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DIVISION OF BOTANY AND PLANT PATHOLOGY

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TWENTY-SIXTH ANNUAL REPORT OF THE CANADIAN PLANT DISEASE SURVEY 1946

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FOREWORD

The Twenty-Sixth Annual Report contains several special accounts. They are: "Survey of Nursery Material for Plant Diseases in 1946" by T. Johnson, B. Peturson and W.J. Cherewick, "Physiologic Races of Cereal Rusts in Canada in 1946" by T. Johnson and B. Peturson, "Flax Diseases in Saskatchewan in 1946" by T.C. Vanterpool, "Flax Diseases in Manitoba in 1946" by W.E. Sackston, "Soybean Diseases in Southwestern Ontario in 1946" by L.W. Koch and A.A. Hildebrand; and a report on tobacco diseases by L.W. Koch. A few reports of special surveys were also submitted, but they have been incorporated into the general text. The scope of the survey is indicated under the first disease discussed. In our opinion special reports deserve separate status only when they incorporate most of the observations on the diseases of a particular crop.

Our thanks are due to all who have contributed to the Survey. Principal Contributors outside the Division of Botany and Plant Pathology were: Dr. J. Emile Jacques, Prof. J.E. Howitt, Dr. J.D. MacLachlan, Mr. Fernand Godbout, Mr. E. Lavallee, Mr. Omer Caron, Mr. David Leblond, Mr. T. Simard, and the District Potato Inspectors across Canada. Dr. R.O. Lachance has translated the introductory section "New and Noteworthy Diseases" for the benefit of our French readers.

The contributions for the present report were unusually slow in being submitted. This fact greatly delayed the preparation of the report.

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New or Noteworthy Diseases

Wheat stem rust (Puccinia graminis) was not seen on any stem-rust resistant varieties in Man. Initial infection occurred late throughout the Prairie provinces and the disease was not serious even on susceptible varieties. Stem rust of oats substantially reduced the yields of late plantings of Vanguard, Exeter and Ajax in Man., owing to the predominance of races that attack these varieties. Races 8, 10 and 11 of P. graminis var. Avenae, capable of attacking these varieties, became increasingly prevalent in Man. and Ont. Further evidence was obtained of the importance of barberries both as foci of local epidemics and as the source of virulent races of P. graminis var. Tritici and P. graminis var. Avenae.

Leaf rust of wheat (P. triticina) became heavy in Man. just before harvest, too late to cause serious losses. A notable feature of the season was the widespread prevalence, in various races of this rust, of biotypes capable of attacking Renown, Regent, Redman and related wheats. These virulent biotypes are particularly abundant in Sask., Man. and northwestern Ont. where the stem-rust resistant wheats are widely grown. Elsewhere these varieties showed considerable resistance.

Crown rust of oats (P. coronata) developed too late to cause appreciable losses in the Prairie Provinces. In eastern Canada it was apparent that the presence of buckthorn aggravated the abundance of races 2 and 3 of this rust; these races form teliospores freely and are therefore favoured by the presence of the alternate host.

Ratings of common root rot (Helminthosporium sativum and Fusarium spp.) of wheat in Sask. were significantly higher than in 1945. The difference is largely due to heavy damage correlated with drought conditions in some areas.

Winter crown rot (low-temperature basidiomycete) of alfalfa was very destructive in west-central Alta. and has become plentiful in Sask. Bacterial wilt (Corynebacterium insidiosum) of alfalfa was heavy in the irrigated sections of southern Alta.; it was found for the first time in Sask. in the White Fox district and was later found to be abundant in the southwestern irrigated sections.

Foliage diseases of flax were light in Sask., but seedling blight (Rhizoctonia Solani etc.) was more prevalent than usual. Coniothyrium seedling blight (C. olivaceum Bonard.) and Selenophoma branch rot (S. linicola Vanterpool) have recently been described from Sask. Pasmo (Septoria linicola) was seen for the first time in Sask., and was abundant in Man.

Downy mildew (Peronospora manshurica) of soybean was prevalent in southwestern Ont. It has been shown that infected seed give rise to systemically infected plants.

Rathay's disease (Corynebacterium rathayi) of orchard grass was found in Quebec; this is the first record of this disease in Canada.

Bacterial ring rot (Corynebacterium sepedonicum) of potato was again second only to leaf roll as a cause of rejection for certification, and was the leading cause in Sask., Man., Ont., and Que. It is still not general in B.C., where nearly all outbreaks have been due to planting imported table stock, which is now being carefully inspected. Both acreage and intensity of infection were again reduced in Alta. as a result of continued campaigning among table-stock producers; but importation and planting of infected table-stock has caused some spread. Ring rot was increasingly serious in fields entered for certification, and probably in table-stock, in Sask., Man., Ont., Que. and N.B. A comprehensive survey in N.S. revealed the disease in a total of 24 plantings, mostly small fields or garden plots, but none was found in the main seed-producing areas. Most cases were traced to the planting of table-stock or of condemned potatoes consigned to a starch factory. In P.E.I. ring rot was found in a total of 27 fields in three areas.

Late blight (Phytophthora infestans) increased in B.C., but there was little rot in sprayed or dusted crops. It caused little damage elsewhere except in N.S. and P.E.I. where considerable loss occurred in imperfectly sprayed crops. It was reported in Sask. for the first time.

Stemphylium leaf spot (S. consortiale (Thüm.) Groves & Skolko) was reported from B.C. as general but usually light; this is the first record of this organism as a potato parasite.

Leaf roll (virus) infection in B.C. was half that of 1945, and intensity was low in Alta. although the disease was widespread. Little leaf roll occurred in Man. and northwestern Ont., but increases occurred in Sask., central Ont., Que., N.S. and P.E.I. The situation was unchanged in N.B. Leaf roll is still the leading cause of rejection for certification. Mosaic (virus) was widespread but of reduced intensity in B.C., and little occurred in the prairie provinces and Ont. Little change occurred in N.B., but it increased in Que., N.S. and P.E.I. Witches' Broom (virus) was the principal disease in seed crops of White Rose and Netted Gem in the Cariboo district, B.C. A few fields in Alta. showed a trace of this disease.

A few observations on diseases of other vegetable crops are worthy of inclusion. Anthracnose (Colletotrichum Lindemuthianum) of bean was very severe in southwestern Ont. Powdery mildew (Erysiphe Polygoni) of bean, previously reported from Quebec only, caused appreciable damage in southwestern Ont. Halo blight (Pseudomonas medicaginis var. phaseolicola) and bacterial blight (Xanthomonas Phaseoli) were severe in B.C., Sask., southwestern Ont. and parts of Que., and the former was also important in central Alta. Yellows (Callistephus virus 1) was widespread on carrots in most provinces and was severe in many fields in P.E.I. Wilt (Mycosphaerella citrullina), previously known from Alta., occurred on cucumber in Ont. Yellow Dwarf (Allium virus 1) occurred on onion near Grand Forks, B.C., and on shallot in N.S. Mycosphaerella blight (M. pinodes) has become heavily

established in the principal pea-growing areas of Sask. Blue mould (Peronospora tabacina) was again epidemic on tobacco in Ont. Leaf Mould (Cladosporium fulvum) was heavy on V121 in greenhouses in Ont.; traces of infection were seen on V473. Late blight (Phytophthora infestans) was very heavy on tomato in parts of southern Ont., especially in fields planted with southern-grown stock. Black leg (Phoma lingam) heavily damaged stored turnips in several regions; but black rot (Xanthomonas campestris) caused little damage in Ont., apparently because of the adoption of seed treatment.

Among the diseases of fruits the following may be mentioned. Apple scab (Venturia inaequalis) was heavy on poorly sprayed trees but of slight importance in well-managed orchards in eastern Canada. Coryneum blight (Clasterosporium carpophilum) was severe in south-eastern B.C. on apricot and peach. Black knot (Dibotryon morbosum) was seen on apricot in B.C. Grey mould (Botrytis cinerea) and brown rot (Sclerotinia fructicola) were severe on sweet cherries in south-eastern B.C., owing to wet weather when the fruit was ripening. What seems to be a virulent strain of Lambert mottle (virus) was seen on Lambert cherries in B.C. Little cherry (virus) has spread into all important parts of the Kootenay district, B.C. Spur blight (Didymella applanata) was destructive in many raspberry plantations in Ont. Strawberry red stele (Phytophthora Fragariae) caused extensive losses in coastal B.C.

Interesting records for trees and shrubs include the following: Canker (Nectria galligena) was severe on a few trees of Betula papyrifera in Que. Crown rot (Fusarium Solani) caused heavy losses of Caragana in Sask. Anthracnose (Gloeosporium aridum) on ash in Ont., needle cast (Lophodermium juniperinum) and twig blight (Phomopsis juniperovora) on junipers in Ont., canker (Pseudomonas mori) on mulberry in Ont., leaf spot (Cylindrosporium Dearnessii) on Ostrya in Ont. and Que., canker (Dothichiza populea) on poplar in Ont., canker (Phomopsis lokoyae) on Douglas fir in B.C., anthracnose (Gnomonia veneta) on oak in Ont. and Que., and leaf spot (Mycosphaerella (Phleospora) Ulmi) in Que. all deserve mention. Many additional trees affected by Dutch elm disease (Ceratostomella Ulmi) have been found in Que., and eradication is being confined to the periphery of the area in the hope of limiting the outbreak.

Among the more serious diseases of ornamental plants scab (Pseudomonas marginata), core rot (Sclerotinia Draytoni), dry rot (Sclerotinia Gladioli), hard rot (Septoria Gladioli) and bacterial blight (Xanthomonas gummisudans) were destructive to gladioli in various areas, and fire (Botrytis Tulipae) of tulip was unusually heavy in B.C. and Que. Interesting records include: Puccinia Ptarmicae on Achillea Ptarmica in Que., Xanthomonas begoniae on Begonia in Ont., Coleosporium Campanulae and Puccinia Campanulae on Campanula rotundifolia in Que., Alternaria dianthicola on Dianthus in Ont. and Que., Phyllosticta Digitalis on Digitalis in P.E.I., and Peronospora Trifoliorum on Lupinus in B.C.

