and stiffening of leaves, chlorotic streaks and blotches, and stunting developed on young Kent wheat plants that were infested with Brachycolus frequens, an aphid that often occurs on Agropyron in southeastern Ontario. After affected plants were sprayed repeatedly with Malathion to kill the aphids, they appeared to recover completely and grow normally, but the non-sprayed plants eventually died. It appears that the symptoms associated with these aphids are not caused by a virus but by toxic effects of aphid feeding.

Cereal Smuts in Western Canada - 1959

W. Popp

Loose smut of wheat was relatively scarce in Manitoba in 1959 (Table 3). Infection consisted of a maximum of 2 per cent in Lee wheat, less than 1 per cent in durum varieties, and none in Selkirk. Selkirk occupied over 83 per cent of the crop acreage.

Eighty-three per cent of the barley fields examined in Manitoba were found to be smut infected. There was an average of 1.5 per cent in the crop as a whole. As compared to 1958, there was a decline of loose smut and an increase of covered smut. This coincides with a change in the relative prevalence of Montcalm and Parkland barley. Montcalm is affected mainly by loose smut whereas Parkland is prone to infection by covered smut.

Practically no smut, either loose or covered, was found in oats.

All major classes of wheat inspected in 1959 by the Western Inspections Branch of the Board of Grain Commissioners were relatively free from bunt (Table 4). This is rather unusual for Alberta Red Winter wheat. The amount of bunt found in the 1958 crop is shown in Table 5.

Table 3. Cereal Smuts in Manitoba - 1959

Cereal	Kind of Smut	Per Cent smut in Fields	
		Range	Mean
Wheat	Loose	0 - 1	trace
	Bunt	---	0
Barley	Loose	0 - 6	0.4
	Covered	0 - 10	1.0
	False loose	0 - 3	0.1
Oats	Loose and covered	0 - trace	trace

Table 4. Bunt of Wheat in Western Canada
August 1, 1959 to October 31, 1959.

Class of Wheat	Cars Inspected	Cars graded "Smutty"	Percentage graded "Smutty"
Hard Red Spring	47269	21	0.04
Amber Durum	4379	0	0.00
White Spring	35	0	0.00
Alta. Red Winter	545	0	0.00
Garnet	70	2	2.86
Mixed Wheat	22	0	0.00
All classes	52320	23	0.04

Table 5. Bunt of Wheat in Western Canada
August 1, 1958 to July 31, 1959

Class of Wheat	Cars Inspected	Cars graded "Smutty"	Percentage graded "Smutty"
Hard Red Spring	175781	99	0.06
Amber Durum	8351	1	0.01
White Spring	272	0	0.00
Alta. Red Winter	248	2	0.81
Garnet	4	0	0.00
Mixed Wheat	89	0	0.00
All classes	184745	102	0.06

The Occurrence of Surface-borne Smut Spores in Samples of Cereal Seed Produced in the Prairie Provinces in the Crop Years 1945 - 1958

Dr. F.J. Greaney has provided the data given in Table 6 from the results of tests of farmers' seed samples made by the Line Elevators Farm Service, Winnipeg, Man.

Table 6. Smut Spores on Farmers Seed Samples 1945 - 1958

Year seed produced	WHEAT		OATS		BARLEY	
	Samples examined	% bearing smut spores	Samples examined	% bearing smut spores	Samples examined	% bearing smut spores
1945	6,069	51.2	1,600	90.3	1,602	95.1
1946	8,267	71.3	2,978	89.3	1,043	96.4
1947	9,173	66.8	2,800	88.3	687	94.2
1948	7,442	60.6	2,405	85.9	1,369	92.4
1949	9,570	44.6	2,936	81.1	1,679	88.9
1950	11,993	45.6	5,331	73.5	3,149	89.2
1951	2,730	47.9	1,106	84.4	1,124	66.8
1952	5,121	46.7	1,655	87.4	1,584	63.6
1953	5,255	38.8	1,528	85.9	1,705	93.1
1954	3,464	27.7	1,140	81.3	1,230	90.1
1955	3,428	25.6	1,931	73.1	1,656	91.8
1956	6,148	20.1	1,122	82.4	1,144	95.0
1957	4,523	22.4	1,931	75.2	3,074	91.0
1958	4,031	12.4	1,444	69.7	1,894	90.1

Seed Treatment Survey in the Prairie Provinces - 1959

The information in the Table 7 was supplied by Dr. F.J. Greaney of the Line Elevators Farm Service, Winnipeg.

In June, 1959, Elevator Agents of Member Companies were asked to estimate and report the percentage of the total acreage of each of the crops of wheat, oats, barley and flax, in their respective districts, that was planted

treated seed in 1959. The results, by provinces and crop districts, are tabulated below. (Number of individual reports used to determine the average acreage estimates in brackets.)

Table 7. Results of 1959 Seed Treatment Survey

Province and Crop District	Percentage of Total Acreage Planted with Treated Seed:			
	Wheat	Oats	Barley	Flax
MANITOBA				
Average 1/	47.2 (102)	25.6 (91)	42.1 (98)	40.3 (78)
SASKATCHEWAN				
1A	50.7	25.5	54.3	46.6
1B	43.9	46.1	73.3	65.0
2A	65.7	55.0	72.9	46.7
2B	56.7	51.5	67.6	51.5
3AN	64.8	60.2	81.1	55.7
3AS	68.9	65.5	75.4	72.4
3BN	70.4	67.9	78.7	59.6
3BS	65.9	73.2	81.8	72.7
4A	73.3	67.5	77.9	74.0
4B	81.8	76.1	81.0	73.6
5A	27.3	39.8	49.4	55.0
5B	36.8	42.9	64.2	62.4
6A	52.1	64.7	77.3	57.4
6B	63.7	53.9	75.4	51.7
7A	83.8	78.5	94.0	80.0
7B	74.6	75.0	90.3	85.8
8A	43.2	45.6	56.5	37.9
8B	38.8	70.0	78.9	61.5
9A	57.6	61.3	76.5	85.7*
9B	48.7	67.5	75.4	72.5*
Average 1/	60.3 (651)	60.7 (619)	74.7 (656)	63.2 (456)
ALBERTA				
1	87.0	76.7	85.2	66.7
2	91.6	83.8	92.9	81.2
3	89.0	81.4	91.2	87.1
4	80.8	81.3	88.8	78.5
5	78.6	74.2	79.7	92.9*
6	84.6	78.8	83.0	75.0*
7	89.0	84.8	85.1	84.3
Average 1/	86.3 (386)	81.1 (384)	91.2 (384)	81.3 (234)
PRAIRIE PROVINCES				
Average 1/	67.9 (1139)	65.0 (1094)	77.5 (1138)	66.4 (768)

* Based on less than 10 individual reports.
1/ Weighted.

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 surveyed 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, meliloti, 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. Pacôme, 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 surveyed 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 trifolii). 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.S. (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. meliloti) 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-one 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 found 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 were tested for the presence of seed-borne fungi. The following species were 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 present 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 Gerdemann, 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 Glycene 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 been 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 usual 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 most 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 tracks. 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 refused to accept seed lots because of the unusually high incidence of purple stain, 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 conspicious 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 1958, 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 plants 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 interveinal 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 (Rhizoctonia 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. Hildebrand

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.

Afanasiev, 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 beets 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 root louse gained access, by way of the cracks to the roots 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, Delcrest. 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 (Rhizoctonia 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-lesion 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

AGROPYRON

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. infection 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.).

III. DISEASES OF VEGETABLES AND FIELD CROPS

ASPARAGUS

STEMPHYLIUM BLIGHT (Pleospora herbarum). The disease, on asparagus at Ste. Foy, Que., was characterized by the presence of yellow lesions extending along stems and branches. The lesions eventually turned a dull brown. Both Stemphylium sp. and P. herbarum were present in the lesions, the former the more prevalent (D. Leblond).

BEAN

GRAY MOLD (Botrytis cinerea). A trace infection developed on the foliage of Golden Wax at Canaan, N.S. Damage was negligible (K.A. Harrison).

ANTHRACNOSE (Colletotrichum lindemuthianum) caused the complete loss of a 15-acre crop of Soldier beans at Millville, N.B. (S.R. Colpitts). A planting of the Jacob's Cattle variety at Kentville, N.S. was 100% infected. Damage was estimated at 95% of the crop (K.A.H.).

HALO BLIGHT (Pseudomonas phaseolicola) was rated as 2-tr.-sl. 2-sl.-mod. 1-sev./6 fields surveyed in s. Alta. (E.J. Hawn). The varieties Lapin and Soldier were 5% infected in a planting at Millville, N.B. (S.R.C.). In a field at Canaan, N.S., halo blight was spread across a 2-acre field by a storm. The focal point of the infection appeared to be a single infected plant. The disease was not seen in other fields planted with seed from the same source (K.A.H.).

ROOT ROT (Rhizoctonia solani). Trace to moderate infections were seen in 2/6 fields surveyed in s. Alta. (E.J. Hawn).

SCLEROTINIA ROT (S. sclerotiorum) caused moderate damage at one end of a field of the variety Topcrop at York, P.E.I. (J.E. Campbell).

COMMON BLIGHT (Xanthomonas phaseoli) was generally very light in Sask. where the dry weather militated against its spread (R.J. Ledingham). It was troublesome in gardens at Birch Hills and Yorkton, Sask. (T.C. Vanterpool). At the Special Crops Experimental Farm, Portage la Prairie, Man., infection ranged as high as 25%. In farm fields in the Portage district the average infection was tr.-sl. in the variety Sanilac. All 7 fields surveyed were infected (W.A.F.H.).

MOSAIC (virus) was found in 2/6 fields surveyed in s. Alta. A few plants were moderately damaged (E.J.H.).

ROOT ROT. Five/7 plantings on saline soils in Man. were affected by root rot. The crowns and roots were severely damaged and isolations yielded a variety of fungi including Fusarium sp., also yellow bacteria. The high degree of salinity was due to calcium sulfate and magnesium sulfate (W.A.F.H.).

SUNSCALD caused light damage in a 30-acre field at St. Cesaire, Rouville Co., Que. (R. Crête).

Field Bean Diseases in Western Ontario in 1959

R.N. Wensley

Two surveys for field bean diseases on farms selected at random in Kent, Middlesex, Huron and Essex counties showed that the prevalence and severity of bean diseases in Western Ontario were determined largely by two factors: first, the prevailing drought during the growing period and second, the widespread substitution of the early maturing variety, Sanilac, for Michelite and other varieties. This report is based principally upon diseases of Sanilac although some finds do apply to the varieties Michelite, Clipper and Red Kidney.

Root Rot was a factor in some areas during a post-planting period of from one to two weeks. Subsequent drought, however, restricted the development of root rot and minimized its importance in most areas of western Ontario.

Anthracnose (Colletotrichum lindemuthianum) was not found, presumably because of the predominance of the anthracnose-resistant variety, Sanilac, to the exclusion of Michelite and other susceptible varieties on many farms and because of the unfavorable weather conditions that prevailed.

Bacterial Blights (Pseudomonas phaseolicola, Xanthomonas phaseoli) were prevalent in western Ontario. Severity was greatest on early maturing varieties such as Sanilac, planted early and growing under conditions of drought. The green foliage, the greater growth, and the lower incidence of disease among plants in depressions and protected border areas as opposed to those in more open situations caused many fields to assume a patch-like appearance.

Alternaria. Secondary invasion of damaged leaf tissues by Alternaria sp. was severe in numerous fields where leafhopper populations were high. Alternaria infection was also associated with bacterial blight. The incidence and severity of Alternaria infection and of bacterial blight were most pronounced on early maturing crops.

Mineral Deficiencies. Symptoms of mineral deficiencies developed in many fields of beans in Kent, Middlesex and Huron counties. Symptoms were most pronounced on knolls, in sandy soils and in fields planted to sugar beets in 1958. Severe drought accentuated the symptoms and reduced the effectiveness of fertilization. In one field, an early application of ammonium nitrate to the surface of sandy ridges and knolls at the rate of 150 lb/acre reduced the severity of deficiency symptoms and extended the period of growth. However, under severe drought conditions no evidence was found of increased pod formation or yield. The deficiency or non-availability of mineral nutrients is expected to cause a pronounced reduction in yield in many fields.

Sclerotinia Wilt (Sclerotinia sclerotiorum) was found in one field of Cherokee (wax) and Black Valentine in Essex County. Mortality was 12 1/2 percent in Cherokee and 8 percent in Black Valentine.

BEET

SCAB (Streptomyces scabies). Three-4% of the roots in a late planting in the Dover marshes near Prairie Siding in s-w. Ont. showed deep scab lesions. The pH of the soil was about 9. Scab has not previously been observed on table beets in southwestern Ont. (C.E. McKeen).

BROAD BEAN

FUSARIUM WILT (F. oxysporum f. fabae) affected 80% of the plants of the Windsor variety in a garden at Desbiens, Roberval Co., Que. Broad beans have been grown on this plot for a number of years (L.J. Coulombe).

CABBAGE

BROWN ROT (Alternaria brassicae). A sev. infection developed in the outer leaves of cabbage in storage at Lincoln, Lunenburg Co., N.S. By stripping affected leaves, the grower was able to salvage most of the crop (K.A.H.).

LEAF SPOT (Alternaria sp.). Light infections appeared in experimental plots at Ste. Clothilde, Chateauguay Co., Que. (R. Crête).

CLUB ROOT (Plasmodiophora brassicae) is widely distributed in cruciferous crops in N.S. The use of crop rotation as a control measure is essential (K.A.H.).

BLACK ROT (Xanthomonas campestris). The number of specimens of infected plants received at the Winnipeg Laboratory for diagnosis would indicate that black rot continues to do avoidable damage to cabbage in Man. (W.A.F. Hagborg).

INTUMESCENCE (non-parasitic). This disorder was widely distributed through 2 adjacent townships in the Chatham, Ont. area. No recognizable cause could be determined in association with the affected plants. Intumescence is attributed to an upset in the water economy of the plant, resulting in enations on the inner surface of the leaves of the head (B.H. McNeill, C.B. Kelly).

CARROT

LEAF SPOT (Alternaria dauci) caused the defoliation of one-third of a 10-acre planting at Port Williams, N.S. (J.F. Hockey).

BLACK ROT (Alternaria radicina) was observed in 1958 carrots in storage in April and a moderate infection occurred in the field in Sept. at Neuville, Portneuf Co., Que. (D. Leblond). Three percent of the roots of the variety Nantes were affected in storage at Hillaton, Kings Co., N.S. (K.A.H.).

GRAY MOLD ROT (Botrytis cinerea). Specimens bearing numerous sclerotia were received from St. Pierre, Isle Orleans, Que. (D.L.).

LEAF SPOT (Cercospora carotae) is becoming more widespread in the Annapolis Valley of N.S. It caused, in association with A. dauci, a browning of tops in the Berwick area (K.A.H.). This same combination of organisms was observed in most carrot fields in s.-w. Que. In many cases infection was sev. It was 20-30% in a 15-acre field at Ste. Blaise (R. Crête).