Maladies nouvelles ou d'importance notable

R.O. Lachance

Au Manitoba la rouille de la tige du blé (Puccinia graminis) ne s'est manifestée sur aucune des variétés résistantes. L'infection primaire s'est produite très tard dans les provinces des Prairies et même les variétés susceptibles n'ont été que légèrement atteintes. La rouille de la tige de l'avoine a diminué substantiellement les rendements dans les semis tardifs des variétés Vanguard, Exeter et Ajax au Manitoba, à cause de la prédominance des races qui attaquent ces variétés. Les races 8, 10 et 11 de P. graminis var Avenae, qui sont capables d'attaquer des variétés, sont devenues de plus en plus répandues au Manitoba et en Ontario. On a eu d'autres preuves de l'importance de l'épine-vinette comme foyer d'infections locales et comme source des races virulentes de P. graminis var Tritici et de P. graminis var Avenae.

La rouille des feuilles du blé (P. triticina) devint abondante tout juste avant la récolte mais trop tard pour causer des dommages graves. Un fait particulier à cette année fut la présence généralisée et en abondance de biotypes des diverses races de cette rouille, capables d'attaquer le Renown, le Regent, le Redman et d'autres variétés de ce type. Ces biotypes virulents sont particulièrement abondants en Saskatchewan, au Manitoba et dans le nord-ouest de l'Ontario où les blés résistants à la rouille de la tige sont très en honneur. Ailleurs, ces mêmes variétés ont montré beaucoup de résistance à la rouille des feuilles.

La rouille couronnée (P. coronata) est apparue trop tard dans les provinces des Prairies pour causer des dommages appréciables. Dans l'Est du Canada, il appert que la présence du nerprun a multiplié les races 2 et 3; ces races forment des téliospores en abondance et bénéficient conséquemment de la présence de l'hôte complémentaire.

Les estimations de la pourriture commune des racines (Helminthosporium sativum et Fusarium spp.) du blé furent appréciablement plus élevés qu'en 1945 en Saskatchewan. Cette différence est due dans une bonne mesure, à ce que l'effet de la sécheresse qui a sévi dans certaines régions a accentué les dommages déjà graves causés par la maladie elle-même.

La pourriture hivernale du collet (basidiomycete croissant à basse température) de la luzerne s'est avérée très destructive dans la partie ouest du centre de l'Alberta et est devenue abondante en Saskatchewan. La flétrissure bactérienne (Corynebacterium insidiosum) de la luzerne fut grave dans les sections irriguées du sud de l'Alberta; on l'a observée pour la première fois en Saskatchewan, d'abord dans le district de White Fox et plus tard dans les districts irrigués du sud-ouest où elle était abondante.

Les maladies du feuillage du lin ne furent que légères en Saskatchewan; par contre, la pourriture rhizoctonienne des plantules (Rhizoctonia Solani, etc.) fut plus abondante que d'habitude. La brûlure coniothyrienne des plantules (Coniothyrium olivaceum Bonard.) et la pourriture des branches (Selenophoma linicola Vanterpool) observées en Saskatchewan ont été décrites

récemment. Le pasmo (Septoria linicola) fut observé pour la première fois en Saskatchewan, tandis qu'il fut très abondant au Manitoba.

Le mildiou (Peronospora manshurica) de la fève soya fut général dans le sud-ouest de l'Ontario. On a démontré que l'infection des plants provenant de graine infectée est systémique.

La maladie du Rathay (Corynebacterium rathayi) du dactyle pelotonné fut observée dans Québec; c'est la première mention de cette maladie au Canada.

La pourriture bactérienne du cerne (Corynebacterium sepedonicum) de la pomme de terre fut encore la deuxième cause en importance, après l'enroulement des feuilles, du refus de certification; elle fut la principale cause en Saskatchewan, au Manitoba, en Ontario et dans Québec. Cette maladie n'est pas encore généralisée dans la Colombie Britannique, où presque toutes les épidémies locales résultèrent de la plantation de pommes de terre importées pour la consommation. Ces importations subissent maintenant une inspection minutieuse. En Alberta, l'étendue de même que l'intensité de l'infection ont baissé grâce à une campagne d'éducation poursuivie auprès des producteurs de pommes de terre de consommation; toutefois l'importation et la plantation de pommes de terre de consommation ont contribué à la disséminer quelque peu. La pourriture bactériemne du cerne fut encore plus grave en Saskatchewan, au Manitoba, en Ontario, dans Québec et au Nouveau-Brunswick dans les champs éligibles à la certification et très probablement dans les champs de pommes de terre de consommation. Une enquête détaillée faite en Nouvelle-Ecosse a révélé la présence de cette maladie dans 24 champs, pour la plupart petits ou de simples parcelles dans des jardins, mais aucun cas n'a été décelé dans la principale région de production de semence. Dans la majorité des cas la source de l'infection a pu être retracée et attribuée à de la patate de consommation ou à des lots condamnés et destinés aux manufactures d'amidon. Dans l'Ile du Prince Edouard, la pourriture bactérienne du cerne fut décelée dans 27 champs distribués dans trois districts.

Le mildiou (Phytophthora infestans) a accusé une augmentation en Colombie Britannique mais il n'y eut que peu de pourriture des tubercules dans les champs arrosés ou poudrés. Cette maladie n'a fait que peu de dégats ailleurs, sauf en Nouvelle-Ecosse et dans l'Ile du Prince Edouard, où, dans les champs mal arrosés, les pertes ont été considérables. On l'a observée en Saskatchewan pour la première fois.

La tache stemphylienne des feuilles (Stemphylium consortiale (Thüm.) Groves & Skolko), fut rapportée comme générale mais ordinairement légère en Colombie Britannique; ceci constitue la première mention à l'effet que ce champignon est un parasite de la pomme de terre.

Le pourcentage d'infection par le virus de l'enroulement des feuilles ne fut que la moitié de celui de 1945 en Colombie Britannique, tandis qu'en Alberta il était faible bien que la maladie fut très répandue. Il n'y eut que peu d'enroulement au Manitoba et dans le nord-ouest de l'Ontario; par contre, il y eut une augmentation en Saskatchewan, dans le centre de l'Ontario, le Québec, la Nouvelle-Ecosse et l'Ile du Prince

Edouard. La situation n'a pas changé au Nouveau-Brunswick, où l'enroulement est la principale cause du déclassement des champs éligibles à la certification. La mosaïque (virus) était très commune mais d'intensité réduite en Colombie Britannique et il n'y en eut que très peu dans les provinces des Prairies et l'Ontario. La situation est restée stationnaire au Nouveau-Brunswick, mais on a enrégistré une augmentation dans Québec, en Nouvelle-Ecosse, et dans l'Ile du Prince Edouard. Le balais de sorcière (virus) fut la principale maladie des semences de White Rose et Netted Gem dans le district de Cariboo en Colombie Britannique. Des traces furent observées dans quelques champs en Alberta.

Quelques observations sur les maladies d'autres légumes méritent d'être soulignées. L'anthracnose (Colletotrichum Lindemuthianum) des haricots fut très grave dans le sud-ouest de l'Ontario. Le blanc (Erysiphe Polygoni) des haricots, qui jusqu'ici n'avait été observé que dans Québec, a causé des dommages appréciables dans le sud-ouest de l'Ontario. La tache bactérienne (Pseudomonas medicaginis var phaseolicola) et la graisse (Xanthomonas phaseoli) furent graves en Colombie Britannique, en Saskatchewan, dans le sud-ouest de l'Ontario et dans certaines régions du Québec, tandis que la première fut importante dans le centre de l'Alberta. La jaunisse (Callistephus virus 1) fut générale dans les champs de carottes, dans la plupart des provinces, mais particulièrement graves dans plusieurs champs dans l'Ile du Prince Edouard. La flétrissure mycosphaérelléenne (Mycosphaerella citrullina) du concombre, qui est connue en Alberta, est apparue en Ontario. La jaunisse naine (Allium virus 1) fut observée sur l'oignon près de Grand Forks en Colombie Britannique et sur les échalottes en Nouvelle-Ecosse. L'ascochytose (Mycosphaerella pinodes) est définitivement établie dans la principale région de production de pois en Saskatchewan. Le mildiou (Peronospora tabacina) du tabac a de nouveau pris une allure épidémique en Ontario. La fumagine ou moisissure grise (Cladosporium fulvum) de la tomate attaqua gravement la V121 dans les serres en Ontario, tandis que des traces ont été observées sur la V473. Le mildiou (Phytophthora infestans) de la tomate fut très grave dans certaines régions du sud de l'Ontario, particulièrement dans les champs où l'on a utilisé des plants produits plus au sud. Le pied noir (Phoma lingam) a causé des pertes appréciables aux choux-navets dans les caveaux dans plusieurs régions, tandis que la nervation noire (Xanthomonas campestris) n'a causé que peu de dommages en Ontario, apparemment parce qu'on a pratiqué la désinfection de la semence.

Parmi les maladies des fruits, on peut mentionner les suivantes: La tavelure (Venturia inaequalis) fut grave sur les arbres mal arrosés, mais négligeable dans les vergers bien entretenus dans l'Est du Canada. La brûlure clastérosporienne (Clasterosporium carpophilum) fut grave et sur l'abricotier et sur le pêcher dans le sud-est de la Colombie Britannique. Le nodule noir (Dibotryon morbosum) fut observé sur l'arbricotier en Colombie Britannique. La moisissure grise (Botrytis cinerea) et la pourriture brune (Sclerotinia fructicola) affectèrent gravement les cerises sucrées au temps de la maturité alors que le climat fut très humide dans le sud-est de la Colombie Britannique. On a observé sur les cerises Lambert

en Colombie Britannique ce que l'on croit être une lignée virulente du virus de la marbrure Lambert. La petite cerise (virus) s'est disséminée dans toutes les parties importantes du district de Kootenay en Colombie Britannique. La brûlure des dards (Didymella applanata) a causé de graves dommages à plusieurs plantations de framboisiers en Ontario. Le stèle rouge (Phytophthora Fragariae) du fraisier a causé des pertes considérables dans la région côtière de la Colombie Britannique.

Les observations d'intérêt particulier sur les arbres et arbrisseaux sont nombreuses. Le chancre européen (Nectria galligena) fut grave sur quelques Betula papyrifera dans Québec. La pourriture du collet (Fusarium Solani) a été la cause de la mort de plusieurs Caragana en Saskatchewan. On a également observé l'anthracnose (Gloeosporium aridum) du frêne en Ontario, la chute des aiguilles (Lophodermium juniperinum) et la brûlure des brindilles (Phomopsis juniperovora) du génévrier en Ontario, le chancre bactérien (Pseudomonas mori) du mûrier en Ontario, la tache des feuilles (Cylindrosporium Desmessii) de l'Ostrya en Ontario et Québec, le chancre (Dothichiza populea) du peuplier en Ontario, le chancre (Phomopsis lokoyae) du sapin de Douglas (pin de Colombie) en Colombie Britannique, l'anthracnose (Gnomonia veneta) du chêne en Ontario et dans Québec, et la tache des feuilles (Mycosphaerella (Phleospora) Ulmi) de l'orme dans Québec. Le nombre d'ormes atteints de la maladie Hollandaise (Ceratostomella Ulmi) dans le Québec continue d'augmenter, et l'éradication des arbres malades est confinée à la périphérie de la zone infestée avec l'espoir de limiter la dissémination de cette maladie.

Au nombre des maladies les plus graves des plantes ornementales, on a remarqué les suivantes: sur les glaïeuls, la gale (Pseudomonas marginata) la pourriture du coeur (Sclerotinia Draytoni) la pourriture sèche (Sclerotinia Gladioli) la pourriture dure (Septoria Gladioli) et la brûlure bactérienne (Xanthomonas gummisudans). Sur les tulipes, la moisissure grise (Botrytis Tulipae) fut particulièrement grave en Colombie Britannique et dans Québec. Voici quelques autres observations intéressantes: Puccinia Ptarmicae sur Achillea Ptarmica dans Québec, Xanthomonas begoniae sur Begonia en Ontario, Coleosporium Campanulae et Puccinia Campanulae sur Campanula rotundifolia dans Québec, Alternaria dianthicola sur Dianthus en Ontario et dans Québec, Phyllosticta digitalis sur Digitalis dans l'Ile du Prince Edouard, et Peronospora Trifoliorum sur Lupinus en Colombie Britannique.

In the Niagara Peninsula, Ont., heavy fall rains contributed to high winter mortality of young peach and cherry trees. Loss of trees through crown injury was extensive in poorly drained soils. Otherwise the winter of 1945-46 was favourable for orchard fruits. The minimum temperature of -5°F. occurred in December.

Orchard dormant sprays were generally applied during the week of March 18. Excellent conditions prevailed and growers were able to apply these sprays to good effect. Spring development of the trees was slightly in advance of average. The bloom period for sweet cherries, from April 22 to May 4, was fair and moderately cool and no loss from blossom blight occurred; light frosts on April 27-28 caused some browning of the petals, but did not affect the set or development of the fruit.

Sour cherries, peaches, plums and pears were in bloom April 28 to May 11. Frost damage was more extensive on sour than on sweet cherries, affecting the set and causing some pitting and malformation especially on Richmond. Stem rot of sour cherries and plums was negligible, a small percentage developing after rain and high humidity on May 11.

Mature ascospores of Venturia inaequalis were found on April 9, and a light discharge occurred on April 15. The first potential infection period was during the prolonged rain of May 4 when apple bloom was at the full pink stage. The foliage was continually wet for 16 hours but low temperatures of 46-48°F. did not favour scab development. Heavy ascospore discharges, of no importance because of unfavourable moisture relations, occurred on several occasions during bloom. On May 15-16, almost continuous rain for 20 hours, with moderate temperatures of 60-62°F., allowed abundant infection, which was apparent ten days later. Secondary infections developed freely in June, foliage scab increasing as much as 62% on unsprayed trees and many leaves being completely overrun. Infection of the fruit was conspicuous at this time especially around the calyx end, which suggested that it occurred during the infection period of May 15-16 before the protective calyx spray was applied. Considerable mid and late season pin-point infection developed on the fruit.

Leaf spot of sour cherries was of very little importance until late in the season when a moderate infection hastened leaf fall.

Late blight of tomatoes developed rapidly and caused severe losses in many plantings during a few days of humid weather in the latter part of August. In some plantings the crop was a total loss. Most severe losses occurred in fields set with southern grown plants. Drier conditions in September checked the spread of the disease.

Generally fair weather during peach harvest kept losses due to brown rot at a minimum (G.C. Chamberlain).

At Ottawa, Ont., there was permanent snow cover from Nov. 15, but the depth of snow was never more than about 15 in. December was bright and cold with little snow; January was close to average in mean temperature, but was otherwise normal. The ground cleared quickly in March, temperatures being high almost every day from Mar. 13 when the ground became largely uncovered; a maximum of 78°F. was recorded on Mar. 28, and the mean temperature for the month was 12° above average. The first and last weeks of April were cool and wet, and the first three weeks of May were cool. Consequently the early gain in growth of vegetation was lost, much as in 1945, as the phenological data show. However, there was little damage from late frosts, the most severe being 27°F. on May 3, and planting was not as seriously delayed as in 1945.

A heavy storm gave 3 in. of rain on June 17, but otherwise June and July were close to the average in all respects. Late June and mid July were warm and dry, but there was no serious drought. August was cool, cloudy and wet, encouraging many foliage diseases, but spells of warm, dry weather in mid September and early October aided harvesting of late crops. From Oct. 10 onward the fall was decidedly wet (D.B.O. Savile).

The main features of the weather in Quebec in 1946 were a rainy and cold spring, a dry and cool summer, and a dry, mild, sunny fall. These conditions resulted in a very low incidence of diseases in most crops. Seeding was considerably delayed, but the crops matured normally on account of the open fall. The first killing frost occurred Oct. 8. Cereal rusts were virtually absent in some districts and developed late in all others.

Late blight of potatoes was absent in the province except in the Lake St. John district and South Gaspe Co. On tomatoes late blight appeared very late and the infection was slight throughout the province.

Apple scab was easily controlled at Ste. Anne de la Pocatiere and no ascospore discharge was observed during the whole season in spite of the abundance of perithecia on the leaves (R.O. Lachance).

The summer and early fall were very dry in N.B.; consequently many of the common plant diseases were not observed (S.F. Clarkson).

The spring opened in N.S. with very moist soil, and planting was somewhat delayed on heavy land. April precipitation was above normal; that of May a little below normal. The last ten days of May, and June and July were dry with a total of 4.25 in. in place of a normal of about 7 in. for the period. Crops suffered from drought during July and wilting was apparent even in some apple orchards on light soils. Boron deficient soils caused symptoms to be produced on apples and some root crops. The balance of the season was reasonably favourable for crop production.

Late growth in potato vines created a demand for vine-killing chemicals. No injury or tuber blemish was observed from their use (J.F. Hockey).

Phenological Data - 1946

The data in the main table were compiled by M.W. Cormack at Edmonton, R.C. Russell at Saskatoon, and B. Peturson at Winnipeg. The second column under each locality shows the departure from average in days.

The season opened very early at Saskatoon and Winnipeg, but by the end of May frosts and cool weather had reduced development to about the average. At Edmonton, the spring opened somewhat early but lagged slightly in mid May. Several spring frosts injured blossom buds and leaves at Winnipeg, and to a lesser extent at Saskatoon; consequently records were not available for some regularly observed species (R.C. Russell).

Cereal rusts were first observed in Man. as follows:

Puccinia triticina	23/6
P. coronata	18/7
P. graminis Tritici	15/7
P. graminis Avenae	18/7
P. Hordei	18/7

(B. Peturson).

Anthesis dates at Ottawa, with number of days departure from average, for 9 plants from the main list were as follows:

Populus tremuloides	29/3	16E	Anemone canadensis	8/6	4L
Acer Negundo	21/4	4E	Bromus inermis	19/6	1L
Viola canadensis	2/5	1L	Phleum pratense	28/6	3L
Prunus pennsylvanica	17/5	6L	Solidago canadensis	6/8	10L
Smilacina stellata	20/5	2L			

Anthesis dates for marker trees at Ottawa compared with previous years:

	10-yr. average	1944	1945	1946
Acer saccharinum	14/4	17/4	25/3	21/3
Ulmus americana	27/4	30/4	3/4	7/4
Acer saccharum	8/5	6/5	14/4	8/5
Pinus sylvestris	27/5	24/5	27/5	1/6

The flowering season at Ottawa opened about 24 days ahead of average. This advance was gradually lost, however, and the season was close to the average by 1 May; it was several days behind average during most of May and a lag of 5-10 days persisted through June and most of July (W.H. Minshall).