SOFT ROT (Erwinia carotovora). Several tons of carrots at Berwick, N.S. broke down after cold storage facilities were discontinued (K.A.H.).

FUSARIUM ROT (Fusarium spp.). Specimens of Fusarium rot of carrots in storage were received from Levis and from St. Laurent, Isle Orleans, Que. (D.L.).

VIOLET ROOT ROT (Rhizoctonia crocorum) was seen in carrots purchased in Russell Co., Ont. It is thought that they may have been grown in the adjacent muck soil area near Alfred (K.M. Graham).

SCLEROTINIA ROT (S. sclerotiorum) was sl.-mod. in gardens in Sask. This is an important rot-inducing organism of stored carrots, particularly in urban areas where there is little opportunity for rotation of the garden plot (R.J. Ledingham). It caused a 20% loss in a lot of 200 bbl. at Berwick, N.S. (K.A.H.).

ASTER YELLOWS (aster yellows virus). Only a few infected plants were noted, late in the season, in Sask. (R.J.L.). A moderate infection was seen in a planting near Winnipeg, Man. (W.L. Gordon). It was tr. at Ste. Anne de la Pocatiere, Que. (R.O. Lachance), and at Salisbury, Albert Co., N.B. (S.R. Colpitts). Infections were very light in fields observed in N.S. in 1959 (K.A.H.). A heavy infection caused moderate damage in a field at Southport, P.E.I. (J.E. Campbell).

CHEMICAL INJURY. Three or four early plantings of carrots in the Jeanette Creek Marsh near Tilbury, Ont. exhibited necrotic areas on the tap root at the ground level. No pathogenic organism was associated with the necrotic tissue. Plants toppled over and died when they were from 6-10 inches high. Up to 20% of the plants were affected and killed in 2 fields. All the affected fields had been sprayed, prior to seeding, with aldrin and the injury is thought to have been caused by that chemical. A similiar type of injury on tobacco transplants has been attributed to aldrin (C. D. McKeen).

CAULIFLOWER

LEAF SPOT (Alternaria brassicae). Specimens from Port Hope, Ont. were received at St. Catharines for diagnosis. The grower reported the infection to be serious. This disease is not often found in the field in Ont. (J. F. Bradbury).

CLUB ROOT (Plasmodiophora brassicae) was light in a 2-acre field at Ste. Martine, Chateauguay Co., Que. (R. Crête).

WILT (Sclerotinia sclerotiorum). Infections ranging from 5-15% were seen in fields from 1-10 acres in area at St. Eustache, Ste. Dorothee and St. Martin, Que. (R.C.).

LEAF SPOT (?Xanthomonas campestris) was reported from Man. The spots contained an abundance of bacteria which are suspected to be X. campestris. Testing of isolates was not complete at the time of this report (W. A. F. Hagborg).

BORON DEFICIENCY. Slight to moderate symptoms were observed in most fields in the vicinity of Montreal, Que. (R.C.).

WHIPTAIL (Molybdenum deficiency) was sl. in most fields observed at Ste. Dorothee and St. Martin, Que. (R.C.).

CELERY

EARLY BLIGHT (Cercospora apii) was sev. and caused a complete loss of 2 fields of 10 acres each at Sherrington, Napierville Co., Que. (R. Crête).

PINK ROT (Sclerotinia sclerotiorum). Light infections occurred in plots at Ste. Clothilde, Chateauguay Co., Que. (R.C.).

LATE BLIGHT (Septoria apii) was sl. in a 10-acre field at Ste. Clothilde, Que. (R.C.).

BLACKHEART (physiological). About 30% of the plants in a 15-acre field at St. Remi, Napierville Co., Que. were affected. Damage, however, was light (R.C.).

CHINESE CABBAGE

BACTERIAL LEAF SPOT (Xanthomonas campestris). Trace infections were seen in a 2-acre field at Ste. Clothilde, Que. (R. Crête).

CUCUMBER

GRAY MOLD (Botrytis cinerea) was tr. in a greenhouse at Falmouth, N.S. in April (K.A. Harrison).

SCAB (Cladosporium cucumerinum). The susceptible variety Straight-8, a popular slicing variety, was heavily infected in Queens and Sunbury counties, N.B. Up to 40% of the crop in some fields was diseased (S.R. Colpitts). Damage was sev. on slicing varieties in gardens in N.S. (K.A.H.).

BACTERIAL WILT (Erwinia tracheiphila) caused sl. damage in several small gardens at Ste. Anne de la Pocatiere, Que. (R.O. Lachance). Only one case of bacterial wilt was reported from Kings Co., N.S. (K.A.H.).

POWDERY MILDEW (Erysiphe cichoracearum). Infections developed late in the harvest season in the field crop in Essex Co., Ont. As a consequence, damage was much lighter than usual (C.D. McKeen). It was sev. in plantings at Ste. Foy, Que. (D. Leblond). A trace infection was seen in a greenhouse at Kentville, N.S. (K.A.H.).

ANGULAR LEAF SPOT (Pseudomonas lachrymans) caused mod-sev. damage in 2 fields at Picture Butte and in 1 near Taber, Alta. (J.B. Lebeau). Only one specimen was received from Man. in 1959 (W.A.F. Hagborg).

WILT (high temperatures). Injury was observed at Birch Hills and Newdorf, Sask. (T.C. Vanterpool).

EGGPLANT

WILT (Verticillium albo-atrum). Every field observed in Essex Co., Ont. showed wilt affecting from a few to 100% of the plants. Crop losses from wilt have never been higher. Soil fumigation with Dowfume MC-2 in experimental plots gave good control. Other chemicals tested did not give satisfactory results (C. D. McKeen).

LETTUCE

GRAY MOLD (Botrytis cinerea). Infection was about 2% at Grand Pre, N.S. in plants transplanted from the greenhouse (K.A. Harrison).

DOWNY MILDEW (Bremia lactucae) was 10-15% in experimental plots at Ste. Clothilde, Que. (R. Crête).

LEAF SPOT (Phyllosticta ? mulgedii) was sl. on the variety Great Lakes at Ste. Foy, Que. (D. Leblond).

DROP (Sclerotinia sclerotiorum) Thirty % of the plants were attacked in a 15-acre field on muck soil at Sherrington, Que. (R.C.). About 15% of the plants in one corner of a 3-acre field at Grand Pre, N.S. were affected. The same area of the field was affected in 1958 (K.A.H.).

ASTER YELLOWS (Aster yellows virus) infected about 95% of the head lettuce plants that matured about mid-summer in the Komoka Marsh near London, Ont. Leafhopper populations in the marsh were very high and spraying twice a week from emergence to harvest reduced disease incidence only to 50% (C.D. McKeen). Infection was heavy at Southport, P.E.I. (J.E. Campbell). It was 15% in a 10-acre field at St. Sulpice, L'Assomption Co. and 20% in plots at Ste. Clothilde, Que. (R.C.).

TIP BURN (non-parasitic) was 5% in plots at Ste. Clothilde, Que. (R.C.).

MELON

LEAF SPOT (Alternaria cucumerina). Heavy infections appeared in most fields in Essex Co., Ont. at mid-harvest (C.D. McKeen).

POWDERY MILDEW (Erysiphe cichoracearum) appeared later than usual in crops in Essex Co., Ont. and the overall damage was not heavy (C.D. McK.).

FUSARIUM WILT (F. bulbigenum f. niveum) occurred in infested soils in s-w. Ont. in fields where wilt-resistant varieties were not being grown (C.D. McK.).

ONION

BLACK MOLD (Aspergillus niger). The incidence of black mold in cooking onions reached a level of 7-8% in several crops in the Erieau Marsh near Blenheim, Ont. A similiar high incidence of this disease occurred in stored onions after the hot, dry summer of 1955 (C.D. McKeen).

NECK ROT (Botrytis allii). Infections in the Okanagan Valley of B.C. ranged from 25-90%. Neck rot was widespread in the area and was much more serious than normal, probably as a result of the cool, rainy weather in Sept. (G.E. Woolliams). This disease is present every year in most gardens in N.S. (K.A. Harrison).

GRAY MOLD ROT (Botrytis cinerea) was sev. on the variety Philadelphia at Ste. Foy, Que. Infections were not confined to the neck, as with B. allii, but originated at any point on the bulbs. A specimen was also received from St. Nicolas, Levis Co., Que. (D. Leblond).

SOFT ROT (Erwinia carotovora). Both red and white onions from Kamouraska and L'Islet counties, Que. rotted badly in storage. Infections were as high as 50% (L.J. Coulombe).

BULB ROT (Fusarium oxysporum f. cepae). A sl. infection occurred in a planting near Winnipeg, Man. (W.L. Gordon). It was also sl. on the variety Philadelphia at Ste. Foy, Que. (D.L.). It was 5-7% in a 60-acre field at Ste. Sabine, Que. (R. Crête).

WHITE ROT (Sclerotium cepivorum). Diseased patches occurred in a planting of the variety Ebenezer near Winnipeg, Man. and the causal organism was isolated from affected plants. All the bulbs from this planting were confiscated and destroyed (W.L. Gordon). White rot has not been previously reported in the Survey on onion. One record of S. cepivorum on garlic in Canada exists. This was from Steveston, B.C. in 1952 (C.P.D.S. Ann. Rep't. 31:50, 1951 [1952] (D.W. Creelman).

SMUT (Urocystis cepulae). Infections ranging as high as 90% were seen in fields at Kelowna, B.C. The average infection was about 25% (G.E.W.). Smut was reported to be general in the area around Winnipeg, Man. It was more commonly encountered than it has been for several years (W.L.G.).

ASTER YELLOWS (Aster yellows virus). Moderate infections were observed in the Winnipeg, Man. district (W.L.G.).

YELLOW DWARF (virus) affected 20% of the young plants in a 4-acre field at La Salle in s.w. Ont. The onions were rendered unfit for bunching. The setts used in this field were grown the previous summer in the Leamington area (C.D. McK.).

PARSNIP

CANKER (Itersonilia perplexans) occurred in parsnips grown in 2 fields near Fredericton, N.B. Approximately 25% of the roots were affected and damage was severe (K.M. Graham). Isolations from cankered roots were identified as Itersonilia perplexans Derx. The only previous record of this disease in Canada is from Dixie, Ont. (C.P.D.S. 36:63, 1956 [1957] (D.W. Creelman).

PEA

FOOT ROT (Ascochyta pinodella). Infections were rated 3-tr.-sl. 1-sl.-mod. 2-mod.-sev./20 fields surveyed in s. Alta. (E.J. Hawn).

LEAF AND POD SPOT (Ascochyta pisi). Peas in town gardens in Sask., planted closely and watered frequently, showed sev. infections. Sl.-mod. infections were seen elsewhere in the province (R.J. Ledingham). A relatively heavy infection developed in canning peas late in the growing season at Charlottetown and Bedeque, P.E.I. Some losses in yield and quality resulted, though the lateness of the infection minimized the damage (J.E. Campbell).

GRAY MOLD (Botrytis cinerea). Infection was 75% on the lower leaves in a planting at Kentville, N.S. Some pods were not filling and a 10% loss was estimated (K.A. Harrison).

POWDERY MILDEW (Erysiphe polygoni) was tr. in 1 field at Lethbridge, Alta. (E.J.H.). Heavy infections developed late in the season in Sask. but the average damage was slight (R.J.L.). Mildew was general on peas in N.B., but most crops were harvested before damage became serious (S.R. Colpitts). Late season infections caused little loss at Kentville, N.S. (K.A.H.).

ROOT ROT (Fusarium spp.). Specimens were submitted from a home garden in Winnipeg, Man. (W.A.F. Hagborg). A 60% infection was recorded at Ste. Anne de la Pocatiere, Que. (L.J. Coulombe), and tr.-60% infections occurred in home gardens in N.B. (S.R.C.).

MYCOSPHAERELLA BLIGHT (M. pinodes). Infected patches up to 20 feet in diameter were found in 2 fields near Winnipeg, Man. (W.A.F.H.).

BACTERIAL BLIGHT (Pseudomonas pisi) was found in 4/20 fields surveyed in the Taber and Lethbridge, Alta. districts, 3-tr.-sl. 1-sl.-mod. It was also present in 2/5 seed fields examined (E.J.H.).

LEAF BLOTCH (Septoria pisi) occurred in 6/20 s. Alta. fields, 5-tr. -sl. 1-sl.-mod. (E.J.H.).

ROOT ROT (various pathogens). Aphanomyces sp. was the suspected cause of root rot in 6/20 pea fields examined in the Lethbridge and Taber, Alta. districts, 4-tr.-sl. 2-mod.-sev. Damage from Rhizoctonia solani occurred in 8/20 fields, 5-tr.-sl. 2-sl.-mod. 1-sev. (E.J.H.).

PEPPER

ANTHRACNOSE (Colletotrichum atramentarium). Several fruits were found in Essex Co., Ont. with sporulating lesions bearing this fungus. It was identified by Prof. W.I. Illman of Carleton University, Ottawa (C.D. McKeen).

DOWNY MILDEW (Peronospora tabacina) was mod. on seedling plants at Vittoria, Norfolk Co., Ont. It caused leaf and stem lesions and the collapse of seedlings. Infected material was also received from Simcoe Co., Ont. (G.C. Chamberlain). This is the first report of downy mildew on pepper in Canada (D.W. Creelman).

WILT (Verticillium albo-atrum). Nearly 50% of the plants were affected in a 4-acre field at Harrow, Ont. Wilt was almost completely limited to a portion of the field that had been flooded by a heavy rainfall earlier in the season. A lesser amount occurred in other pepper fields in the Harrow-Leamington area (C. D. McK.).

BACTERIAL SPOT (Xanthomonas vesicatoria) was prevalent in a few crops in the Harrow-Leamington district of Ont. Careful investigations have shown that contaminated seed has been responsible for serious field infections in recent years. It has not always been possible to obtain disease-free seed (C. D. McK.).

BLOSSOM END ROT (physiologic) was sev. in many crops in Essex Co., Ont. (C. D. McK.).

POTATO

The data presented in Tables 8 to 10 relevant to Seed Potato Certification in Canada were submitted by the Plant Protection Division, Production and Marketing Branch, Canada Dept. of Agriculture.

Both the acreage entered for certification and the number of acres passed were less than in any year since 1955. Bacterial ring rot and blackleg were responsible for more than one-third of the total rejections.

EARLY BLIGHT (Alternaria solani) was rated as sl. in 31/522 seed fields inspected in B.C. It was most prevalent in the North Okanagan district. Losses were negligible (N. Mayers). It was present in most n. Alta. fields but was not serious. On the other hand, in s. Alta. it was responsible for high economic losses in several hundred acres of table stock. Forty-two % of the seed fields inspected showed tr-sl. infections (R.P. Stogryn). Early blight caused considerable anxiety to growers in the Rosemary, Ranier, Vauxhall and Taber areas of s. Alta. (E.J. Hawn). It was sl. on early varieties in n. Sask. (A. Charlebois), and a few sl. infections were seen in Man. and n.w. Ont. (D.J. Petty). Infections were widespread in the Muskoka-Parry Sound, Sudbury, Algoma and Manitoulin areas of Ont. (H.W. Whiteside). Its incidence increased slightly in the Guelph, Ont. district (E.W. Arthur). In e. Ont., early blight was 29-sl. 10-mod./58 fields (E.H. Peters). In Que., infections were 233-sl. 60-mod. 8-sev./1,039 fields. It was mostly confined to the Chicoutimi and Lake St. John districts (B. Baribeau). A 50% infection was seen on the variety Osseo at Ste. Anne de la Pocatiere, Que. (H. Genereux). It was sl. in N.B. (C.H. Godwin); occurred in 39/263 fields inspected in N.S. (R.C. Layton), and was sl. in P.E.I. (G.C. Ramsay).