SUMMARY OF PHENOLOGICAL DATA TAKEN AT WINNIPEG, SASKATOON, AND EDMONTON, IN 1945

		Winnipeg		Saskatoon		Edmonton	
Pulsatilla Ludoviciana		9/4	?	5/4	10E	---	---
Populus tremuloides		14/4	11E	10/4	12E	18/4	4E
Phlox Hoodii		---	---	18/4	9E	---	---
Salix petiolaris		---	---	21/4		---	---
Acer Negundo		23/4	12E	28/4	8E	26/4	4E
Thermopsis rhombifolia		---	---	28/4	12E	---	---
Betula papyrifera		---	---	30/4	10E	30/4	7E
Prunus americana		1/5	11E	---	---	---	---
Amelanchier alnifolia		4/5	11E	5/5	8E	15/5	1L
Heirochloë odorata		28/5	7L	10/5	6E	---	---
Prunus pennsylvanica		---	---	16/5	4E	18/5	2L
Viola canadensis		---	---	14/5	2E	20/5	1L
Smilacina stellata		buds frozen		15/5	8E	26/5	1L
Prunus sp. (chokecherry)		23/5	3E	24/5	2E	24/5	1E
Crataegus sp. (hawthorn)		25/5	N	24/5	3E	26/5	3E
Svida sp. (dogwood)		buds frozen		29/5	N	2/6	2L
Lonicera glaucescens		---	---	1/6	5E	6/6	2E
Elaeagnus commutata		---	---	5/6	2L	---	---
Viburnum Lentago		29/5	6E	---	---	---	---
Achillea lanulosa		---	---	5/6	4E	23/6	2E
Anemone canadensis		3/6	3E	8/6	1E	19/6	1L
Viburnum pubescens		5/6	3E	---	---	---	---
Diholcos bisulcatus		---	---	8/6	2E	---	---
Galium boreale		---	---	10/6	2E	16/6	N
Viburnum trilobum		buds frozen		---	---	8/6	N
Rosa alcea		---	---	10/6	7E	---	---
Bromus inermis		19/6	2E	18/6	6E	30/6	4L
Gaillardia aristata		---	---	21/6	1E	---	---
Campanula petiolata		---	---	25/6	3L	---	---
Agrimonia striata		---	---	---	---	---	---
Symphoricarpos occidentalis		25/6	1E	2/7	4E	4/7	1L
Spiraea alba		---	---	2/7	1L	---	---
Chrysopsis hirsutissima		---	---	4/7	4L	---	---
Psoralidium argophyllum		---	---	8/7	1E	---	---
Lactuca pulchella		---	---	8/7	2E	12/7	2E
Phleum pratense		---	---	---	---	9/7	3L
Chamaenerion spicatum		---	---	---	---	9/7	N
Agastache anethiodora		---	---	---	---	10/7	1E
Solidago canadensis		---	---	---	---	16/7	1E
Solidago missouriensis		---	---	15/7	1L	---	---
Grindelia perennis		---	---	1/8	8L	---	---
Oligoneuron canescens		---	---	28/7	4L	---	---
Aster crassulus		---	---	28/7	N	---	---
Aster laevis		---	---	3/8	6L	28/7	3E
Thatcher Wheat:	Sown	12/4	11E	10/4	15E	29/4	3L
	Emerged	24/4	10E	30/4	11E	13/5	5L
	Headed	24/6	3E	26/6	4E	25/6	6E
	Harvested	12/8	8L	6/8	N	14/8	N

I. DISEASES OF CEREAL CROPS

WHEAT

ERGOT (Claviceps purpurea). A trace was recorded in one field out of 103 examined in Alta. (M.W.C.).

POWDERY MILDEW (Erysiphe graminis). Infection ranged from a trace to severe in the plots at Edmonton, Lethbridge and Olds, Alta. (M.W.C.). It was severe on Regent in the variety plots, Nappan, N.S. (R.J. Baylis). Powdery mildew was moderate on winter wheat about Guelph, Ont., and was moderate to severe on Dawson's Golden Chaff at the Ont. Agr. College (J.D. MacLachlan). In the rust nursery material (q.v.) a moderate infection was recorded for Agassiz, B.C.

HEAD BLIGHT (Fusarium spp.) was very slight in winter wheat at Guelph, Ont. (J.D. MacLachlan).

LEAF BLOTCH and HEAD BLIGHT (Helminthosporium sativum) was observed in the plots of the Illustration Station, Vanderhoof, B.C. (G.E. Woolliams).

COMMON ROOT ROT (Helminthosporium sativum and Fusarium spp.). Damage was a trace in 17 fields, slight in 30, moderate in 14 and severe in 4 out of 103 examined in Alta. (M.W.C.). In winter wheat, the damage was a trace in 11 fields, slight in 2, moderate in 2 and severe in 5 out of 41 examined in southern Alta. in late July. Seedlings collected from several fields of winter wheat in late October showed lesions on the culms, crowns, sub-crown internodes, and secondary and primary roots, the lesioning varying with the field. The principal pathogens isolated were Helminthosporium and Fusarium spp. On the other hand, Ophiobolus graminis constituted 25% of the isolates obtained from the crowns of diseased mature winter wheat plants collected in late July (L.E. Tyner).

Of the 226 fields of wheat sampled on or after July 28 in Sask., all had common root rot present in varying amounts. Disease ratings based on about 100 plants from each field ranged from 2 to 32 on a scale having 40 as the maximum. The mean rating for all fields was 10.68 with a standard deviation of 5.36. This mean exceeds the 1945 mean of 9.3 and the increase is statistically significant to the 1% point. The increase in 1946 is mainly the result of a greater proportion of high disease ratings in crop districts 3 and 4, where crops have been light for the second and third year respectively. In these two crop districts, the disease ratings appear to have been cumulatively larger as the result of successive dry years. The first estimates of yields of wheat in bu. per acre for districts 1 to 9 were respectively 18.5, 19.2, 9.9, 8.7, 21.7, 12.8, 14.3, 20.4 and 12.6; the corresponding common root-rot ratings were 7.8, 6.6, 13.6, 16.7, 8.7, 10.4, 9.7, 8.5, and 7.7. A notable feature in several districts this year was the unusual degree of lesioning of the stems above ground level, particularly in the region of the first, second, and third nodes above the crowns. Common root rot together with drought appeared to be an important factor in causing a marked reduction in yields and grades in an area with a radius of 5 to 15 miles around Hawarden. Many fields were decidedly patchy in appearance as well as in yield and grade of grain (B.J. Sallans).

TAKE ALL (Ophiobolus graminis) affected scattered plants in a field of Jones Fife in the East Kootenay district, B.C., examined on July 20 (M.F. Welsh). Damage was a trace in 1 field, slight in 9, moderate in 3 and severe in 1, at Innisfail, out of 103 examined in Alta. (M.W.C.). In winter wheat damage was a trace in 6 fields, slight in 5, moderate in 3, and severe in 10 out of 41 examined in southern Alta. in late July (L.E. Tyner). Take all also caused severe damage in 2 fields of winter wheat seeded after spring wheat at Red Deer (G.B. Sanford). The disease affected scattered plants in 7 fields in the east and southeast parts of Sask. out of 196 examined (H.W.M.). Take all was less prevalent than in 1945 on winter wheat about Guelph, Ont.; a few centres were observed in plots of Dawson's Golden Chaff (J.D. MacLachlan).

STRIPE RUST (Puccinia glumarum) was prevalent on Kharkov winter wheat in the Creston area, B.C., in early July (W.R. Foster). A moderate infection was recorded in a field of Jones Fife in the East Kootenay (M.F. Welsh).

STEM RUST (Puccinia graminis) did not appear until late in the season in Alta. and was still difficult to find in most fields, even of susceptible varieties, in late August. Infection was a trace in 18 fields, slight in 14 and moderate in 3 out of 103 examined (M.W.C.). Only a trace was recorded in 5 fields in the Kamsack area and one near Leader, Sask. Rust was common, however, on second growth and on late crops. A trace infection was observed on June 10 at the University of Sask., Saskatoon, but it is probable that it was the result of spread from nearby artificially inoculated plots (H.W.M.).

Initial infections of stem rust appeared in the field in Man. considerably later than normal. The first infections were observed as occasional pustules on barley at St. Norbert on July 18 and wheat was found infected at Morden on July 20. Stem rust was not observed on any of the stem-rust resistant varieties. However, a 15% infection developed on Marquis and Little Club at Morden and Brandon (B. Peturson). A slight infection was present in a block of Dawson's Golden Chaff (Elite) at O.A.C., Guelph, Ont. (J.D. MacLachlan). Stem rust infections of 25 to 50% were recorded on Garnet and traces to 25% on Huron at harvest time in plots at 6 places in P.E.I. (B. McLaren).

LEAF RUST (Puccinia triticina) was first seen at Edmonton, Alta., on July 18. By mid-August it was prevalent through central Alta. and quite severe in some fields at harvest. However, in southern Alta. leaf rust was only a trace to slight (M.W.C.). Leaf rust was very common in Sask. and was severe in many fields in the eastern half of the province (H.W.M.).

Leaf rust of wheat made its appearance in Man. a few days later than normal. The first infections were observed at Morden on June 23 and at Winnipeg on June 27. Owing to sub-normal rainfall during much of July, rust development was rather slow. However, by July 10 traces of leaf rust had appeared throughout the agricultural area south of the Riding Mountains. By July 18 the infection was quite general and averaged about 4%. Towards the end of July, a week or so before harvesting became general, infection

on Thatcher wheat averaged about 75% and that on Regent 55-60%. Leaf rust caused only light damage apparently due to the fact that grain crops had reached quite an advanced stage before infection became heavy. In controlled experiments at Winnipeg, naturally induced leaf rust infection reduced the yield of Thatcher by about 6%, and its bushel weight by about 0.75 lb. Leaf rust occurred on durum wheat throughout the province but only in trace amounts and caused no appreciable damage (B. Peturson).

Leaf rust was severe in a block of Dawson's Golden Chaff (Elite) at O.A.C., Guelph, Ont. (J.D. MacLachlan).

A trace of leaf rust was found on Coronation II at Aylesford, N.S. (J.F. Hockey) and a 65% infection in a field in Queens Co., P.E.I. (B. McLaren).