GRAY MOLD (Botrytis cinerea) attacked the lower leaves and caused defoliation in many N.B. potato fields in mid-August (S.F. Clarkson).

Table 8 Seed Potato Certification

Acreage Passed by Variety and Province - 1959

Variety	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.-Alta.	B.C.	Total
Sebago	18,658	13	403	133	332		10	19,549
Katahdin	967	16	4,835	199	176	4	6	6,203
Kennebec	1,492	206	3,093	610	75	42	96	5,614
Netted Gem	13	43	835		3	1,631	1,078	3,603
Red Pontiac	185	32	1,463		2	651	38	2,371
Irish Cobbler	1,254	39	267	54	54	160		1,828
Green Mountain	440	30	139	1,065	26	2	25	1,727
Keswick	63	22	420	199	64		4	772
Warba	25	6	6		17	192	93	339
Fundy	85	19	84		2			190
Chippewa	9	1	87		88			185
Huron			20	4	147		1	172
White Rose			100				38	138
Canso	105	1		1			23	130
Waseca	1				5	107		113
Cherokee	51	16		9	3	12		91
Others	17	28	74	8	5	255	49	436
Totals	23,365	472	11,826	2,282	999	3,056	1,461	43,461

Table 9 Summary of Fields and Acres Entered and Passed - 1959

Province	No. of Applications	FIELDS Entered	FIELDS Passed	% Passed	ACRES Entered	ACRES Passed	% Passed
P.E.I.	3,341	5,144	4,626	89.9	26,336	23,365	88.7
N.S.	74	263	240	91.2	532	472	88.7
N.B.	555	2,063	1,818	88.1	14,762	11,826	80.1
P.Q.	617	1,039	569	54.7	4,386	2,282	52.0
Ont.	189	529	447	84.5	1,239	999	80.6
Man.	26	139	125	89.9	1,348	1,215	90.1
Sask.	17	111	87	78.4	363	126	34.7
Alta.	68	266	236	88.7	2,062	1,716	83.2
B.C.	202	522	340	65.1	2,570	1,461	56.9
Totals	5,089	10,076	8,488	84.2	53,598	43,462	81.0
1958	5,859	11,251	9,669	85.9	58,855	49,472	84.0
1957	5,982	11,417	9,879	86.5	57,617	48,588	84.2
1956	6,130	11,440	9,575	83.3	53,926	44,398	82.1
1955	6,365	12,003	10,239	85.3	51,627	42,173	81.7

Table 10 Fields Rejected on Field Inspection - 1959

Province	Leaf Roll	Mosaic	Bacterial Ring Rot	Blackleg	Wilts	Adjacent Diseased Fields	Foreign Variety	Misc.	Total
P.E.I.	1	45	32	146	6	22	160	182	594
N.S.	3	3			4	3	8	2	23
N.B.		10	119	2		3	22	89	245
P.Q.	5	28	222	59	1	20	36	99	470
ONT.	14	3	9	12	7	9	6	22	82
MAN.	5	2	3					4	14
SASK.			7	1	2		1	13	24
ALTA.			7	6				17	30
B.C.	125	1		3				53	182
Total	153	92	399	229	20	57	233	481	1,664 *

* The discrepancy between the total given herein and the total rejections calculated from the data in Table 9 is explained as follows:
The figures in Table 10 include lots which were rejected at shipping and bin inspection, whereas the figures in Table 9 refer to field inspections only.

Rejection as a percentage of fields:

Inspected	1.5	0.9	3.9	2.2	0.2	0.5	2.3	4.7	16.5
Rejected	9.3	5.5	23.9	13.8	1.2	3.4	14.0	28.9	100.

BLACK DOT (Colletotrichum atramentarium) was sev. on the varieties Norland and Irish Cobbler in plots at the Experimental Farm, Ste. Anne de la Pocatiere, Que. (H.G.).

BACTERIAL RING ROT (Corynebacterium sepedonicum) was found in the 1958 crop in 2 storehouses at Grand Forks, B.C. No 1959 seed stocks were found infected, but ring rot was found in 1 table stock field (N.M.). Twenty-four /266 fields were rejected in s. Alta., 17 of which were contact cases (R.P.S.). It was found in 7/111 seed fields in Sask. (A.C.), and appears to be increasing in prevalence in that province (A.C., R.J. Ledingham). Three/139 Man. fields were rejected (D.J. Petty). One field of Huron at Scotland, Ont. was infected (F.J. Hudson). Ring rot incidence decreased in the Barrie, Ont. district. Only 5/297 fields were rejected (H.W.W.). One field of Sebago in Waterloo Co., Ont. (E.W.A.), and 2/58 fields in e. Ont. were infected (E.H.P.). Rejections in Que. were 222/1,039 fields, involving more than twice the acreage rejected in 1958 (B.B.). In N.B., 119/2,063 fields inspected were infected. An additional 74 fields were rejected because of ring rot in table stock on the same farms. A total of 2,561 acres was involved (C.H.G.). No ring rot was found in N.S. in 1959 (R.C.L.). It was found on 27 farms involving 32 fields and 306.5 acres in P.E.I. There were also 44 contact cases involving 308.5 acres. Of the 27 farms involved, 12 cases were diagnosed in the field, twelve during harvesting and 3 after harvest (G.C.R.). Forty-seven cases of ring rot were diagnosed at the Charlottetown, P.E.I. laboratory (J.E. Campbell).

BLACKLEG (Erwinia atroseptica) was rated as 75-tr. 2-sl. 2-mod. 1-sev./522 fields inspected in B.C. Six fields were rejected. In general, blackleg was more prevalent in B.C. than in previous years (N.M.). It caused the rejection of 6 n. Alta. fields and in s. Alta. was present in 83% of the fields inspected. It is, without doubt, the most troublesome disease in seed stocks in the province (R.P.S.). Incidence was slightly lower in Sask. than in 1958. Black leg occurred in 20% of the fields inspected and caused the rejection of 1/111 fields (A.C.). It was tr.-mod. in 11% of the fields seen in Man. and in 64% of those in n.-w. Ont. (D.J.P.). A few fields in s.-w. Ont. had sl. infections (F.J.H.). Eleven/297 fields were rejected in the Barrie, Ont. district, nine of which were of the variety Sebago (H.W.W.). Blackleg was at about the same level in the Guelph district as in 1958 (E.W.A.), and was noted in 8/58 fields in e. Ont. (E.H.P.). The disease was found in 604/1,039 fields in Que. and caused the rejection of 59. Its incidence was somewhat lower than in 1958 (B.B.), as was the case in N.B. (C.H.G.). It was recorded in 110/263 N.S. fields but none were rejected (R.C.L.). In P.E.I. 146/5,144 fields were rejected (G.C.R.).

SOFT ROT (Erwinia carotovora) occurred in some potato stocks in the southern part of Simcoe Co., Ont. (H.W.W.). It caused considerable loss in some fields of Katahdin near Strathroy in s.-w. Ont. (F.J.H.). At Hillaton, Kings Co., N.S. soft rot caused the loss of 2 bins, each of 1200 bbl. of Kennebec, in storage. Other stored stocks in Kings Co. were affected to a lesser degree (K.A. Harrison).

DRY ROT (Fusarium spp.) was less prevalent than usual in the stored 1958 crop in Que. Of the infected varieties, Keswick seemed the most susceptible (B.B.). It was of little consequence in N.B. (C.H.G.), and was rated as sl.-mod. in P.E.I. (C.G.R.).

WILTS (Fusarium oxysporum, Verticillium albo-atrum) were seen in only 2 B.C. fields (N.M.). They were present in 13% of the fields inspected in n. Alta., mostly in the variety Warba, and in 27% of s. Alta. fields (R.P.S.). The incidence of wilts was lower in Sask. than in 1958. Six % of the fields inspected were diseased compared with 17% in 1958 (A.C.). At Portage la Prairie, Man., one field showed 1% (D.J.P.). Considerably less wilt was seen in s.-w. Ont. than in 1958 (F.J.H.). In the Barrie district, six/297 fields were rejected because of Verticillium wilt (H.W.W.). They were found in Durham Co. (E.W.A.) and in 6/58 fields in e. Ont. (E.H.P.). Verticillium wilt caused appreciable losses in a few fields of Kennebec in the vicinity of Sherbrooke, Que. (B.B.). It occurred in 47/263 fields inspected in N.S. and caused the rejection of 4. The variety Kennebec was the most seriously affected although all fields of Fundy examined showed some Verticillium wilt. There was a decrease in wilt incidence in P.E.I. and only 6/5,144 fields were rejected (G.C.R.).

SILVER SCURF (Helminthosporium atrovirens) was found in the field at harvest time in the Barrie district of Ont. (H.W.W.). Sl. infections were reported on a few farms in Que. (B.B.).

ROOT-KNOT NEMATODE (Meloidogyne arenaria) was found at Grand Forks, B.C. at planting time in seed stocks of Netted Gem (N.M.). A subsequent field survey of the area confirmed the presence of root-knot nematodes in samples representing 105/282.5 acres surveyed (W.R. Orchard).

RHIZOCTONIA (Pellicularia filamentosa) was recorded in 409/522 fields inspected in B.C., 299-sl. 95-mod. 15-sev. It was most prevalent in the Okanagan, Grand Forks and Pemberton areas (N.M.). It was found in all fields observed in n. Alta. but tuber infection was light compared with 1958. In s. Alta. it was sl. in 67% of the fields compared with 90% in 1958 (R.P.S.). Rhizoctonia was not of importance in Sask. (A.C.) and sl. infections only occurred in most fields in Man. and n.w. Ont. (D.J.P.). A decreased incidence was recorded in s.-w. Ont. (F.J.H.) but an increase was noted in the Barrie district (H.W.W.). Rhizoctonia was fairly general in the Guelph district and remained at about the 1958 level (E.W.A.). It was recorded as 27-sl. 2-mod./58 fields in e. Ont. (E.H.P.). It was found in 100/1,039 fields and in 248 bin lots in Que. and was less prevalent than in 1958 (B.B.). It was sl. in a few fields in N.B. (C.H. Godwin). Only 1 severely infected lot was seen in N.S. with infection rated as 25% mod-sev. (R.C.L.).

LATE BLIGHT (Phytophthora infestans) was seen in only 2/522 fields inspected in B.C. (N.M.). It was not recorded from the 3 Prairie Provinces (R.P.S., A.C., D.J.P.). Sl. infection was recorded at Upsala and Dorion in n.-w. Ont. (D.J.P.) and it was prevalent in Dufferin Co. where Sebago was the variety chiefly affected (H.W.W.). Blight incidence was very low in the Guelph, Ont. district (E.W.A.) and scattered infections on susceptible varieties were seen in e. Ont. (E.H.P.). In Que. it was reported in 22% of the fields inspected compared with 50% in 1958 (B.B.).

Epidemiology of Potato Late Blight in Quebec - 1959

Henri Généreux

A very light infection of potato late blight was first recorded July 28 on Kennebec in Nicolet Co. The disease appeared later than in previous years, due to the unusually dry, warm weather that prevailed throughout July. During the first week of August, traces of the disease were recorded in Portneuf and Labelle counties and, by the middle of the month, light infections were observed in Napierville, Chicoutimi and Bonaventure counties.

The prolonged summer drought ceased by the second week of August and warm, humid and rainy conditions persisted throughout the Province, except in the Gaspé Peninsula where precipitation was below normal. Temperatures averaged from two to four degrees above normal although there were small deficiencies along the St. Lawrence valley below Québec. The conditions which prevailed during August were favorable for sporulation and spread of late blight. Incidentally, towards the end of August, most fields in Labelle county were severely infected. The disease had made little progress in Lake St. John and Chicoutimi districts. Unsprayed fields were severely infected in Portneuf and Wolfe counties. Traces of blight were also recorded in Lennoxville, Ste. Anne de la Pocatiere, St-Arsène, Temiscouta Co., and l'Alverne, Bonaventure Co.

The disease progressed rapidly until September 10, favoured by temperature and humidity. It was reported as being widespread and severe in Labelle, Joliette, Eastern Townships, Portneuf, Lake St. John and Chicoutimi, Kamouraska, Témiscouata and Carleton counties. A few scattered fields were found infected from Rimouski to Gaspé and in the Baie Comeau region.

A very cold spell between September 14 and 18 brought the mercury down to freezing, killing the foliage in many regions and checking the spread of the disease. Many farmers had also applied vine killers to reduce damage to their potato crop.

By September 15, tuber rot had been found in Laval and Kamouraska counties. At harvest time, tuber rot was sometimes severe in wet and heavy soils whereas only traces were found in sandy soils in the most severely affected regions.

Blight was first reported in N.B. on July 13 in a 2-acre field of Keswick at Plaster Rock, Victoria Co. A few other isolated cases were reported in late July and early Aug. but extremely dry weather checked the development of the disease. It did not gain any headway until late Aug. following a prolonged period of heavy rainfall which hampered spraying. By Sept. 6 late blight could be found in many fields in the St. John River Valley. Most seed fields and commercial table stock fields were top-killed but tuber rot, in some instances, caused serious losses. Blight was very prevalent in the non-commercial potato growing areas of the province (G.C.R., S.F.C.). A mod. infection was reported on July 6 in N.S. This is a week earlier than it has ever been reported previously. However, it did not become general throughout the province until Aug. 10. after which date it reached serious proportions. It was found in 160/263 fields inspected. Despite a vigorous spraying schedule the losses from late blight in the commercial potato growing areas would be between 20 and 30% with some fields a complete loss. Some instances of heavy losses from tuber rot in storage have been reported (R.C.L.). Late blight appeared in P.E.I. about July 15 and caused considerable damage in inadequately sprayed fields (G.C.R.).

Distribution by Provinces of Physiologic Races of *Phytophthora infestans* in Canada in 1959

K.M. Graham

During the fall of 1959, 113 samples of blight-infected potato tubers and tomato fruits were received from commercial fields and National Potato Trial plots located in five provinces. A summary of the races received is given in Table 11.