BROWNING ROOT ROT (Pythium spp.). Although soil moisture conditions were apparently favourable no browning root rot was found in 15 fields examined in east-central Alta. on June 10 (C.B. Sanford). Browning root rot was generally light and inconspicuous in Sask. when the annual survey was made in June. Some moderate patches were observed between White Fox and Meath Park, south of Prince Albert, south of Melfrot, around Domremy and Hoey and south of Wilkie. Soil moisture was deficient and consequently crown-root development was delayed or inhibited; thus there was a lack of conspicuous lesioning on the roots (T.C. Vanterpool).

SPECKLED LEAF BLOTCH (Septoria spp.) was much less prevalent than usual in Alta. Infection was slight in 11 fields and moderate in 3 out of 103 examined (M.W.C.). A scattered light infection was observed in south-east Sask.; the disease was common and infection was slight to moderate in the northeast. Leaf injury was severe at Aylsham (H.W.M.). Neither Septoria nodorum nor S. Avenae was found in Man., but the long-spored organism with spores similar to those of S. Avenae was common on wheat as in several previous years. Infection, however, was much lighter than in 1945 and damage was probably negligible (T. Johnson). Additional records are contained in the survey of nursery material (q.v.).

SPECKLED LEAF BLOTCH (Septoria Tritici) slightly affected mostly the lower leaves of a block of Dawson's Golden Chaff at O.A.C., Guelph, Ont. (J.D. MacLachlan).

BUNT (Tilletia caries and T. foetida). In Table 1 are summarized the records of inspections of the Western Inspection Division at Winnipeg for the crop year 1945-46 and for the first quarter of 1946-47. (W. Popp).

Table 1. Wheat Bunt in Western Canada

Class of Wheat	Aug. 1, 1945 to July 31, 1946			Aug. 1 to Oct. 31, 1946		
	Cars Inspected	Cars Graded Smutty	Percentage Graded Smutty	Cars Inspected	Cars Graded Smutty	Percentage Graded Smutty
Hard Red Spring	164,405	418	0.25	57,731	228	0.38
Amber Durum	2,589	77	2.97	2,289	96	4.19
White Spring	51	1	1.96	53	0	0
Alberta Red Winter	1,106	19	1.72	1,043	68	6.52
Garnet	2,089	0	0	428	2	0.47
Mixed Wheat	109	2	1.83	27	2	7.41
All Classes	170,349	517	0.30	61,571	396	0.64

The figures for the whole grain year 1945-46 agree closely with those for the first quarter, Aug. 1 to Oct. 31, 1945. On the contrary the percentage of cars graded smutty Aug. 1 to Oct. 31, 1946, is over double the previous year. An increase occurred in the three main classes of wheat, particularly in Alberta Red Winter.

Bunt caused considerable loss in winter wheat in the Northern Okanagan district, B.C., from soil-borne infection. The varieties Ridit and Hussar, which remained resistant for many years, are now affected. It is hoped the new resistant varieties Wasatch, a hard red winter variety, and Orfed, a soft white winter variety, developed in the United States may prove satisfactory (W.R. Foster). Bunt was reported on Canus at Munson and Oyen, Alta. (A.W. Henry). No bunt was observed in any of the 41 fields of winter wheat examined during early August in southern Alta. (G.B. Sanford). Infection was a trace in 7 fields, slight in 3 and heavy in 3 in Sask. Bunt appeared to be less prevalent in the southwest corner, where it is usually most commonly found in this province (R.C. Russell).

In 1946, the Line Elevators Farm Service examined 9,271 farmers' seed samples for surface-borne smuts as part of its advisory service to farmers. When the seed was found to carry more than a minimum load of spores, seed treatment was recommended. The results are summarized in Table 2, which was supplied by Dr. F.J. Greaney, Director.

Table 2. Prevalence of Surface-borne Smut in Samples of Wheat, Oats, and Barley Seed from the 1945 Crop in Western Canada.

(Line Elevators Farm Service, Winnipeg, Man.)

Crop and Province	Number of Seed Samples Examined	Percentage of Samples Carrying Smut		
		No Smut (Clean)	Trace Only	More than Trace 1/
WHEAT				
Manitoba	191	48.2	45.5	6.3
Saskatchewan	4,853	51.6	39.0	9.4
Alberta	1,025	35.5	51.4	13.1
All Provinces	6,069	48.8	41.3	9.9
OATS				
Manitoba	26	-	61.5	38.5
Saskatchewan	1,066	9.2	46.6	44.2
Alberta	508	11.2	63.6	25.2
All Provinces	1,600	9.7	52.2	38.1
BARLEY				
Manitoba	95	-	33.7	66.3
Saskatchewan	793	4.0	31.2	64.8
Alberta	714	6.4	42.6	51.0
All Provinces	1,602	4.9	36.4	58.7

1/ Seed Treatment Recommended.

LOOSE SMUT (Ustilago Tritici). A trace was found in one field out of 103 examined in Alta. (M.W.C.); in 5 fields of common wheat out of 31 examined in Man.; in one field of durum wheat at Boissevain (W.L. Gordon); and in a block of Dawson's Golden Chaff at O.A.C., Guelph, Ont. (J.D. MacLachlan).

BACTERIAL BLACK CHAFF (Xanthomonas translucens ff. spp.) caused little damage in Man. in 1946. The most severe attack observed was at Vista, where 60% of the leaf area was destroyed in patches in a field of Thatcher (W.A.F. Hagborg).

BRITTLE DWARF. Observations on this disease of wheat in Sask. were summarized in P.D.S. 11:11. Since 1931 it has been reported from time to time. In 1946 affected plants of wheat and barley were observed scattered through the Laboratory plots, Saskatoon. Dr. A.P. Arnason, Dominion Entomological Laboratory, suggested that these plants had become affected by aphids from nearby badly infested plots of crested wheat grass. He also drew my attention to a similar trouble described on winter wheat (Parker, J.R. The western wheat aphis, Brachycolus tritici Gill. Jour. Econ. Ent. 9: 182-187. 1916). The outbreak there described was of considerable economic importance. Although the evidence suggests that the trouble is due to insect attack, the view was put forward during earlier observations that it might be caused by a virus. The serious nature of the outbreak on crested wheat grass, a widely grown forage crop in Western Canada, points to the necessity of both entomologists and plant pathologists studying its etiology (P.M. Simmonds).

FROST INJURY AT HEADING TIME. Frost occurred a few nights in July, particularly the nights of July 23 and 24 in districts east and northeast of Saskatoon, Sask. Temperatures around 28°F. for 2-3 hours were sufficiently low to form ice in shallow containers and to blacken potato crops. It is known that potatoes blacken if exposed to temperatures of 26°F. for one hour and presumably exposure to a slightly higher temperature for a longer time has the same effect. On the other hand, wheat in flower can withstand for short periods without noticeable injury temperatures lower than the critical temperature for potatoes. On July 27, a survey was undertaken with Mr. A. Blackstock, Supervisor of District Representatives for northeast Saskatchewan, to determine the extent of the injury. Frost injury to potatoes was watched for and where the damage appeared severe, cereal crops were examined closely. Enquiries were also made to facilitate location of damaged crops. In general, injury was sporadic in the area surveyed, although further to the north and west reports of severe damage were received. In most districts damage was confined to low areas. At Hendon, many of the heads were shrunken, bleached, or dull yellow in the low spots in a rolling field, whereas the wheat on the higher ground was uninjured. Injury had taken place in the early flowering stage. The yield was probably reduced 3-5%. Potato foliage was completely blackened. A field of oats believed injured was examined, but damage could not be established. At Nora severe damage to barley was seen: the heads were bleached almost white and were dry; the young kernels were distinctly discoloured, and much of the foliage of red-root pigweed and annual sow thistle was also frozen. Near Shipman, wheat was severely damaged; several acres on low land were killed. Wheat beyond the flowering stage was virtually uninjured and many barley fields nearing maturity escaped damage. Damage was estimated to be 15% in wheat and it was probably severe in some oat fields.

Severe reductions in yield and grade are usually the result of frost in August; damage was reported to have been heavy this year from frosts in late August in the northern districts (P.M. Simmonds).

OATS

ROOT ROT (Colletotrichum graminicola) caused a trace of damage in a field at Thorsby, Alta.; anthracnose on the above ground parts of the plants was not observed (M.W.C.).

COMMON ROOT ROT (Fusarium spp.). A trace of damage was found in 2 fields out of 41 examined in Alta. (M.W.C.). Infection was slight in 5 and moderate in 40 out of 46 fields sampled in Sask. (B.J. Sallans).

LEAF BLOTCH (Helminthosporium Avenae). Infection was slight in 20 fields and moderate in one out of 41 examined in Alta. (M.W.C.); slight on Alaska and moderate on Erban in seed blocks at O.A.C., Guelph, Ont. (J.D. MacLachlan). Infection was slight in 21 fields, moderate in 4 and severe in 1 out of 33 examined in July in the Montreal district, Que. In the Quebec Seed Board plots leaf blotch was usually a trace except at St. Prosper and Frampton. At the former place, infection was severe on Mabel, Beaver and Banner, and moderate on Ajax and two unnamed varieties (T. Simard). A slight infection was found at Stewiacke, N.S. (D. Creelman).

BLIGHT and ROOT ROT (Helminthosporium victoriae). A popular, illustrated account of this new blight and root rot of oats, as it occurs in Iowa, has been published by H.C. Murphy (That new oat disease. Iowa Farm Science 1(4): 3-5. Oct. 1946). The disease is destructive on varieties of oats carrying Victoria resistance to crown rust. The organism was named and described by Frances Meehan and H.C. Murphy in Science 104 (2705): 413-414. Nov. 1, 1946. The disease occurs in several other states including New York. Fruiting specimens were obtained through the kindness of Dr. John Niederhauser, Cornell University. The spores are more cylindrical than most graminicolous species of the Eu-Helminthosporium type, but germination is typically by a single polar germ tube at each end of the spore (I.L. Conners).