Table 11 Determinations of Races of *P. infestans* in 1959

Race	N.S.	N.B.	P.E.I.	Que.	B.C.	Total
1	6	-	7	-	-	13
3	-	-	-	-	2	2
4	12	6	17	21	1	57
1 + 4*	1	1	1	-	5	8
1.4	3	14	1	9	-	27
1.3.4	1	-	1	-	-	2
1.2.3.4	-	-	-	2	-	2
1.2.3.4.5	-	-	-	1	1	2
Total	23	21	27	33	9	113

* Indicates a mixture of races 1 and 4

Of especial interest is the occurrence of Race 3 for the first time in material received from British Columbia, and the appearance of Race 1.2.3.4.5. in British Columbia and Quebec. Race 3 occurred on three seedlings numbered 3425-11, 3426-29 and F5563 in a National Potato Trial located at Agassiz, B.C., while Race 1.2.3.4.5 occurred on seedling 3426-1 at Agassiz and on the variety Manota at Ste. Anne de la Pocatiere, Que.

Occasionally, races more highly specialized than 0 and 4 were determined in commercial varieties lacking genes for resistance. This is shown in Table 12.

Table 12 Races Determined in Major Commercial Varieties in 1959

	No. of determinations of Race:				
Variety	4	1	1 + 4*	1.4	1.3.4
Irish Cobbler	6	-	1	-	-
Sebago	3	-	-	-	-
Katahdin	3	1	-	2	-
Fundy **	-	1	-	3	-
Avon **	-	1	-	1	-
Kennebec **	-	6	-	2	-
Green Mountain	12	-	-	1	1
Keswick **	-	1	-	6	-
Netted Gem	2	1	-	1	1
Red Pontiac	1	-	1	1	-

** Variety containing 1 or more genes for resistance to blight.

LEAK (Pythium ultimum) caused losses in the Grand Forks, B.C. district. It was also found in 1 field on Vancouver Island (N.M.). Trace infections were seen in a 5-acre field of Green Mountain and in a planting of Teton at Ste. Anne de la Pocatiere, Que. (H.G.).

POWDERY SCAB (Spongospora subterranea) was reported in a few bins in the lower St. Lawrence valley in Que. (B.B.), and caused a 15% infection in Bliss Triumph at Scott's Bay, Kings Co., N.S. (R.C.L.).

COMMON SCAB (Streptomyces scabies) was generally light in B.C. but caused some losses in white-skinned varieties, particularly in the Okanagan Valley (N.M.). In n. Alta. infections were less heavy than in 1958, but caused the down-grading of some stocks of Warba. Some early varieties showed moderate infections in s. Alta. (R.P.S.). Sl. infections were seen in Sask. (R.J.L.) with 1 severe infection at Donwell (T.C. Vanterpool). Sl.-mod infections occurred on early varieties near Winkler, Man. (D.J.P.). Deep scab lesions were seen in north Simcoe Co., Ont. (H.W.W.) and light infections were general in s.w. Ont. (F.J.H.). Scab incidence, though widespread in the Guelph, Ont. district, was 5-10% below that of 1958. Serious damage was encountered in only a few cases.

Throughout the area damage ranged from sl.-20% (E.W.A.). It was prevalent in light, sandy soils in e. Ont. (E.H.P.). In Que., scab incidence was at about the 1958 level. Infections were 284-sl. 12-mod. 14-sev./1,039 fields inspected. Some sev. infections were as high as 25-60% (B.B.). Scab incidence in N.B. was lower than in the past 2 years (C.H.G.), and it was also generally low in N.S. where only 1 sev. infection was seen (R.C.L.). A moderate level of scab was encountered in P.E.I. (G.C.R.).

JELLY END ROT (various fungi). Specimens from the market in Quebec City, Que. yielded Rhizoctonia and Fusarium spp. (D. Leblond).

LEAF ROLL (virus) reached a serious level in B.C. in both seed and table-stock fields. In seed fields it was rated 92-tr. 9-sl. 18-mod. 103-sev./522 inspected. The highest levels were recorded in the Lower Mainland, Lulu and Sea Islands and in the Okanagan Valley. The variety Netted Gem was the most seriously affected since it is particularly susceptible to net necrosis due to current season infection. Due mainly to leaf roll, no Netted Gem potatoes were certified in the Fraser Valley and a large part of the acreage in the North Okanagan was rejected. Heavy losses were experienced by table-stock growers. The presence of necrosis caused the downgrading of affected stocks from Canada No. 1 to No. 2. at a price differential of $12.50 per ton. Based on the 5,665 tons of potatoes sold up to Nov. 30, leaf roll necrosis was responsible for the loss of $20,823. Losses will be even heavier since large quantities of Netted Gem were still on hand at this date (N.M.).

Leaf roll incidence also rose sharply in Alta. It caused the reduction in grade from Foundation to Certified of 100 acres in n. Alta. and was found in 57/154 fields in s. Alta. (R.P.S.). Approximately twice as many Sask. fields, compared to 1958, were infected (A.C.). Six fields were rejected in Man. (D.J.P.). It was present in 150/297 fields inspected in the Barrie district causing the rejection of 13 (H.W.W.). Its incidence in s.-w. Ont. and the Guelph district was less than in 1958 (F.J.H., E.W.A.), and 3/58 fields in e. Ont. were rejected (E.H.P.). Leaf roll was found in 228/1,039 Que. fields (B.B.) and was at a low level in N.B. and P.E.I. (C.H.G., G.C.R.). It was found in 128/263 fields in N.S. and was considerably more prevalent than in 1958. Three fields were rejected (R.C.L.).

MOSAIC (virus) caused the rejection of seed fields in all provinces but Sask. and Alta. but its incidence was much lower than in 1958. It was responsible for 5.5% of the total rejections as compared with 15.7% the previous year. A few of the representative reports are given below (D.W.C.).

It was 18-tr. 3-sl. 1-mod. 1-sev./522 fields inspected in B.C. The Lower Mainland had the highest incidence (N.M.). Mosaic increased slightly in prevalence in the Guelph district, causing the rejection of 1 field and the reduction in grade of another (E.W.A.). Two fields were rejected in e. Ont. (E.H.P.). It was found in 414/1,039 Que. fields and was responsible for the

rejection of 28. This represents a considerable decrease from the 1958 level (B.B.). Ten fields, mainly Green Mountain and Keswick were rejected in N.B. (C.H.G.). Mosaic continues to be the most serious virus disease problem in potatoes in N.S. It was found in 140/263 fields and caused the rejection of 3 (R.C.L.).

PURPLE TOP (virus) was found in 26% of the fields inspected in n. Alta., principally in the variety Warba and was tr. in 4.5% of the s. Alta. seed fields (R.P.S.). Sl. infections were seen at Lethbridge and Taber, Alta. (E.J. Hawn). Trace infections were encountered in Sask. (R.J. Ledingham). It continues to be a problem in the Algoma and Sudbury areas in Ont. (H.W.W.). In Que., sl. infections were seen in 3 fields (B.B.), and it was tr. in plots at Ste. Anne de la Pocatiere (R.O. Lachance). Trace infections occurred in N.B., N.S. and P.E.I. (C. H.G., R.C.L., G.C.R.).

SPINDLE TUBER (virus) is becoming more prevalent in the Barrie, Ont. district (H.W.W.). A few affected plants of the varieties Cherokee and Kennebec were found in the Strathroy and Melbourne districts of s.w. Ont. (F.J.H.). It caused the rejection of 2 fields in Que. (B.B.). The incidence of spindle tuber was much greater in N.B. than in 1958. Fourteen fields, principally of Kennebec and Netted Gem, were rejected (C.H.G.). It also appears to increasing in N.S. in Kennebec (R.C.L.) and in P.E.I. (G.C.R.).

WITCHES' BROOM (virus) was 17-tr. 1-sl. 1-sev./522 B.C. fields (N.M.), and occurred in tr. amounts in n. Alta. (R.P.S.).

GIANT HILL occurred in 17% of the fields inspected in s. Alta. The 1958 total was 43% (R.P.S.). It was seen in a few fields in the northern part of the Barrie, Ont. district (H.W.W.) and as tr. amounts in a few fields in N.S., mostly in Green Mountain and Netted Gem (R.C.L.).

HOLLOW HEART (physiologic) occurred in 20% of the larger tubers of Kennebec in s.e. B.C. (N.M.). It was very common in 1959 in Que. In some lots as many as 40% of the tubers were affected (B.B.).

FROST caused slight to moderate damage in unharvested potato crops in Sask. (R.J.L.). Damage in Ont. was restricted to Ontario, Northumberland and Durham counties (E.W.A.). Frost injury was seen in 22% of the bin lots inspected in Que. Losses ran as high as 25-30% in some lots (B.B.).

STEM-END BROWNING (physiologic) was observed in a few bin lots of Green Mountain, Katahdin, Kennebec and Sebago in Que. (B.B.).

RADISH

LEAF SPOT (Alternaria raphani). The foliage of one greenhouse crop in Essex Co., Ont. was heavily infected (C. D. McKeen).

CROWN AND ROOT ROT (Rhizoctonia solani). A moderate infection was recorded at Ste. Foy, Que. (D. Leblond).

RHUBARB

RED LEAF (cause unknown) was seen in a home garden in Saskatoon, Sask. (T. C. Vanterpool). It was also found in garden plantings in Taber, Milk River and Lethbridge, Alta. (E. J. Hawn).

SPINACH

DAMPING OFF (Rhizoctonia solani). A 5-acre field in the Erieau Marsh near Blenheim, Ont. was killed early in May. Destruction of young plants was most severe on the dry knolls. Several plantings made in Aug. and early Sept. at Kingsville, Ont. were destroyed. High temperatures favored the progress of the disease (C. D. McKeen).

SQUASH

STORAGE ROT (various fungi). Rhizopus sp. caused the loss of 25% of a lot of squash stored at Horton, Kings Co., N. S. Infection was occurring through the stems which had not thoroughly dried out. Botrytis cinerea and Cladosporium sp. were responsible for a moderate amount of rot of immature squash in storage at Berwick, N. S. (K. A. Harrison).

STORAGE BREAKDOWN (physiologic). A breakdown of epidermal and parenchyma tissue occurred in 7000 bu. of Butternut squash in s.-w. Ont. after 3 1/2 months in cool storage. Bacteria were found in the tissues and breakdown developed rapidly when the squash were removed to a higher temperature. Squash can normally be held in storage for 5-6 months before breakdown occurs. High summer temperatures may have predisposed the crop to early storage breakdown (C. D. McKeen).

SWEET CORN

EAR ROT (Fusarium culmorum). This fungus, usually confined to the roots and stems, had spread to ears at Agassiz, B. C. (M. J. Pratt).

SMUT (Ustilago maydis) was observed at the Provincial Plant Protection Station, Ste. Foy, Que. Specimens were also received for identification from 7 places in 6 counties; Compton, Beauce, Dorchester, Rimouski, Temiscouata and Bonaventure, between Sept. 1 and 21. It was more common than usual in 1959 (D. Leblond). It was also common in Kamouraska Co., Que. (R. O. Lachance). Trace amounts were found in many areas of New Brunswick (S. R. Colpitts).

SEED ROT (various fungi). June plantings of corn in N.B. suffered tr.-40% damage because of cold, wet weather (S.R.C.).

SWEDE TURNIP

CROWN GALL (Agrobacterium tumefaciens) was identified on a single specimen from a storage warehouse in s. Alta. (E.J. Hawn).

GRAY MOLD (Botrytis cinerea) caused 2% loss in stored roots at Grand Pre, N.S. (K.A. Harrison).

SOFT ROT (Erwinia carotovora) was reported from Kings, Cumberland, Pictou and Cape Breton counties, N.S. It was much more prevalent than usual (K.A.H.).

CLUB ROOT (Plasmodiophora brassicae) was light in a 2-acre field at St. Remi, Napierville Co. and 10% in a 10-acre field at St. Sulpice, L'Assomption Co., Que. (R. Crête).

SKIN ROT (Rhizoctonia solani). Severe infections developed in April in roots in storage at Grand Pre, Kings Co., N.S. Twenty % of the roots were infected. A field of Laurentian swedes at Vernon Mines, Kings Co., was 100% infected when lifted. Skin rot rendered the crop unfit for table use. This disease is becoming more troublesome each year (K.A.H.).

STORAGE ROT (Sclerotinia sclerotiorum). Infected specimens were received, during the winter, from Levis and Champigny, Que. (D. Leblond). A trace amount was seen in stored Laurentian roots at Grand Pre, N.S. (K.A.H.).

SCAB (Streptomyces scabies) affected about 3% of the roots in a 3-acre field at Oromocto, N.B. but did not impair the market value (S.R. Colpitts). Slight infections were noted in Prince Co., P.E.I. (J.E. Campbell).

BROWN HEART (Boron deficiency) was recorded from Quebec City, Ange Gardien, Montmorency Co. and Cookshire, Compton Co., Que. (D.L.).

TOMATO

EARLY BLIGHT (Alternaria solani). Moderate damage was caused by a 75% infection at Alberni, B.C. There was a high incidence of foliar infection accompanied by wilt and leaf-drop symptoms. Some fruit infection occurred resulting in dark, sunken lesions at the stem end (W.R. Orchard). It was slight in both the early basket crop and canning crop in Essex Co., Ont. (C.D. McKeen). Incidence was very high in the Oromocto, N.B. area. Complete defoliation resulted in many fields. Damage from this disease was estimated to be greater than that from late blight (S.R. Colpitts). Early blight in Kings Co., N.S. was kept at a low level by the frequent application of fungicides (K.A. Harrison).

NAIL HEAD SPOT (Alternaria tomato) was seen in Toronto, Ont. on tomatoes from Mexico (J.F. Bradbury).

GRAY MOLD ROT (Botrytis cinerea) developed in growth cracks at Oromocto, N.B. (S.R.C.).

LEAF MOLD (Cladosporium fulvum) was prevalent in s.-w. Ont. and caused extensive foliage destruction in plastic greenhouses where high humidities prevailed during the late spring. It also caused serious foliage loss in susceptible varieties grown as fall greenhouse crops where artificial heat was not supplied soon enough (C.D. McK.). A mod. infection occurred in April in a greenhouse crop at Beamsville, Ont. (G.C. Chamberlain). A 20% infection caused mod. damage at Ste. Anne de la Pocatiere, Que. (L.J. Coulombe).

ANTHRACNOSE (Colletotrichum atramentarium). Incidence of anthracnose, late in the harvesting season in s.-w. Ont. rose to such a level as to cause appreciable rejections of tomatoes at canning factories (C.D. McK.). Trace infections were seen on the variety Asgrow at Ste. Foy, Que. (D. Leblond). It caused mod. damage on Bounty at Ste. Anne de la Pocatiere, Que. (L.J.C.), and was tr.-3% at Oromocto, N.B. (S.R.C.). Infection occurred late in the season in Kings Co., N.S. and reached a level of 10% (K.A.H.).

BACTERIAL CANKER (Corynebacterium michiganense) was widespread in plantings in the Okanagan Valley, B.C. in 1959 (G.E. Wooliams). Canker was disgnosed on specimens from the Brooks and Taber areas of s. Alta. (E.J. Hawn). An extremely heavy infection caused a total loss of the crop in a 5-acre field of Bounty near Watford, Ont. The symptoms in the early stages were indistinguishable from those of virus streak. However, inoculation experiments established the identity of the disease. Trace infections were seen in other varieties in adjacent fields (B.H. McNeill).

ROOT-KNOT NEMATODE (Meloidogyne incognita). A moderate infection occurred in the University greenhouses, Vancouver, B.C. (W.R.O.).

PHOMA ROT (P. destructiva) was moderate in intensity in the Quebec City area at the end of the season (D.L.).

LATE BLIGHT (Phytophthora infestans). Moderate infections developed in the Quebec City area late in the growing season (D.L.). Late blight was sev. at St. Roch, L'Islet Co. (L.J.C.), and mod. at Ste. Anne de la Pocatiere late in the season (H. Genereux). Unsprayed fields in the St. John River valley N.B. were heavily infected (S.R.C.), and unprotected plantings in Kings Co., N.S. were 75% defoliated (K.A.H.).

SCLEROTINIA ROT (S. sclerotiorum) affected a few plants in a field at Kentville, N.S. (K.A.H.).

WILT (Verticillium spp.). V. dahliae was found affecting plantings throughout the Okanagan Valley, B.C. (G.E.W.). V. albo-atrum infection was sev. in many crops planted for the early basket trade and wilt incidence was high in several canning crops in s.w. Ont. Considerable evidence of differences in resistance was noted. Trellis 22, a variety grown on stakes, was found to be highly susceptible (C.D. McK.).

BACTERIAL SPOT (Xanthomonas vesicatoria) was found in canning crops in Essex and Kent counties, Ont. Contaminated seed proved to be the source of infection (C.D. McK.).

BLOTCHY RIPENING (virus). A severe outbreak occurred in the variety Truck Queen at Falmouth, N.S. Growth was lush and a heavy mosaic infection was present (K.A.H.).

BROWN WALL (virus) was prevalent in several fall greenhouse crops and in staked varieties at Leamington, Ont. (C.D. McK.).

MOSAIC (virus) was present throughout the Okanagan Valley, B.C. in both field and greenhouse crops (G.E.W.). A few canning crops at Harrow, Ont. suffered heavily from infection with tobacco mosaic virus. Other crops in the district were infected with potato virus X, the virus being transmitted from potatoes by cultivating machinery (C.D. McK.). Mosaic infection was 25-40% causing moderate stunting and spindly tip-growth in a large greenhouse at St. Catharines, Ont. (G.C.C.). Greenhouse crops at Falmouth and Kingston, N.S. were 100% infected (K.A.H.).

STREAK (virus) was found extensively in tomato fields at Vernon, B.C. (G.E.W.). Double-virus streak was generally prevalent in canning crops, regardless of variety, in Halton and Wentworth counties, Ont. Infection was as high as 50% in some fields (B.H. McN.). Infection was 20% in Waltham Forcing at Truro, N.S. (K.A.H.).

BLOSSOM-END ROT was serious in a few instances in Sask. and most gardens showed some amount of the disorder (R.J. Ledingham). It was very serious in July and August at Ste. Foy, Que. Specimens were also received from Beauce and Bellechasse counties (D.L.). A few slight cases were seen in Kings Co., N.S. (K.A.H.).

CATFACE was prevalent in June in N.B., due probably to the cool, damp weather (S.R.C.).

GROWTH CRACKS appeared in crops in the Oromocto, N.B. district in Aug. Heavy rains had followed a dry period in July (S.R.C.).

CHEMICAL INJURY. Drift of 2,4-D from other crops caused extensive crop losses in several commercial tomato fields at Vernon, B.C. (G.E.W.). The same chemical, applied to a nearby grain field, caused a moderate amount of twisting of leaves and narrowing of leaf blades in a tomato field at Woodside, Kings Co., N.S. (K.A.H.).

Storage Diseases of Tomatoes in Nova Scotia in 1959

C.L. Lockhart

A survey was made of the organisms causing rots of tomato, variety Quebec #13 in controlled atmosphere cold storage in Nova Scotia. For this purpose infected tomatoes were collected for laboratory examination and/or counts were made of the rots as they were removed from storage from October to December 1959. A total of 608 isolations were made. The results of the survey are given in Table 13.

Table 13 Organisms isolated and the percent of tomato rots as averages for 1959.

Organism	Controlled atmosphere	Control
Phoma destructiva	23.0	40.0
Alternaria tenuis	19.1	20.4
Fusarium oxysporum Fusarium avenaceum	3.2(61.0*)	0.0(70.0)*
Botrytis cinerea	13.7	8.5
Alternaria solani	0.1	3.3
Colletotrichum atramentarium	0.4	1.2
Penicillium sp.	1.8	5.4
Aspergillus sp.	1.6	0.0
Mucor sp.	6.2	0.0
Macrosporium sp.	0.0	1.5
Pullularia pullulans	0.0	8.3
Unidentified fungi	11.0	7.0
Bacteria	1.3	6.2

(*) represents counts of Fusarium found overgrown mainly as secondary rots.

IV DISEASES OF FRUIT CROPS

A. POME FRUITS

APPLE

FIRE BLIGHT (Erwinia amylovora) was widespread on apple and crab-apple in Edmonton, (W.P. Campbell), and caused sl.-mod. damage to crab-apple trees in Lethbridge, Alta. (J.B. Lebeau). Infections were slight at Saskatoon, Sask. (R.J. Ledingham). Six/112 home plantings inspected in Man. were infected and an additional nine samples, showing mod.-sev. infections were received at Winnipeg (W.A.F. Hagborg). A scattered infection at Stoney Creek, Wentworth Co., Ont. caused killing of spurs and occasional twigs. Some fruit infection was found as well (G.C. Chamberlain). A nursery near Montreal, Que. had a 2% infection (J. Ringuet) and specimens were received from Megantic and Charlevoix counties in Que. (D. Leblond). Fire blight is increasing in importance in most of the orchard districts of Que. Infections, ranging from a few trees to blocks of 25-100 trees in an orchard were observed at St. Hilaire, Rougemont, Abbotsford, Hemmingford, Franklin, Oka and Châteauguay. The varieties Yellow Transparent, Fameuse, Wealthy, Wolf River and McIntosh were the most seriously affected (L. Cinq Mars).

BULL'S-EYE ROT (Gloeosporium perennans). Heavy infections occurred in stored Newtown apples from the 1958 crop at Naramata and Summerland, B.C. Some lots when re-packed showed a 10-30% loss. Heavy rains during the harvest period favored fruit infection. McIntosh fruit from the 1959 crop, in controlled atmosphere storage at Vernon, B.C. had developed 20% rot by mid-January. (L.E. Lopatecki).

RUST (Gymnosporangium clavipes) was particularly severe in 1959 on the varieties Melba, Lobo and Fameuse at Ste. Anne de la Pocatiere, Que. Other varieties were less seriously affected. Many pycnia were observed but few aecia developed on the fruit (H. Genereux). Traces of rust were found in scattered orchards in Annapolis Co., N.S. (J.F. Hockey).

FLY SPECK (Leptothyrium pomi). Slight infections were seen on specimens submitted from Huntingdon and St. Anicet, Que. (R. Crête).

PERENNIAL CANKER (Neofabraea perennans). Infections developed in 10% of the trees in a 3-year old planting of McIntosh at Naramata, B.C. Wooly aphids and perennial canker were prevalent on nearby mature trees (L.E.L.).

STORAGE ROT (Penicillium sp.) caused 10-20% loss of fruit stored at Dunnville, Haldimand Co., Ont. Storage conditions were not ideal and the fruit showed considerable evidence of bruising (G.E.C.).

POWDERY MILDEW (Podosphaera leucotricha). The incidence of powdery mildew in the Okanagan Valley, B.C. was much higher in 1959 than for many years. Delicious, Jonathan, McIntosh and Winesap were affected. Foliage on new terminal growth was infected, particularly on Jonathan, but very little fruit infection was seen (D.L. McIntosh). A single tree of Yellow Transparent at Vineland, Ont. showed sheath infections on terminal growth (G.C.C.).

CROWN ROT (Phytophthora cactorum) killed a tree on Malling VII rootstock in a commercial orchard at Okanagan Center, B.C. (D.L. McI.).

CALYX-END ROT (Sclerotinia sclerotiorum). Fruit infections by midsummer were generally less than 1% in Kings Co., N.S. (J.F.H.).

SCAB (Venturia inaequalis). Weather conditions late in the growing season favored scab infection in several districts in the Okanagan Valley, B.C. Pin-point scab developed in storage, particularly on Winesap, resulting in heavy losses in cullage (D.L. McI.). Pin-point scab developed on stored fruit from the 1958 crop at Simcoe, Ont. (G.C.C.). The disease was of minor importance in the Niagara Peninsula of Ont. in 1959. For the first time in 28 years, only traces of infection could be found on unsprayed trees at St. Catharines (G.C.C.). Infection was about 25% and damage was moderate on McIntosh at St. Roch, L'Islet Co., Que. (L.J. Coulombe). Primary scab infections were relatively easy to control in the Farnham, Que. district. Six infection periods occurred between May 21 and June 19. Late pin-point scab, on the other hand, affected many orchards in s.-w. Que. despite light primary infection on the foliage (R. Desmarteau, L. Cinq Mars). Scab was generally well controlled in N.B., though pin-point scab was more common than in previous years (S.R. Colpitts). A similiar condition prevailed in N.S. (R.G. Ross).

FLAT LIMB (virus). Eight 34 year old trees of standard Gravenstein were affected at St. Catharines, Ont. They exhibited a marked gnarling and malformation of main limbs and the trunks were severely affected. The vigor of the affected trees was fair, although the top growth in some of them was thin. (G.C.C.).

LEAF PUCKER (virus). This disease, with its associated fruit symptoms, was found in most of the Yellow Newtown plantings inspected at Penticton, Naramata, Summerland, Oliver and Kaleden, B.C. The number of infected trees varied from single trees to one-third of some plantings. In most cases, the accompanying fruit symptom was a striking ring-russeting pattern, but in one orchard the fruits were small, covered with purple blotches and exhibited skin cracking.

A fruit blotch symptom in Stayman Winesap has been under observation for 6 years in several orchards in Summerland and Westbank, B.C. where it affects more than 50% of the trees in some plantings. The disease is apparently spreading slowly. In 1959, most of the affected trees showed leaf pucker symptoms. Trees without fruit symptoms did not display foliage symptoms suggesting strongly that the fruit blotch under observation may be a fruit symptom of the leaf pucker disease (M.F. Welsh).

MOSAIC (virus) was found affecting about 20 trees of the varieties Wealthy, McIntosh, Wolf River and Fameuse in an orchard at Rougemont, Que. It apparently causes little damage (L.C.).

MOTTLE (?virus). A symptom, not previously seen, occurred on 5 Delicious trees at Kaleden in the Okanagan Valley, B.C. All fruits on the affected trees exhibited a yellow or light pink mottle covering most of the surface. These symptoms resemble those of "dapple-apple" as described by Smith et al. (P.D.R. 40:9, p. 765. 1956). Seriously affected fruits are also deformed (M.F.W.).

RUBBERY WOOD (virus). Scions of the varieties Delicious, Rome Beauty, Winesap, Spartan and Golden Delicious from various centers in the Okanagan Valley, B.C. have been indexed on the variety Lord Lambourne. The presence of the rubbery wood virus has been demonstrated in orchard trees of each of the varieties tested. The virus is latent in the source trees and no symptoms are evident (M.F.W.).

STEM PITTING (virus). Indexing on Virginia Crab has revealed the presence of the stem pitting virus in commercial orchard trees of the following varieties: McIntosh, Delicious, Spartan, Winesap, Golden Delicious and Rome Beauty. The test trees were from various centers in the Okanagan Valley, B.C. Except for mild pitting symptoms in Delicious and Golden Delicious the virus is latent (M.F.W.).

UNKNOWN VIRUS DISEASE. A clone of East Malling rootstock II, indexed as virus-free at the East Malling Research Station, was used as the rootstock in experiments with a Russian apple, R12740-7A, and Hopa and Bedford crabs. Few scions grew and those that did were stunted and displayed abnormal foliar symptoms. The symptoms in R12740-7A resembled those described as "chlorotic leaf spot" by Mink and Shay (P.D.R. Suppl. 254. p. 14, 1959). Various types of foliar necrosis developed on the crabs (M.F.W.).

DROUGHT SPOT (boron deficiency) affected a number of orchards in s.w. Que. Damage in individual orchards varied from slight to severe. In some severely affected orchards, spot picking was necessary (R.D.).

IRON DEFICIENCY affected 2 home plantings in Winnipeg, Man. Chelated iron applied to the soil effected rapid improvement (W.A.F.H.).

FROST INJURY caused moderate damage to the bloom in early June at Moncton, N.B. (S.R.C.).

WINTER INJURY was evident in orchards in York, Sunbury and Queens counties in N.B. (S.R.C.).

PEAR

FIRE BLIGHT (Erwinia amylovora). A sev. outbreak occurred in 1 orchard of Bartlett and Anjou, late in the season, at Summerland, B.C. Hot, dry weather checked the development of the disease before harvest (L.E. Lopatecki). High humidities and high temperatures favored the development of fire blight in many orchards in the Niagara Peninsula in Ont. Late blossom infection was quite common. Fire blight was active throughout the growing season and in a few cases green fruit infection was also noted (R. Wilcox, W.S. Carpenter). Fire blight was generally more common than in 1958 in the Niagara Peninsula. In five orchards at Vineland there was considerable direct fruit infection but little leaf, twig or branch blight (G.C.C.).

SOOTY BLOTCH (Gloeodes pomigena) was quite prevalent on Kieffer pears held for processing in the Niagara Peninsula, Ont. Frequent rains during the harvest period were likely a contributing factor (G.C.C., R.W., W.S.C.).

RUST (Gymnosporangium clavariaeforme) affected leaves and twigs at Victoria, B.C. Twig infection was characterized by a marked hypertrophy of affected parts and the presence of closely aggregated aecia. The organism was determined by W.G. Ziller (W.R. Orchard).

LEAF SPOT (Mycosphaerella sentina). Severe foliage spotting occurred on unsprayed trees at Kingston, N.S. (J.F. Hockey).

SCAB (Venturia pirina) was not as common on Bartlett as in 1958 in the Niagara Peninsula, Ont. One orchard of Flemish Beauty was severely infected in the Elfrida area (R.W., W.S.C.). Twenty-four % of the harvested fruit from an unsprayed tree of Flemish Beauty at St. Catharines was infected with late-season scab (G.C.C.). It was sl. on fruit at St. Aubert, L'Islet Co., Que. (D. Leblond).

ANJOU PIT. Observations made in 1958 and 1959 suggest that there are at least three types of "Anjou pit". One form, which recurs every season has been recognized in relatively few trees in scattered orchards. It is characterized by the presence of deep pits with stony tissue beneath and

deformities in the fruit. This form has now been demonstrated to be a virus disease. A second form occurred in a slightly greater number of trees in 1959 than did the virus-induced form. This form is always associated with black-end of pear. The third form, which was widespread in 1958 and is not necessarily associated with black-end, did not occur in 1959. The two latter forms have shallow pits on the fruit surface, underlain with a brown corky tissue (M.F. Welsh).