HALO BLIGHT (Pseudomonas coronafaciens). Infection was a trace in 2 fields in Alta., and trace to slight in the plots at Olds and Lethbridge (M.W.C.). A slight infection was recorded at Saskatoon, Sask. (R.C. Russell, W.A.F. Hagborg). A patchy infection, causing death of some plants, was reported on oats after summerfallow at Tisdale (T.C. Vanterpool). Halo blight was observed in 16 fields out of 18 examined in Man. The leaf area destroyed varied from a trace (8 fields) to 20% (2 fields); most of the fields were sown to varieties resistant to halo blight (W.A.F. Hagborg).

CROWN RUST (Puccinia coronata). A scattered light infection was observed in eastern Sask. (H.W.M.). In 1946, crown rust of oats was first observed in Man. in the Red River Valley on July 17. Although its development and spread were rather slow it was present in trace amounts throughout most of the agricultural area by the end of the first week in August. Generally this rust caused little or no damage, except in some very late fields where it attained an intensity of about 10% (B. Peturson). In seed blocks at O.A.C., Guelph, Ont., infection was slight to moderate on Alaska, trace to slight on Beaver and a trace on Erban (J.D. MacLachlan). In August, crown rust was slight in 4 fields, moderate in one and severe in one out of 7 examined in the Montreal district, Que. The source of infection in the severely infected field was a nearby buckthorn hedge (T. Simard). In some

places in the Quebec district, crown rust was very severe even on early varieties or on early-sown fields (D. Leblond). A 25% infection was recorded on Brighton in the plots, Queens Co., P.E.I. (B. McLaren).

STEM RUST (Puccinia graminis) did not develop until late in the season in Alta. and was very scarce. Infection was a trace in 6 fields and slight in 1 out of 41 examined. A heavy primary infection was found in the plots at Lacombe on Aug. 14 (M.W.C.). In Sask., infection was scattered and light on the main crop, but it was fairly abundant on late crops or ones with second growth (H.W.M.). The first occasional pustules of stem rust of oats in 1946 were observed on July 17, in the central part of the Red River Valley, Man. From that date rust increased gradually and by the beginning of August, about a week before the main oat crop ripened, infection had spread throughout the province and generally averaged from 1 to 10%. Early-sown oats apparently ripened before the rust increased appreciably and were reduced only slightly or not at all in yield. A small percentage of the oat crop ripened late and became quite heavily rusted. Some fields carried average infections in excess of 30% and suffered appreciable losses due to rust attack. The races that attack the new varieties Vanguard, Exeter, and Ajax, were very prevalent and late stands of these varieties suffered yield reductions (B. Peturson). A slight infection was found in an Alaska seed block, O.A.C., Guelph, Ont. (J.D. MacLachlan). A slight infection was present in 2 fields out of 7 examined in the Montreal district, Que. A few barberry bushes were seen at Vankleek Hill, Ont. and near Carillon, Que. Hundreds of bushes were found growing in pasture land in the Frelighsburg district; spread of rust from the bushes to nearby cereals was not established (T. Simard). Stem rust infection was severe on Mabel and Banner and moderate on Beaver and Ajax in the Q.S.B. plots at St. Prosper; generally it was a trace or absent (T. Simard). In the Quebec district, infection was late, but quite severe, on some late varieties or late-sown grain (D. Leblond).

A field of Ajax oats growing adjacent to barberry bushes was severely rusted at Upper Woodstock, N.B. Elsewhere the rust was nil (S.F. Clarkson). A 50% infection was recorded on Erban in plots at New Perth, P.E.I. (B. McLaren).

SPECKLED LEAF BLOTCH (Septoria Avenae). A trace was found in 3 fields in Alta. (M.W.C.). In July infection was moderate in 3 fields and slight in 13 out of 33 examined in the Montreal district, Que. (T. Simard). In the Q.S.B. plots infection was usually a trace, but slight to moderate infections were present in some, notably at East Broughton. In the Quebec area, infection was slight and appeared before leaf blotch (D. Leblond).

SMUTS (Loose Smut, Ustilago Avenae, and Covered Smut, U. Kolleri). Covered smut was found occasionally on Vanguard and Victory at Prince George and Houston, B.C. (G.E. Woolliams). Smut was a trace in 4 fields and slight in 2 out of 41 examined in Alta. (M.W.C.). Smut was recorded in 14 fields out of 54 examined in Sask. with an average infection of 1%. Fewer fields were infected than in 1945. Most of the smut appeared to be covered smut (R.C. Russell). A trace of smut was

recorded in 2 fields and an 8% infection in one out of 10 examined in Man. (W.L. Gordon). Smut was found in 2 fields out of 33 examined in July in the Montreal district, Que. (T. Simard). It was general but light in the Quebec area (D. Leblond).

BLAST (non-parasitic) was reported as follows: trace in 12 fields, 5% in 21, 10% in 3, and 20% in one out of 41 examined in Alta.; trace to slight in plots at Olds and Lethbridge (M.W.C.); present in most fields, causing slight damage in Sask. (H.W.M.); slight in 4 fields and moderate in one out of 33 examined in July in the Montreal district, Que. (T. Simard); trace to heavy in the Q.S.B. plots through Que. (D. Leblond).

BARLEY

ERGOT (Claviceps purpurea) was noted as follows: trace in Titan at Lacombe, Lethbridge, and Pincher Creek, Alta. (M.W.C.); light infection at Saskatoon, Sask.; affected heads received from Moosomin (H.W.M.); reported to be on the increase on smooth-awn barleys in Ont. (J.E. Howitt); a trace in 2 fields in the Montreal district, Que., and on two selections at the L'Assomption Station (T. Simard).

POWDERY MILDEW (Erysiphe graminis) was recorded in seed blocks at O.A.C., Guelph, Ont. as follows: moderate on Wong, moderate to severe on Galore, severe on Barboff and very severe on O.A.C. 21 (J.D. MacLachlan). Infection was severe in one field in the Montreal district, Que. In the Q.S.B. plots, appreciable amounts of mildew were recorded at St. Hyacinthe and Wotton; infection was moderate to severe on O.A.C. 21, and moderate on Montcalm, M.C. 8129, M.C. 8229 and Byng (T. Simard, D. Leblond).

SPOT BLOTCH (Helminthosporium sativum) infections were recorded as follows: moderate in a field at Canal Flats, B.C. (M.F. Welsh); moderate on Wong, Barboff, and Galore in seed blocks at O.A.C., Guelph, Ont. (J.D. MacLachlan); traces on some varieties in the Q.S.B. plots in Que. (D. Leblond). Slight infection in the odd field in the Montreal district (T. Simard).

COMMON ROOT ROT (Helminthosporium sativum and Fusarium spp.). Damage was a trace in 4 fields and slight in 3 out of 33 examined in Alta. (M.W.C.). Of 37 fields examined in Sask., 1 was slightly, 29 moderately and 7 severely affected. The disease ratings for barley were 27% higher than those for wheat (B.J. Sallans).

HEAD BLIGHT (Fusarium spp. and Helminthosporium sativum). A slight infection was recorded in several fields in the Montreal district, Que. (T. Simard).

NET BLOTCH (Helminthosporium teres). A slight infection was recorded in 5 fields out of 33 examined in Alta. (M.W.C.). Infection was a trace in 4 fields, slight in 8 and severe in 1 out of 37 examined in Sask. (H.W.M.). Net blotch was recorded in 4 fields in Man.; infection was severe in 2 fields in mid-August, but it was a trace to slight in the other 2 in mid-July (W.L. Gordon). Traces of net blotch were present in the Q.S.B. plots in Que.; a slight infection was also noted in 8 fields out of 13 examined in the Montreal district in July (T. Simard).

STRIPE RUST (Puccinia glumarum) moderately affected a field at Canal Flats, near Windermere, B.C. (M.F. Welsh).

STEM RUST (Puccinia graminis). A trace was found late in the season in 2 fields in Alta. (M.W.C.). A very light infection was recorded in 6 fields out of 37 examined in Sask. (H.W.M.). Stem rust infections developed slowly on barley varieties, and shortly before harvest infections, although general throughout southern Man., were present only in trace amounts (B. Peturson). Slight to moderate infections were present in a few fields in the Montreal district, Que.; the same was true in the Q.S.B. plots at L'Assomption, but elsewhere infection was nil or a trace (T. Simard, D. Leblond).

LEAF RUST (Puccinia Hordei Otth). According to John A. Stevenson and Aaron G. Johnson (U.S.D.A. Pl. Dis. Reporter 30(10): 372. 1946) the barley leaf rust pathogen should be called Puccinia Hordei Otth. 1871, of which P. anomala Rostr. 1878 and P. simplex (Koern.) Erikss. & Henn. 1894 are synonyms. P. Hordei Fuckel was published in 1873, not in 1860 as given by Arthur (Manual) and others. Thus, P. Hordei is not a later homonym of Fuckel's binomial. Although Eriksson and Henning were the first to recognize the specific identity of the barley leaf rust fungus, the name they selected is a later homonym of P. simplex Peck, and therefore unavailable under the present Rules (I.L. Conners).

A very light infection was seen in one field in Sask. (H.W.M.). From observations made on barley varieties from the rust nurseries, it was concluded that leaf rust occurred only in trace to light amounts during 1946 in Canada (W.J. Cherewick). Infection was moderate to severe on Wong in a seed block at O.A.C., Guelph, Ont. (J.D. MacLachlan). A slight infection was recorded in one field in the Montreal district, Que.; infection was slight to moderate on Velvet in Q.S.B. plots at L'Assomption with traces elsewhere in Que. (T. Simard and D. Leblond).

SCALD (Rhyncosporium Secalis). Infection was a trace in 2 fields, slight in 5, moderate in 2 and severe in 2 out of 35 examined in Alta.; infection ranged from slight to severe in the plots at Lacombe (M.W.C.).