HEAT SCORCH was general in the Niagara Peninsula, Ont. and severe in many orchards. It is thought to be related to seasonal conditions of high temperatures and a deficiency of soil moisture. Red mite infestations are also considered a contributing factor (G.C.C., R.W., W.S.C.).

PSEUDO BLIGHT (cause unknown). This injury resembles fire blight in appearance. The variety Kieffer appears to be the most susceptible and the condition usually occurrs in orchards on shallow, heavy, poorly-drained soils. It is most conspicuous when subsoil moisture levels are critical. It was seen in several areas in the Niagara Peninsula, Ont. in 1959 (R.W., W.S.C.).

CHEMICAL INJURY. Herbicide drift caused a twisting of foliage on 2 trees in a home garden at White Rock, B.C. (H.N.W. Toms).

PLANTING FAILURE. In various districts in the Okanagan Valley, B.C., newly-planted pear and cherry trees frequently fail to grow satisfactorily. Loss of feeder roots is characteristic of the disorder. The cause of such failure being sought (D.L. McIntosh).

B. STONE FRUITS

APRICOT

GRAY MOLD (Botrytis cinerea) caused the loss of apricot seedlings in flats in a greenhouse at Summerland, B.C. (D.L. McIntosh).

BLOSSOM BLIGHT (Monilinia fructicola). A single tree with heavy bloom showed a 30% infection of blossoms at St. Catharines, Ont. (G.C. Chamberlain).

BROWN ROT (Monilinia laxa). Approximately 20 young trees at the Research Station, Summerland, B.C. were slightly affected. Blossom and twig blight were not seen and fruit infection took place only through wounds. This was the only recorded outbreak of M. laxa in the Okanagan Valley in 1959 (L.E. Lopatecki).

VERTICILLIUM WILT (V. dahliae) was found in apricots in the Summerland area and elsewhere in the Okanagan Valley, B.C. (G.E. Woolliams).

RING POX (see Twisted Leaf of Cherry).

CHERRY

BLACK KNOT (Dibotryon morbosum). Specimens of black knot on sour cherry were received from Lauzon, Levis Co. and Victoriaville, Arthabaska Co., Que. (D. Leblond). It was prevalent on plums and cherries in N.B. (S.R. Colpitts).

LEAF SPOT (Higginsia hiemalis). Scattered infections were recorded in an orchard at St. Catharines, Ont. early in Aug. Yellowing and leaf drop were confined to the lower part of the trees. The orchard was practically defoliated early in Oct. (G.C. Chamberlain). A 15% infection caused sl. damage at Riviere du Loup, Que. (L.J. Coulombe). Twenty trees at Moncton, N.B. were severely infected (S.R.C.), and tr. infections only were seen at the Research Station, Kentville, N.S. (C.O. Gourley).

BLOSSOM BLIGHT (Monilinia fructicola) was sev. on Bing, Lambert and other varieties in the Arrow Lake district of B.C. Bloom was exceedingly heavy and the disease therefore did not affect fruit set seriously. The infection did not spread to green fruit and the dry weather during the harvest period prevented any appreciable development of brown rot in the ripe fruit (L.E. Lopatecki). Infections were mostly scattered and light in the Niagara Peninsula, Ont. In the laboratory orchard at St. Catherines, infections on unsprayed trees were rated as follows: Yellow Spanish 13.2%, Schmidt's 8.5%, Victor 4.2% and Windsor 2.2% (G.C.C.).

BROWN ROT AND BLOSSOM BLIGHT (Monilinia laxa). In contrast with the behavior of M. fructicola (see above), infections by M. laxa did spread to green fruit and a moderate amount of fruit rot developed. This occurred only in the Upper Arrow Lake area. To date, M. laxa has not been found in the Lower Arrow Lake district (L.E. Lopatecki).

BLOSSOM AND TWIG BLIGHT (Monilinia padi). Sour cherry trees in the vicinity of Charlottetown, P.E.I. were affected by a blight that destroyed blossom clusters and invaded the twigs to a considerable distance. The causal organism was identified by Dr. J.W. Groves as Monilinia padi (Wor.) Honey (J.E. Campbell). M. padi possesses much larger conidia than those of the more ubiquitous M. fructicola. This species does not cause a brown rot of fruit and the conidia are normally borne on twigs and petioles. According to Seaver, (The North American Cup Fungi (Inoperculates) 428 pp., 1951), it has been known only from the type locality, Ithaca, N.Y. This is certainly the first report of M. padi occurring in Canada (D.W. Creelman).

BARK ROT (Phytophthora cactorum). Limb infections, initiated in 1958, were observed killing large limbs at Summerland, B.C. There were many reports of limb infections from various parts of the Okanagan Valley (D.L. McIntosh).

POWDERY MILDEW (Podosphaera oxyacanthae). Sev. infections were seen on leaves of new terminal growth on sour cherry trees at Summerland and Westbank, B.C. Tree vigor and crop size were not obviously affected (D.L.McI.). Ten-year old cherry trees, closely planted, in the Vineland, Ont. district were heavily infected (R. Wilcox, W.S. Carpenter). Mildew was common in many Niagara Peninsula orchards, affecting many terminals and causing a curling of terminal leaves (G.C.C.).

LITTLE CHERRY (virus) affected all varieties of sweet cherries in the West Kootenay district of B.C. A high percentage of the fruit produced was unsuitable for the fresh fruit trade. The fruit from Lambert trees was more severely affected than that from Bing (J.M. Wilks). Little cherry has, as yet, been unreported from the Okanagan and Similkameen Valleys of B.C. (T.B. Lott, F.W.L. Keane).

? NECROTIC RUSTY MOTTLE (virus). In 2 orchards in the Okanagan Valley, B.C. a disease has been found in Bing cherry with leaf symptoms similiar to Lambert mottle. However, Bing cherry has been shown to be a symptomless host of Lambert mottle. The disease in question, which may be necrotic rusty mottle, has been transmitted experimentally to both the varieties Bing and Lambert. In Bing, symptoms first appeared five years after inoculation. Unlike Lambert mottle, this virus can be transmitted through apricot though the apricot remains symptomless (T.B.L., F.W.L.K.).

RASP LEAF (virus) affected a number of trees of the variety Victor in the Niagara Peninsula, Ont. These trees, planted as pollinators, have shown symptoms every year since planting but there has been no apparent spread (T.R. Davidson, J.A. George). It was also found affecting a few trees of the variety Van on the Peninsula (R.W., W.S.C.).

TATTER LEAF (virus) was diagnosed in a few Niagara Peninsula, Ont. orchards (R.W., W.S.C.).

TWISTED LEAF (virus). Experimental work has strengthened the theory that twisted leaf of cherry and ring pox of apricot are caused by a single virus. Chokecherry has been shown to be a symptomless host of the virus causing both diseases. Both diseases have been produced experimentally by a virus obtained from chokecherries growing close to diseased orchard trees in the Okanagan and Similkameen Valleys in B.C.

In 1959 the virus causing twisted leaf was demonstrated to be indigenous and widespread in wild chokecherries in both Valleys and in the surrounding hills. It was recovered in locations as much as 19 miles from the nearest orchard area and at elevations as high as 1, 900 feet above the nearest orchard (T.B.L., F.W.L.K.).

YELLOWS (virus) in sour cherries was found in one-half to two-thirds of the trees in orchards surveyed in the Okanagan Valley, B.C. in 1959. Heavy leaf fall was observed. The 1959 season was favorable for a strong display of symptoms, following a period of cool night temperatures in May and June (M.F. Welsh). The yellow leaf drop symptom was virtually absent in Niagara Peninsula, Ont. orchards in 1959 (T.R.D., J.A.G.). Symptoms were seen in one English Morello tree at the Research Station, Kentville, N.S. (C.O.G.).

X-DISEASE (virus) was found in the Niagara Peninsula, Ont. affecting some Bing trees in an orchard adjacent to chokecherries (R.W., W.S.C.). Three trees of Bing at Stoney Creek, Ont. and 1 tree of an unnamed variety at Vineland were found affected. Parts of each tree bore characteristic small, red, immature fruits while fruit on the remainder of the tree was normal. A number of chokecherry bushes at Stoney Creek exhibited typical foliage symptoms (T.R.D., J.A.G.).

REPLANT PROBLEM (? nematodes). In the Niagara Peninsula, Ont., there are, under observation, 7 cases of a replant problem where sour cherries fail to respond to normal cultural treatments. Meadow nematode (Pratylenchus penetrans) counts in the orchard soil are high and soil fumigation tests have been set up to determine responses (R.W., W.S.C.).

PLANTING FAILURE. Newly set-out cherry trees frequently fail to grow satisfactorily in various areas in the Okanagan Valley, B.C. Loss of feeder roots is characteristic of the disorder and investigations are underway to determine the cause (D.L. McI.).

PEACH

GRAY MOLD (Botrytis cinerea) killed peach seedlings in flats in a greenhouse at the Research Station, Summerland, B.C. (D.L. McIntosh).

BLACK KNOT (Dibotryon morbosum). Trace infections were seen on peach seedlings at the Research Station, Kentville, N.S. (C.O. Gourley).

BROWN ROT (Monilinia fructicola). Twig infections caused a slight die-back on Red Haven at Saanichton, B.C. (W.R. Orchard). One tree bore a sl. infection at Trout Creek Point in the Summerland, B.C. district (L.E. Lopatecki). Blossom blight and brown rot were not a problem in orchards in the Niagara Peninsula, Ont. in 1959, but brown rot took its usual toll in shipping (R.W., W.S.C.).

Blossom blight infection was meagre, even on unsprayed trees in the Laboratory orchard, St. Catharines, Ont. (G.C. Chamberlain). Trace infections only were seen in Kings Co., N.S. (C.O.G.).

STORAGE ROTS (Monilinia fructicola, Rhizopus nigricans). After 10 days in storage at St. Catharines, Ont., Vedette peaches showed 41% brown rot (M. fructicola) and 24.6% Rhizopus rot (G.C.C.).

BARK ROT (Phytophthora cactorum) killed some large limbs of Veteran peach at Summerland, B.C. Reports of limb infections were received from several Okanagan Valley districts (D.L. McI.).

LEAF CURL (Taphrina deformans). Scattered trace infections were observed on unsprayed trees at St. Catharines, Ont. (G.C.C.), and trace infections only occurred in Kings Co., N.S. (C.O.G.).

CANKER (Valsa cincta). Very few orchards in the Niagara Peninsula, Ont. are free from this disease. It is probably one of the most important factors in reducing peach production (R.W., W.S.C.).

WILT (Verticillium dahliae) was observed in several orchards in the Summerland area and elsewhere in the Okanagan Valley, B.C. (G.E. Woolliams).

BACTERIAL SPOT (Xanthomonas pruni). Leaf and fruit infection occurred in 1 orchard of June Elberta in the Vineland, Ont. district. Fruit loss was heavy. This orchard has been infected for a number of years. Bacterial spot appears on the variety Victory in most years in the Niagara Peninsula (R.W., W.S.C.).

YELLOWS (virus) was seen in 4 trees in a 5-acre block of Jubilee peaches at Niagara Falls, Ont. It caused premature ripening and decreased vigor in affected trees (G.C.C.).

CHEMICAL INJURY. Peaches growing in the vicinity of a manufacturing plant at Grimsby, Ont. were damaged slightly. Affected leaves develop water-soaked areas and then drop. The fruit ripens prematurely with a raised area on the suture. This damage has been occurring for a number of years (R.W., W.S.C.).

WINTER INJURY. There was more than the usual amount of dead wood in old peach trees in the Niagara Peninsula, Ont. in the spring of 1959. Some older trees died after blossoming (R.W., W.S.C.).

PLUM

BLACK KNOT (Dibotryon morbosum). Light infections were seen in a home garden at North Vancouver, B.C. (H.N.W. Toms). Black knot was prevalent in N.B. (S.R. Colpitts). Infections ranged from trace on the variety Yellow Egg to sev. on an unnamed variety at Kentville, N.S. The ornamental species Prunus tomentosa was also affected at Canard, N.S. (C.O. Gourley).

PLUM POCKETS (Taphrina communis) was trace on Burbank plums at Upper Dyke, Kings Co., N.S. (C.O.G.).

PRUNE

BLACK KNOT (Dibotryon morbosum). A large knot caused killing of branches in 1 tree at St. Catharines, Ont. (G.C.C.).

C. RIBES FRUITS

CURRANT

WHITE PINE BLISTER RUST (Cronartium ribicola). Very heavy infections occurred on the leaves of black currants at Hamiota and Fort Garry, Man. Infection was mod. on red currants at Clearwater Bay, Ont. (B. Peturson, W.L. Gordon).

ANTHRACNOSE (Drepanopeziza ribis) was tr. on currants at the Research Station, Kentville, N.S. (C.O. Gourley).

CLUSTER CUP RUST (Puccinia caricina). Trace infections were recorded at Kentville, N.S. (C.O.G.).

GOOSEBERRY

LEAF SPOT (Mycosphaerella ribis). A 2% infection occurred on gooseberries at the Research Station, Kentville, N.S. (C.O. Gourley).

LEAF SPOT (Phyllosticta grossulariae) was moderate at Trois Pistoles, Rimouski Co., Que. (D. Leblond).

POWDERY MILDEW (Sphaerotheca mors-uvae). Infection was severe on foliage and fruit at Royal Oak, Vancouver Island, B.C. Cleistothecia were present and asci well developed by 23 June (W.R. Orchard). The fruit in one garden at Fort Garry, Man. was destroyed by powdery mildew (B. Peturson). Infection was 5% on fruit of the variety White Smith at the Research Station, Kentville, N.S. (C.O.G.).

D. RUBUS FRUITS

RASPBERRY

CROWN GALL (Agrobacterium tumefaciens) affected 5% of the canes in a planting at Sussex, N.B. (S.R. Colpitts).

GRAY-MOLD WILT (Botrytis cinerea) destroyed 50% of the canes of raspberry seedlings at the Research Station, Kentville, N.S. (C.O. Gourley).

SPUR BLIGHT (Didymella applanata) affected 15% of the canes in a half-acre planting of Viking at Gagetown, N.B. No control measures had been carried out (S.R.C.). It was tr. in raspberries on the Research Station, Kentville, N.S. (C.O.G.).

ANTHRACNOSE (Elsinoe veneta). A mod. infection occurred at Picton, Ont. (G.C. Chamberlain). It was observed in a nursery at St. Césaire, Rouville Co., Que. Twenty-six other nurseries inspected in Que. were free of anthracnose (J. Ringuet). A 10% infection was seen at Norton, Kings Co., N.B. (S.R.C.), and trace infections only were recorded in Kings and Annapolis counties, N.S. (C.O.G.).

CANE BLIGHT (Leptosphaeria coniothyrium). Infection was 5% at the Research Station, Kentville, N.S. (K.A. Harrison). A 2% infection was seen at Timberlea, Halifax Co., N.S. on black raspberry (C.O.G.).

LEAF SPOT (Mycosphaerella rubi) was tr. on the variety Trent at Melvern Square, Annapolis Co., N.S. (C.O.G.).

LATE LEAF RUST (Pucciniastrum americanum) was heavy in a few plantations near Gagetown, N.B. with some infections as high as 75% (S.R.C.). At Berwick, N.S., a 5% infection caused some defoliation (C.O.G.).

WILT (Verticillium albo-atrum) caused slight damage in a garden planting at Medicine Hat, Alta. (E.J. Hawn).

MOSAIC (virus) was found in 17/27 nurseries inspected in Que. Infections ranged from 0.1% to 8% (J.R.).

E. OTHER FRUITS

BLUEBERRY

TWIG BLIGHT AND FRUIT ROT (Gloeosporium sp.). Specimens of affected lowbush blueberries were received from Dolbeau in the Lake St. John district of Que. (D. Leblond).

POWDERY MILDEW (Microsphaera alni var. vaccinii). Affected lowbush specimens were submitted from Glenmore, Halifax Co., N.S. (C.L. Lockhart).

TWIG AND BLOSSOM BLIGHT (Monilinia vaccinii - corymbosi). Trace infections occurred in most lowbush fields in Charlotte Co., N.B. but damage was negligible (S.R. Colpitts). The first affected plants were found near Kentville, N.S. on May 25. Reports from extension workers indicate that the average infection in Nova Scotia fields was about 3% (C.L.L.).

DIEBACK (Phomopsis vaccinii). Infection was 1% on highbush blueberries, variety Rancocas, at Centerville, Kings Co., N.S. (C.L.L.).

WITCHES'-BROOM (Pucciniastrum goeppertianum) was present in trace amounts in all fields observed in Charlotte Co., N.B. (S.R.C.). Nine areas in Antigonish, Guysborough and Inverness counties, N.S., comprising 1500-2000 acres, were surveyed for the presence of witches'-broom. Two areas had infections of 5 and 10% respectively and 7 others had less than 2%. The areas surveyed had all been recently cleared from wooded sites with scattered fir trees. The presence of the alternate host accounts for the higher incidence of witches'-broom than the trace normally found in well-established fields (C.L.L.).

LEAF RUST (Pucciniastrum vaccinii). Sprout and first-crop fields at Collingwood, Cumberland Co., N.S. were heavily infected with leaf rust and premature defoliation resulted. The shoots, however, appeared healthy and showed excellent flower bud development. It appeared unlikely that the leaf rust would adversely affect next year's crop (C.L.L.).

GRAPE

DEAD ARM (Fusicoccum viticola). There were fewer reports of dead arm in the Niagara Peninsula, Ont. than in most years. Very little evidence of infection of current season's growth was observed. A 3% infection was seen on Seibel 10878 at Stamford, Ont. (G.C. Chamberlain).

DOWNY MILDEW (Plasmopara viticola). One minor outbreak was seen at Niagara-on-the-Lake, Ont. (G.C.C.).

POWDERY MILDEW (Uncinula necator) was prevalent as moderate infections in the Stamford, Ont. district (G.C.C.).

STRAWBERRY

GRAY-MOLD ROT (Botrytis cinerea). A cool, wet June favored the development of this disease in Queens and Sunbury counties, N.B. Infection rates ranged from tr.-60% (S.R. Colpitts). Infection was 50% on fruit, stalks and leaves in a heavily matted patch at Kentville, N.S. (K.A. Harrison).

LEAF BLIGHT (Dendrophoma obscurans). Trace amounts of leaf blight were recorded on the Research Station, Kentville, N.S. (C.O. Gourley).

LEAF SCORCH (Diplocarpon earliana). Trace infections only occurred at Kentville, N.S. (C.O.G.).

LEAF BLOTCH (Gnomonia fructicola). The varieties Sparkle, Catskill and Premier showed, on the average, a 1% infection at Kentville, N.S. (C.O.G.).

LEAF SPOT (Mycosphaerella fragariae). A planting of vigorously growing Sparkle plants in the Grimsby, Ont. area was heavily infected in Sept. (R. Wilcox, W.S. Carpenter). Most strawberry plantings in Queens and Sunbury counties, N.B. were infected (S.R.C.). Leaf spot was reported from all the commercial strawberry-growing areas of N.S. The weather conditions prevailing in the summer of 1959 were ideal for the spread of this disease (C.O.G.).

RED STELE (Phytophthora fragariae) caused moderate losses in 2 gardens at Lethbridge, Alta. (E.J. Hawn).

LEAF SPOT (Septoria aciculosa) was more prevalent in 1959 than in any previous season. It was found in Kings, Annapolis and Lunenburg counties and average infection was 10% (C.O.G.).

POWDERY MILDEW (Sphaerotheca humuli). Infections of 50% of the plants were seen at Melvern Square, Annapolis Co. and at Kentville, Kings Co., N.S. (C.O.G.). Strawberry plantings in Queens Co., P.E.I. were heavily infected in 1959. In a replicated planting of 22 varieties at Charlottetown, observations were made on the relative susceptibility to powdery mildew under conditions of natural infection. Red Glow, Armore, Stelemaster and Pocahontas were severely diseased whereas Blakemore and Catskill were unaffected (J.E. Campbell, D.B. Robinson).

WILT (Verticillium albo-atrum) was quite common in the Niagara Peninsula, Ont. and is becoming a serious factor in strawberry production in that area. The varieties Earlidawn, Pocahontas and Sparkle seemed particularly susceptible (R.W., W.S.C.). Twenty-five % of the plants were affected in a planting at Sheffield Mills, Kings Co., N.S. (C.O.G.).

ROOT ROT (various organisms) was reported from Melville, Sask. (T.C. Vanterpool). This trouble is quite general in plantings in N.B. (S.R.C.).

GREEN PETAL (virus) was found in the variety Churchill at Milton, Ont. (R.W., W.S.C.). This is the first report, to the Survey, of the occurrence of green petal in Ont. (D.W. Creelman). Infection was mod. on Senator Dunlop at Ste. Foy, Que. (D. Leblond). Green petal was found in all localities visited

in Que. but was severe only in fields in their third bearing year (R.O. Lachance). Its incidence was tr.-20% in fields in Queens Co., N.B. (S.R.C.). Infection was about 1% at the Research Station, Kentville, N.S. (C.O.G.).

WITCHES'-BROOM (virus). Ten % of the plants were severely affected in a nursery planting of Senator Dunlop at Trois Rivières, Que. (J. Ringuet).

LEAF PUCKERING (cause unknown) was general in plantings in the Niagara Peninsula, Ont. A necrosis at the tips of young leaves causes the distortion (R.W., W.S.C.).

V. DISEASES OF TREES AND SHRUBS

ACER - Maple

Wilt (Verticillium albo-atrum) affected one tree at Kingston, N.S. (J.F. Hockey).

Low Temperature Injury. Cold winds in June in Que. resulted in considerable browning and drying-out of maple leaves. Specimens were received from Carleton, Bonaventure Co., Ste. Angele, Nicolet Co., and Ste. Rose de Degele, Temiscouata Co. (D. Leblond). Moderate damage also occurred in L'Islet and Kamouraska counties (L.J. Coulombe).

AESCULUS - Horsechestnut

Leaf Blotch (Guignardia aesculi). Trace infections occurred at Kentville, N.S. (C.O. Gourley) whereas infection was heavy in central and eastern P.E.I. (J.E. Campbell).

ARBUTUS

Red Leaf Gall (Exobasidium vaccinii) was found causing discrete pustules on infected leaves of A. menziesii at Saanichton, B.C. (W.R. Orchard).

CRATAEGUS - Hawthorn

Rust (Gymnosporangium sp.). A moderate infection of rust on C. arnoldiana was observed near a planting of ornamental juniper at Morden, Man. (W.A.F. Hagborg).

DAPHNE

Anthracnose (Marssonina daphnes) caused the death of shrubs in 2 Vancouver, B.C. gardens. This is a very common disease on D. mezereum in the district (H.N.W. Toms).

FAGUS - Beech

Anthracnose (Gloeosporium fagicola). Affected specimens were received from Charlesbourg, Que. (D. Leblond).

HYDRANGEA

Gray Mold (Botrytis cinerea) caused mod. damage on H. paniculata at St. Roch, L'Islet Co., Que. (L.J. Coulombe).

Powdery Mildew (Erysiphe cichoracearum) was sev. on the foliage of 54/175 plants in a greenhouse at Dunnville, Ont. The remaining plants showed sl.-mod. infections. Plants were closely spaced and aeration was poor (W.G. Kemp). Specimens were received from St. Boniface, St. Maurice Co., Que. (D. Leblond).

PINUS - Pine

White Pine Blister Rust (Cronartium ribicola). In a young stand of white pines at the Research Station, Kentville, N.S., 10% of the trees had blister rust infections on the main limbs and trunks. Aecia had broken open and spores were being liberated on May 12 (C. O Gourley).

PLATANUS - Plane Tree

Anthracnose (Gnomonia veneta). A mod. infection at Royal Oak, Vancouver Island, B.C. caused sev. injury to foliage of P. orientalis. The Gloeosporium stage of organism was fruiting profusely on veins and petioles of affected leaves (W.R. Orchard).

POPULUS - Poplar

Canker (Cytospora chrysosperma) was sev. on P. canadensis var. eugenei at Ste. Foy, Que. (D. Leblond).

Anthracnose (Marssonina populi). Infected specimens of P. nigra var. italica were received from Port Daniel, Bonaventure Co., Que. (D.L.).

Yellow Leaf Blister (Taphrina populina) occurs annually on P. nigra var. italica at Saanichton, B.C. Usually about 2% of the leaves are affected resulting in slight damage to the trees (W.R. Orchard).

PRUNUS - Flowering Cherry

Crown Gall (Agrobacterium tumefaciens) was found, when transplanting, on 75/1000 trees on the University Campus, Vancouver, B.C. (H. N. W. Toms).

Shot Hole (Stigmina carpophila = Clasterosporium carpophilum) is common on hedges of P. lauro - cerasus in Vancouver, B.C. gardens (H.N.W.T.). According to M.B. Ellis (C.M.I. Mycological Paper 72, p. 56. 1959) the fungus commonly known as Clasterosporium carpophilum properly belongs in the genus Stigmina. He has, therefore, made the new combination Stigmina carpophila (Lév.) M.B. Ellis (D.W. Creelman).

Rough Bark (virus). Some 30 trees of the Miyako and Kwansan varieties in the nurseries of the Vancouver, B.C. Parks Board exhibited typical foliage and bark symptoms. The diagnosis was confirmed by T.B. Lott and M.F. Welsh (H.N.W.T.).

Drought Injury. Some trees in Vancouver, B.C. gardens died in the spring of 1959 as the result of severe drought conditions in the summer of 1958 (H. N.W.T.).

PYRUS - Mountain Ash

Fire Blight (Erwinia amylovora) caused mod.-sev. damage to mountain ash transplants in Lethbridge, Alta. (E.J. Hawn). Several reports of fire blight damage to mountain ash were received at Winnipeg, Man. (W.A.F. Hagborg). It was seen on 2 trees at St. Jean, Que. (L. Cinq Mars).

Rust (Gymnosporangium cornutum). Pyrus decora was moderately infected at Clearwater Bay, Ont. No infection was seen on nearby Pyrus aucuparia (W.L. Gordon).

RHAMNUS - Buckthorn

Crown Rust (Puccinia coronata). A hedge of R. cathartica at Summerside, P.E.I. was moderately infected (J. E. Campbell).

RIBES - Flowering Currant

Anthracnose (Drepanopeziza ribis) was found on R. alpinum in 9 nurseries inspected in Que. Infections were light to moderate (J. Ringuet).

RHODODENDRON

Leaf Gall (Exobasidium vaccinii) caused marked distortions on leaves of azalea in a garden at Victoria, B.C. (W.R. Orchard).

Leaf Spot (Pestalotia macrotricha) was found on the lower leaves of a few potted plants at Hamilton, Ont. (W.G. Kemp).

ROSA - Rose

Crown Gall (Agrobacterium tumefaciens) was sev. on a shipment of shrubs at Lethbridge, Alta. (J.B. Lebeau). A large gall was seen on one plant at Truro, N.S. (K.A. Harrison).

Black Spot (Diplocarpon rosae). Heavy rainfall in April favored a higher than usual amount of black spot infection on Vancouver Island, B.C. (W.R. Orchard). Specimens were received from Windsor East, Richmond Co., Que. (D. Leblond).. Unsprayed hybrid tea and floribunda bushes were defoliated at Kentville, N.S. (J.F. Hockey). The variety, The Doctor, seems very susceptible to black spot (R.G. Ross).

Anthracnose (Gloeosporium ? rosae) was sev. on rose fruits in Battlefields Park, Quebec City, Que. (D.L.).

Powdery Mildew (Sphaerotheca pannosa) was extremely severe on the floribunda varieties Pink Garnet and Pink Garnet Supreme in a greenhouse at Richmond Hill, Ont. Over 50% of the bloom in a 400-foot bench of Pink Garnet had to be discarded and the remaining blooms were below top grade. Two other varieties, Jingles and Gold Strike, on either side of the severely affected bench, remained unaffected. Mildew was also severe on the varieties Johanna Hill and Golden Sceptre. Better Times was moderately affected. Pink Delight was the most severely affected hybrid tea variety (W.G. Kemp). Sl.-mod. infections were seen at St. Jean and St. Chrysostome, Que (R. Crête). A rambler rose bush at Wilmont, Annapolis Co., N.S. was 100% infected (K.A.H.).

SALIX - Willow

Crown Gall (Agrobacterium tumefaciens) caused a marked, localized hypertrophy of roots, close to the crown, on S. babylonica at North Saanichton, B.C. Two trees were affected (W.R. Orchard).

Canker (Cytospora chrysosperma). Numerous pycnidia were present on a tree of S. alba var. tristis which had apparently been killed by canker at Sillery, Que. (J. Ringuet).

Blight (Fusicladium saliciperdum) was quite severe on a hedge of S. pentandra at Ste. Foy, Que. (J.R.). A severe infection developed on French Willow in an isolated clump of sucker growth at Kentville, N.S. (K.A. Harrison).

Anthracnose (Marssonina kriegeriana). The occurrence of anthracnose was general in the southern part of Vancouver Island, B.C. and damage to S. babylonica was severe (W.R.O.).

Rust (Melampsora epitea) was abundant at Woburn, Frontenac Co., and in the Laurentide Park in Que. (D. Leblond).

SPIRAEA

Leaf Spot (Cylindrosporium ? filipendulae). Slight to moderate infections were observed on S. vanhouttei in a nursery in Labelle Co., Que. (J. Ringuet). For a discussion of the taxonomy of Cylindrosporium spp. occurring on Spiraea see Fergus, C.L., Mycologia 49: 262-267, 1957 (D.W. Creelman).

SYRINGA - Lilac

Powdery Mildew (Microsphaera alni). Severe infections developed in Aug. and Sept. at Ste. Anne de la Pocatiere, Que. (R.O. Lachance). Mildew on lilacs was very common in western N.S. in 1959 (J.F. Hockey).

Bacterial Blight (Pseudomonas syringae) was observed on many lilac varieties at the Experimental Farm, Morden, Man. Blight was particularly severe on S. oblata var. dilitatta x Syringa sp. (W.A.F. Hagborg).