SPECKLED LEAF BLOTCH (Septoria Passerinii). Infection was slight in 3 fields out of 33 examined in Alta. (M.W.C.). The disease was widely distributed in Man. in 1946, heavy infections occurring in several localities (T. Johnson). Speckled leaf blotch was most noticeable in the Q.S.B. plots at Normandin and Frampton, Que., where infection was slight on some varieties (D. Leblond). A trace was found in 1 field in the Montreal district (T. Simard).

COVERED SMUT (Ustilago Hordei). Infection was a trace in 3 fields and slight in 2 out of 33 examined in Alta. In the plots at Lacombe, it was slight on Newal and absent or a trace on the other varieties (M.W.C.). Covered smut was recorded in 9 fields out of 42 examined in Sask., apparently indicating an increased infection over 1945 (R.C. Russell).

Loose or covered smut was recorded in 14 out of 19 fields examined in Man.: trace in 10, slight in 3 and severe in 1 (10.5% infection) (W.L. Gordon).

LOOSE SMUT (Ustilago nuda or U. nigra). Infection was a trace to severe in fields visited at Prince George, Smithers, Houston, Vanderhoof and Fort Fraser, B.C. (G.E. Woolliams). Infection was a trace in 6 fields, slight in 3 and severe in 3, on Newall, out of 33 examined in Alta. It varied from a trace to moderate in the plots at Lacombe (M.W.C.). Loose smut was recorded in 6 fields out of 42 in Sask.; the disease was less prevalent than in 1945 (R.C. Russell). A slight infection was present in 3 fields out of 4 examined in the Montreal district, Que. (T. Simard). Loose smut was observed on many farms in P.E.I.; in one field near Charlottetown, 15% of the heads were affected (R.R. Hurst).

BACTERIAL BLIGHT (Xanthomonas translucens f.sp.) slightly affected one field at Wolsely, Sask. (H.W.M.). All 13 fields examined in Man. were uninfected (W.A.F. Hagborg).

RYE

ERGOT (Claviceps purpurea) slightly affected rye in the University plots, Saskatoon, Sask. A trace to slight infection occurred in most fields inspected in Sask.; it was most prevalent near the edges of the fields (H.W.M.). It was observed in a field at York, P.E.I. (R. Bagnall).

POWDERY MILDEW (Erysiphe graminis). A slight infection was seen on a heavy crop of fall rye at Bowsman out of 3 fields inspected in Man. (W.L. Gordon).

STEM RUST (Puccinia graminis) was not observed in Man. in 1946 on rye, but evidence was obtained from field collections of stem rust on barley that traces of the Secalis variety occurred on barley in a few localities (B. Peturson).

LEAF RUST (Puccinia secalina). A 2% infection was observed in one field in southern Man. (B. Peturson) and a trace at Starrs Point, N.S. (J.F. Hockey).

BACTERIAL BLIGHT (Xanthomonas translucens ff.spp.) affected 2 out of 4 fields examined in Man.; 15% of the leaf area was destroyed in a field at Coulter (W.A.F. Hagborg).

SURVEY OF NURSERY MATERIAL FOR PLANT DISEASES IN 1946

T. Johnson, B. Peturson and W.J. Cherewick

In Table 3 are summarized the results of examinations of material from 30 uniform rust nurseries across Canada in 1946. The examinations were made at the Winnipeg Laboratory by the writers, who wish to express their gratitude to their co-operators at the various Experimental Farms and Stations.

Twelve varieties of wheat, 9 of oats, and 3 of barley were grown in the nurseries. The varieties were as follows: Wheat - Apex, McMurachy, Regent, Carleton, Little Club, Marquis, Spelmar, Thatcher, Vernal, Norka, Regent x Canus, Warden x Hybrid; oats - Bond, Erban, Trispernia, Ajax, Vanguard, White Russian, S-811, Victory x R.L. 1272, Clinton; barley - Goldfoil, Heil's Hanna, Plush. Varieties grown commercially in Canada are underlined.

Rust damage, in most places in Canada, was light in 1946. In the main rust area, Man. and eastern Sask., initial infections developed later than usual and spread of rust was slow owing to dry weather in the first part of July. In this area stem rust of wheat produced only light infections on susceptible wheat and barley varieties and was not found on rust-resistant wheats. Leaf rust of wheat spread rapidly towards the end of July and in early August Thatcher bore about 75% infection and Regent 50% or more. Damage was, however, light because the crop was approaching maturity before infection became heavy. Oat stem rust developed rather rapidly in early August and some of the late-sown oats in Man. became heavily rusted. Crown rust infection in Man. was light and occurred only in trace quantities in eastern Sask. A very light infection of dwarf leaf rust of barley occurred in the Red River Valley.

Outside the Prairie Provinces the only cereal rust that produced a generally severe infection was leaf rust of wheat. This rust developed a heavy or moderately heavy infection on susceptible varieties in all but four of the rust nurseries, the exceptions being Smithers, B.C., and Beaverlodge, Alta., where no rust was observed, and Kentville, N.S., and Charlottetown, P.E.I., where infection was light. The stem-rust resistant wheats Regent and Rodman (Regent x Canus) showed little or no resistance to leaf rust in the Prairie Provinces and northern Ont. but displayed a good deal of leaf-rust resistance at most stations outside of this region.

Local outbreakds of stem rust of wheat and oats occurred in Eastern Canada. Some of these were possibly heavier than is indicated as, for the most part, the plants were harvested before maturity. Some outbreaks of oat stem rust were definitely traceable to barberry.

Fungi other than rusts probably caused little damage to cereals except possibly in isolated instances, as at certain points in Ontario where powdery mildew of wheat and barley was abundant.

Readings for each disease were made on all varieties and separate tables were prepared for the intensity of infection of the rusts and powdery mildew. These tables were included in the original report as issued by us, but are omitted in this summary. In Table 3 the severity of each disease on the more susceptible varieties is shown

It should be stated, in conclusion, that the record of diseases of fungal origin is by no means complete. Other diseases, such as net blotch of barley and leaf blotch of oats, occurred in certain localities but were not recorded owing to lack of time.

Table 3. Incidence of certain pathogenic fungi on wheat, oats, and barley grown at 30 localities in Canada in 1946

Locality	Wheat						Oats				Barley			
	P. gr. Tritici	P. triticina	E. graminis	S. nodorum	S. Avenae f.	S. Tritici	P. gr. Avenae	P. coronata	E. graminis	S. Avenae	P. graminis	P. Hordei	E. graminis	S. Passerinii
Saanichton, B.C.	0	4	0	0	0	0	2	0	0	0	0	1	0	0
Smithers, B.C.	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Agassiz, B.C.	0	4	3	0	0	0	2	0	1	0	0	3	3	0
Creston, B.C.	2	4	0	0	0	0	0	0	0	0	3	1	0	0
Beaverlodge, Alta.	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Edmonton, Alta.	0	3	2	0	1	0	0	0	0	0	0	0	0	0
Lacombe, Alta.	2	4	0	0	0	0	1	0	0	0	1	0	0	0
Scott, Sask.	0	3	0	1	1	0	1	0	0	0	0	0	0	0
Melfort, Sask.	1	4	0	0	0	0	0	0	0	0	0	0	0	0
Indian Head, Sask.	3	4	0	0	2	0	3	0	0	0	1	0	0	0
Brandon, Man.	2	4	0	0	2	0	2	2	0	0	2	0	0	3
Winnipeg, Man.	3	4	0	0	2	0	2	1	0	0	3	3	0	2
Morden, Man.	2	4	0	0	2	0	2	1	0	0	1	1	0	2
Fort William, Ont.	1	4	0	0	2	0	3	0	0	1	1	0	0	0
Kapuskasing, Ont.	2	4	0	0	1	0	3	2	0	2	1	0	2	0
St. Catharines, Ont.	2	4	2	0	0	0	2	1	0	0	0	0	1	0
Guelph, Ont.	3	4	2	0	0	1	2	1	0	0	2	1	4	-
Kemptville, Ont.	3	4	1	0	1	0	2	4	0	1	3	0	3	0
Ottawa, Ont.	3	4	2	0	3	0	2	3	0	1	1	1	3	0
Manotick, Ont.	2	4	1	0	0	0	-	-	-	-	1	0	1	0
Macdonald College, Que.	2	4	1	0	2	0	1	1	0	1	1	1	1	0
Lennoxville, Que.	2	4	0	0	3	0	3	2	0	1	1	2	1	0
Ste. Anne de la Pocatiere, Que.	3	4	0	0	1	0	2	1	0	0	1	0	0	0
Normandin, Que.	2	4	1	3	1	0	2	1	0	3	1	0	0	0
L'Assomption, Que.	3	4	2	0	1	0	2	1	0	0	2	0	1	0
Fredericton, N.B.	1	3	0	1	0	0	4	4	0	0	3	0	0	0
Kentville, N.S.	0	2	0	3	0	0	2	1	0	1	0	0	0	0
Pictou, N.S.	3	4	1	0	1	0	3	4	0	0	1	2	1	0
Lower South River, N.S.	2	4	1	0	0	0	3	3	0	0	0	0	1	0
Charlottetown, P.E.I.	0	1	0	0	1	0	2	0	0	0	1	0	0	0

Note: 1 = trace; 2 = light; 3 = moderate; 4 = heavy

PHYSIOLOGIC RACES OF CEREAL RUSTS IN CANADA IN 1946

T. Johnson and B. Peturson

In 1946, surveys were made of the distribution, in Canada, of physiologic races of the following cereal rusts: Puccinia graminis var. Tritici, P. triticina, P. graminis var. Avenae, P. coronata var. Avenae, and P. Horaei (P. anomala). There are also included infection studies carried out with aecia on barberry and buckthorn collected in Eastern Canada.

Distribution of Physiologic Races of the Cereal Rusts

Nine physiologic races of Puccinia graminis var. Tritici were identified in 145 isolations. These races were in order of prevalence: 56, 38, 29, 17, 19, 36, 15, 49, and 48. The distribution of the races differed very little from that of 1945. The chief differences consist in a slightly diminished prevalence of race 56 (49.7% of all races in 1946 compared with 60% in 1945), an increased prevalence of race 38 in Eastern Canada (17.2%), and the occurrence of races 15 and 36, which had not been collected on cereals in Canada since 1942.