TSUGA - Hemlock

Leaf Rust (Pucciniastrum vaccinii) infected 40% of the needles of T. canadensis at Concession, Digby Co., N.S. (C.L. Lockhart).

ULMUS - Elm

Black Mold (Chalaropsis thielavioides) was slight on branches of nursery plants of U. pumila at Cap Rouge, Que. (D. Leblond).

Coral Canker (Nectria cinnabarina). A hedge of U. pumila at Quebec City, Que. was heavily infected. (D.L.).

VIRBUNUM - Snowball

Leaf Spot (Phyllosticta lentaginis). A moderate infection was seen on V. opulus in Battlefields Park, Quebec City, Que. (D.L.).

VI. DISEASES OF HERBACEOUS ORNAMENTAL PLANTS

ALTHAEA - Hollyhock

Rust (Puccinia malvacearum) was prevalent throughout the Okanagan Valley, B.C. (G.E. Woolliams).

ANTIRRHINUM - Snapdragon

Downy Mildew (Peronospora antirrhini). Affected specimens were submitted from Lambeth, near London, Ont. Plants were stunted, new growth was bunchy and the leaves were rolled downwards at the edge and had a dull green color. The fungus was sporulating on the underside of the leaves (W.G. Kemp).

Stem Rot (Rhizoctonia solani) was extensive in 2 ground beds at Virgil, Ont. In many localized areas in the beds, all the plants were dead. In other areas infection was spotty. At Ridgeville, Ont., 67/1500 young plants were attacked in a greenhouse bench. Affected plants were wrinkled and shrivelled (W.G.K.).

ARABIS - Rock Cress

Downy Mildew (Peronospora parasitica) occurred on A. albida in a rockery at Vancouver, B.C. This disease was erroneously reported to the Survey in 1958 as white rust (Albugo candida) (H.N.W. Toms).

ASTER

Rust (Coleosporium asterum). Light infections were observed on 30% of the plants in a garden at St. Jean, Que. (L. Cinq-Mars).

Powdery Mildew (Erysiphe cichoracearum) was sev. on A. novi-belgii in the Montreal Botanical Garden (D. Leblond).

BEGONIA

Crown Gall (Agrobacterium tumefaciens). A severely infected tuber of B. tuberhybrida was received from Winnipeg, Man. (W.A.F. Hagborg).

Powdery Mildew (Erysiphe cichoracearum). Infected specimens were received from Champigny, Quebec Co. and Levis, Levis Co., Que. (D. Leblond).

Leaf Spot (Xanthomonas begoniae) affected a single tuberous begonia at St. Catharines, Ont. Many translucent spots, some with necrotic centers, formed on the foliage (W.G. Kemp). An infected specimen was received from St. David, Levis Co., Que. (D.L.).

CALLISTEPHUS - China Aster

Fusarium Wilt (F. oxysporum f. callistephi) affected China Asters at Ste. Foy, Que. (D. Leblond). Wilt completely destroyed a planting at Bear River, Digby Co., N.S. (K.A. Harrison).

Aster Yellows (virus) infection was extremely light at Kentville, N.S. In most seasons this disease makes the growing of China Asters practically impossible (K.A.H.). Heavy infections were observed at Charlottetown and Southport, P.E.I. (J.E. Campbell).

CHRYSANTHEMUM

Powdery Mildew (Erysiphe cichoracearum) was extremely heavy on the varieties Yellow Shasta, White Shasta, Yellow Mefo and White Shoesmith in a poorly ventilated range in Hamilton, Ont. (W.G. Kemp).

Rust (Puccinia chrysanthemi). A light infection occurred on leaves and stems of C. morifolium at Victoria, B.C. (W.R. Orchard).

Leaf Spot (Septoria chrysanthemi) was light on C. maximum at Brentwood, B.C. (W.R.O.). The lower leaves of the variety Indianapolis White were badly spotted at Virgil, Ont. Little damage resulted. At Fort Erie, Ont. the variety Yellow Shasta bore mod.-sev. infections (W.G.K.). Infection was moderate in flower beds at Ste. Anne de la Pocatiere, Que. (D. Leblond).

Stunt (virus). At Hamilton, Ont., 147/200 Yellow Shoesmith plants were affected. The plants were short and blooms were small. No symptoms were evident on the foliage (W.G.K.).

COLEUS

Cutting Rot (Rhizoctonia solani) destroyed the new roots of plants in a propagating bed at Welland, Ont. The sand, used as a propagating medium, had not been sterilized (W.G. Kemp).

CONVALLARIA - Lily-of-the-Valley

Stem Rot (Botrytis sp.). Infection was moderate and damage relatively severe at New Westminster, B.C. (W.R. Orchard). The identity of the Botrytis attacking Convallaria is not clear. Weiss and O'Brien, Index of Plant Diseases in the United States, Part IV, p 684, 1952, list B. paeoniae Oud. as the cause of blight and stem rot, but raise the question that the fungus reported might not be B. cinerea Pers. f. convallariae Kleb. This disease has not been previously reported to the Survey (D.W. Creelman).

CYCLAMEN

Gray Mold Rot (Botrytis cinerea) affected about 10% of the plants in a commercial greenhouse at Summerland, B.C. It caused a wilt of petioles and flower stalks and a rot of the corms (G.E. Woolliams).

DIANTHUS - Carnation, Sweet William

Blight (Alternaria dianthicola) severely affected leaves, stems and flowers of D. barbatus in a home garden at Ottawa, Ont. Affected plants were killed (D.W. Creelman).

Bud and Flower Blight (Botrytis cinerea) occurred on buds and blooms of the carnation varieties Northland and Apollo at Fenwick, Ont. Flower blight was severe (W.G. Kemp).

Wilt (Fusarium oxysporum f. dianthi) caused considerable damage in a greenhouse in the Fraser Valley, B.C. (W.R. Orchard). Severe infections also occurred in greenhouses at Neuville, Portneuf Co., Que. (D. Leblond).

Rust (Uromyces dianthi). Moderate infections occurred on many carnation plants in a range at Fort Erie, and was extremely severe in a greenhouse at Fenwick, Ont. (W.G.K.).

? Boron Deficiency. A condition, tentatively diagnosed as boron deficiency was encountered at Crystal Beach, Welland and Fenwick, Ont. Flowers on many plants aborted and abnormal breaks occurred on the stems (W.G.K.).

ECHINOPS - Globe Thistle

Crown Gall (Agrobacterium tumefaciens) was observed in a nursery at Bunbury, P.E.I. (J.E. Campbell, D.B. Robinson).

EUPHORBIA - Crown-of-Thorns, Poinsettia

? Crown Gall (Agrobacterium tumefaciens). Several galls of the crown gall type were present on a stem of E. splendans, Crown-of-Thorns, at Winnipeg, Man. (W.A.F. Hagborg).

Stem and Root Rot (Pythium sp.). A single poinsettia plant (E. pulcherrima) was affected at St. Catharines, Ont. Soft, brown lesions developed on the stem at soil level and roots were brown and extensively rotted. Isolations from stem and root tissues yielded a Pythium sp. (W.G. Kemp)

FICUS - Rubber Plant

Anthracnose - (Gloeosporium ? cingulatum). Infected specimens were received from Quebec City and from Ste. Marie, Beauce Co., Que. (D. Leblond).

GLADIOLUS

Fusarium Yellows (F. oxysporum f. gladioli was slight, though general, in the Winnipeg, Man. district (B. Peturson).

Corm Rot (Penicillium gladioli) occurred on corms at Kamloops, B.C. (G.E. Woolliams).

Scab (Pseudomans marginata). A very severe infection developed at Kentville, N.S. in 3 rows of the variety Snow Princess. Small corms had been planted in soil which had not grown gladioli for at least 10 years (K.A. Harrison).

Dry Rot (Stromatinia gladioli). A 15% infection was seen in a home garden at Kentville, N.S. (K.A.H.). Trace infections only were recorded in a large commercial planting at Rockland, Kings Co., N.S. This planting, in the past, has suffered at times from severe infections (J.F. Hockey).

Aster Yellows (virus) infection was trace in 2 plantings at Fort Garry, Man. (B.P.).

IRIS

Leaf Spot (Didymellina macrospora) caused slight damage in a home garden in Ottawa, Ont. (D.W. Creelman).

LILIUM - Lily

Leaf Spot (Cercosporella inconspicua). Slight infections were observed on L. canadense at Woburn, Frontenac Co., Que. (D. Leblond). The only previous report to the Survey, of this disease, is one from Dropmore, Man. (C.P.D.S. Ann. Rep't. 25: 115. 1946 [1947]. In this report D.B.O. Savile discusses the nomenclature of Cercosporella spp. on Lilium (D. W. Creelman).

Mosaic (virus) affected 60% of the plants of Regal Lily in a garden at Kentville, N.S. Many plants failed to grow, apparently as a result of 1958 infection (K.A. Harrison).

LIMONIUM - Sea-Lavender

Rust (Uromyces limonii). Light infections were seen on L. latifolium in a rockery at Brentwood on Vancouver Island, B.C. (W.R. Orchard).

MATTHIOLA - Stocks

Stem Rot (Rhizoctonia solani) affected 25/1000 plants at Welland, Ont. Stem lesions developed at the soil surface (W.G. Kemp).

MYOSOTIS - Forget - Me - Not

Powdery Mildew (Oidium sp.). Plantings were severely attacked and ruined in Quebec City in June and at Deschambault, Portneuf Co. in July. Cleistothecia were not found (D. Leblond). There appears to be no published records of a powdery mildew occurring on Myosotis in North America. Weiss, (Index of Plant Diseases in the United States. Part I. 1950), lists Erysiphe cichoracearum as occurring on other genera in the Boraginaceae, with the notation that the powdery mildew on Cynoglossum and Lappula should possibly be assigned to Erysiphe horridula (Lév.) Wallr.

In Oudemans Enumerato Systematica Fungorum Vol. IV the following powdery mildew species are listed on Myosotis: Odium erysiphoides Fr., Oidium asperifolii Erikss., Erysiphe horridula (Lév.) Wallr., Erysiphe lamprocarpa Lév. and Oidium sp., stat. conid. of E. cichoracearum (D. W. Creelman).

NARCISSUS

Smoulder (Botrytis narcissicola). Trace infections were observed on several varieties on the Experimental Farm, Saanichton, B.C. (W.R. Orchard).

Leaf Scorch (Stagonospora curtisii) caused slight damage on the variety Maximus at Saanichton, B.C. Elongate lesions containing numerous pycnidia appeared, mostly towards the tips of leaves. Conidia were viable early in April (W.R.O.).

PAEONIA - Peony

Blight (Botrytis paeoniae) caused sev. damage in May at Saanichton, B.C. (W.R. Orchard). Scattered, light infections were observed in plantings in the Winnipeg, Man. district (B. Peturson). Blight was observed in a home garden St. Catharines, Ont. (W.G. Kemp). The disease was moderate in intensity at Ste. Foy, and diseased specimens were received from Levis, Que. (D. Leblond). It was very prevalent in Kings Co., N.S. (J.F. Hockey).

Leaf Blotch (Cladosporium paeoniae). Moderate damage was observed at Brentwood, B.C. Some plants showed a high rate of infection (W.R.O.).

PELARGONIUM - Geranium

Leaf Spot (Botrytis cinerea) was sev. on 35 stock plants of the variety Salmon Irene at Welland, Ont. B. cinerea was fruiting on the affected leaf areas. It was also sev. on newly rooted cuttings of Radio Red at Fenwick, Ont. (W.G. Kemp).

Basal Stem Rot (Botrytis cinerea) caused up to 50% loss of untreated cuttings in commercial greenhouses at Summerland, B.C. There was evidence of differences in varietal susceptibility to this disease (G.E. Woolliams).

Root Knot Nematode (Meloidogyne sp.). All plants examined in a greenhouse at Fonthill, Ont. exhibited small root galls (W.G.K.).

Stem Rot (Xanthomonas pelargoni) was found affecting stock plants of the varieties Royal Fiat at Fonthill and Irene at Welland, Ont. (W.G. Kemp). A severely infected specimen was submitted from Bridgewater, N.S. Leaf spot symptoms were also present (J.F. Hockey).

Ring Spot (? virus). Four plants from Shelburne, Ont., submitted to the St. Catharines laboratory for diagnosis showed very distinctive ring spot patterns on the foliage. The plants were kept under observation for a 6-month period. No ring spot symptoms developed on the new foliage (W.G.K.).

PETUNIA

Powdery Mildew (?Erysiphe cichoracearum). A white hybrid variety was severely infected at St. Catharines, Ont. (W.G. Kemp).

Aster Yellows (virus). Slight infections were seen on occasional plants in the Winnipeg, Man. area (W.L. Gordon).

PHLOX

Powdery Mildew (Erysiphe cichoracearum) was widespread in home gardens in Ottawa, Ont. (D.W. Creelman). Many specimens were received for diagnosis from widely separated areas in Que. (D. Leblond).

Leaf Spot (Septoria divaricata) was severe on several varieties of phlox at Keating, B.C. (W.R. Orchard).

SALVIA

Wilt (Fusarium oxysporum). Infected specimens were received from Thetford Mines, Que. (D. Leblond).

SOLIDAGO - Goldenrod

Powdery Mildew (Erysiphe cichoracearum) was severe on cultivated goldenrods in the Montreal Botanical Garden (D. Leblond).

TAGETES - Marigold

Aster Yellows (virus) caused moderate damage to plantings at Winnipeg, Man. (W.L. Gordon). Moderate infections were seen on African marigold at Southport, P.E.I. (J.E. Campbell).

TULIPA - Tulip

Fire (Botrytis cinerea). Infection averaged about 5% in home gardens observed in Ottawa, Ont. (D.W. Creelman). Specimens were received from Chateau Richer, Quebec Co., Que. (D. Leblond). Fire was not serious during the main bloom period in N.S. Some early and late infections were observed (J.F. Hockey, K.A. Harrison).

Break (virus) was encountered occasionally in the Okanagan Valley, B.C. (G.E. Woolliams).

Tobacco Necrosis (virus). Tulips being forced in a greenhouse at Burnaby, near Vancouver, B.C., were severely infected with tobacco necrosis virus. Loss was primarily confined to the variety Elmus. Necrotic lesions on flowers and leaves rendered them unsuitable for market. These bulbs were imported from the Netherlands and were infected prior to arrival in Canada. The diagnosis of TNV as the cause of the disease was confirmed by transmission tests to a series of indicator plants (R. Stace-Smith).

VIOLA - Pansy

Crown Rot and Leaf Spot (Centrospora acerina). This disease, reported in 1958, greatly curtailed production at Centerville, N.S. in 1959 (K.A. Harrison).

Powdery Mildew (Sphaerotheca humuli) was severe late in the season at Ste. Anne de la Pocatiere, Que. (D. Leblond).

ZINNIA

Powdery Mildew (Erysiphe cichoracearum) affected 50% of the plants in a garden at St. Jean, Que. (L. Cinq Mars).

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