The most notable feature of the leaf rust survey is the now widespread prevalence, in commonly occurring races of P. triticina, of biotypes capable of heavily attacking Renown, Regent, Redman, and other derivatives of Hope or H-44. Twenty races, including biotypes, were identified in 272 isolates. These races, with biotypes designated by the letter "a" after the number, were in order of prevalence: 15; 128; 15a; 76; 5a; 9; 3; 58, 113a (equal); 5, 113 (equal); 29; 1, 1a, 126 (equal); and 2, 11, 65a, 72, 46-1 (equal). The biotypes were identified by adding to the regular differential hosts the varieties Renown and Hope, the latter being a particularly useful differential host. Strains of leaf rust to which Hope is susceptible in the seedling stage have invariably been found to attack Hope and the other above-mentioned wheats heavily in the adult stage. The biotypes virulent towards these varieties are particularly common in races 5 (8.8% of all strains), 15 (11.4%) and 113 (6.3%). The cultures identified as race 128 (12.5%) differ so little from race 29 that they might, perhaps, equally well be regarded as representing a biotype of that race.

Geographically, these virulent biotypes occur most frequently in the area in which the newer, stem-rust resistant wheats are most commonly grown, that is Man. and Sask. Calculations based on the occurrence of the virulent biotypes (including race 128) on wheats that do not select them out (wheat varieties equally susceptible to all races) indicate that in Man. and Sask. the virulent strains make up about 50% of the leaf rust present in that area. For the other provinces the corresponding figures were: Ont. 15%, Que. 25%, Alta. 5%. The rather meagre survey data for B.C. and the Maritime Provinces indicated that in these regions the virulent strains are present only in trace quantities.

One collection was made of a race that could not be identified with any of the hitherto known races. This race is provisionally designated as 1946-1. The infection types are: Malakof 0, Carina 4, Brevit 4, Webster 4, Loros 4, Mediterranean 4, Hussar 2-, Democrat 4, and Hope X.

Eight races of P. graminis var. Avenae were identified in 171 isolates. These races were, in order of prevalence: 10, 8, 2, 5, 11, 1, 6 and 7. The year 1946 saw a further increase in the prevalence of races 8, 10, and 11, which are capable of attacking Vanguard, Ajax, and other oats of similar origin. Calculations based on their occurrence on oat varieties equally susceptible to all races show that races 8, 10, and 11 now constitute about 30% of the oat stem rust present in Man. and Ont., 20% in Que., and 15% or less in the Maritime Provinces. Scanty survey data for Alta. and B.C. indicate that these races are not common in these two provinces. The occurrence of race 6 in Ont. and its significance will be discussed in the next section.

From 127 collections of crown rust obtained from localities in Eastern Canada and the Prairie Provinces, 9 races of P. coronata var. Avenae were isolated as follows, in order of prevalence: 3, 1, 6, 2, 4, 5, 1946-1, 45, and 38. One race, tentatively designated as race 1946-1, had not previously been collected in Canada. This new race heavily attacks all the crown rust differential hosts except Red Rustproof, Ruakura, Sunrise, Steresil, Belar and Glabrota. It resembles races 34 and 45 in that it heavily attacks Bond. Race 1946-1 was collected in one locality in Ont. and in one in N.S. At Pictou its intensity averaged upwards of 20% on Bond and Clinton in the rust nursery. Races 2 and 3 predominated in Eastern Canada where they comprised 57% of all races isolated, and races 1 and 4 were the most common races in Western Canada comprising 80% of all isolates of the area. Race 5, although present in both Eastern and Western Canada, was much less prevalent than in 1945 - 5.5% of all races in 1946 compared with 22.1% in 1945. There was no marked change in the relative prevalence of the other races.

Infection Studies with Aecia on Berberis and Rhamnus in 1946

This is the third year in which infection studies have been made with aecia from barberry and buckthorn collected in Eastern Canada. We are indebted to the following for collecting and forwarding infected leaves: R.R. Hurst, Charlottetown, P.E.I., J.D.E. Sterling, Nappan, N.S., J.A. Boyle and K. Cox, Kentville, N.S., J.L. Howatt and S.F. Clarkson, Fredericton, N.B., J.E. Jacques, Montreal, Que., R.A. Ludwig, Macdonald College, Que., I.L. Conners, Ottawa, Ont., J.W. McRae, Kemptville, Ont., F.A. Lashley, Alliston, Ont., and W.M. Cockburn, Newmarket, Ont.

In the isolations from barberry, the Secalis variety of P. graminis predominated as it did in the two previous years. It occurred in 19 of the 25 collections studied. Next in frequency of isolation were varieties Avenae and Agrostidis, each of which were present in 5 collections. The Avenae variety was composed of 3 isolates of race 2 and one each of races 5, 7, and 8. The occurrence of race 7 is noteworthy because in past years it has been very rare in rust collections made on oats and grasses. The

solitary isolate of wheat stem rust proved to be race 111, which has not been isolated previously in Canada from field material (either barberry or cereals), but had occurred a number of years ago in crosses between wheat stem rust and rye stem rust. As rye stem rust occurred in the same aecial collection (No. 9, Newmarket, Ont.), it is possible that here, also, it resulted from a cross between wheat stem rust and rye stem rust.

Apart from the aecial collections there is some evidence in the general survey that has a bearing on the importance of barberry in the distribution of uncommon physiologic races. Four isolates of oat stem rust were identified as race 6, the most generally virulent of all oat stem rust races. Three of these isolates appear traceable to barberry. They occurred respectively on heavily rusted specimens of Clinton, White Tartar, and Vanguard oats collected near Appleton, Ont. As heavy stem rust infection on Clinton and White Tartar is rare, inquiries were made of the collector as to whether barberry was present in the neighborhood. The reply was that Appleton was "the home of barberry" and that a nearby area of 65 acres was heavily infested with the shrub. It was further stated that the township council had attempted eradication and had sought governmental support for this work, although, so far, ineffectually.

Five physiologic races of P. coronata var. Avenae were present in the 25 isolates isolated from aecial collections of buckthorn obtained in Eastern Canada in 1946. Races 2 and 3, both of which were quite common in Eastern Canada in 1945, comprised 84% of the isolates. Although in 1945, when the teliospores which caused the 1946 aecial infections were formed, races 5 and 6 were almost as prevalent as races 2 and 3, nevertheless, race 6 was not isolated from the aecial collections, and race 5 was isolated only once. The preponderance of races 2 and 3 in this 1946 aecial material was due no doubt to the fact that these races produce teliospores profusely and conversely, races 5 and 6 were so sparsely represented in this material because they form teliospores very weakly. Race 1 was isolated once and race 45 twice.

II. DISEASES OF FORAGE AND FIBRE CROPS

ALFALFA

BLACK STEM (*Ascochyta imperfecta*) did not appear in Alta. until July, but by mid-August it was present in all fields examined prior to the second cutting. Leaf and stem infection was estimated as slight in 25 fields and moderate in 5 out of 30 examined in central Alta. (M.W. Cormack).

During the week of July 8 a survey was made, in company with J.L. Bolton, Dominion Forage Crops Laboratory, Saskatoon, of the alfalfa seed-growing areas of northern Sask. Observations were made in 77 alfalfa fields in the districts centering on Hudson Bay Junction, White Fox, Big River, and Loon Lake. The diseases encountered are reported under their respective headings. Black stem was prevalent on the stems and leaves in many of the fields examined. Infection was a trace in one field, slight in 36, moderate in 22 and severe in 8. The beneficial effect of burning the old plant remains before growth started was strikingly demonstrated in a few fields, where infection was only a trace in burned areas, compared with slight to moderate in nearby unburned areas (M.W. Cormack, H.W. Mead). Infection was moderate to severe in the alfalfa breeding and seed plots at Saskatoon; some inbred lines appear to have some resistance (H.W.M.).

A trace of a leaf spot (*Ascochyta* sp.) was found in all 5 fields examined in the Montreal district, Que. (T. Simard).

WINTER CROWN ROT (low-temperature basidiomycete). The damage from winter crown rot in fields examined in Alta. in 1946 was estimated as follows:

District	Fields Examined	Percentage of Fields Examined				
		Tr.	Sl.	Mod.	Sev.	Total
		%	%	%	%	%
Southern Alta.	51	8	37	10	0	47
West-central Alta.	109	3	21	23	25	72
Clover Bar	97	4	55	15	1	75
All Alberta	257	3	38	17	11	69

Damage was particularly severe in the west-central areas about Thorsby, Cherhill and Sangudo. About 50% of the plants were killed or seriously weakened in several fields. The pathogen also caused extensive killing of alsike clover, timothy, and various cultivated and native grasses in the same areas. In the old variety plots at Brooks and Lethbridge most of the plants were weakened by partial rotting of the crowns, and this type of damage was also fairly common throughout the irrigated southern areas. True winter-killing was not observed in hardy varieties (M.W. Cormack).

Winter crown rot was prevalent in the Hudson Bay Junction and White Fox districts, Sask., and there was unmistakable evidence of previous damage in many fields of all districts visited during the survey. Damage caused by this pathogen during the early spring of 1946 was found in 40 of the 77 fields examined; damage was a trace in 3 fields, slight in 30, moderate in 4 and severe in 3 (M.W. Cormack, H.W. Mead). The disease also caused moderate damage in the breeding plots at Saskatoon (H.W.M.).

BACTERIAL WILT (Corynebacterium insidiosum). The estimated damage from bacterial wilt in alfalfa fields examined in Alta. in 1946 was as follows:

District	Fields Examined	Percentage of Fields Damaged Tr.	Sl.	Mod.	Sev.	Total
		%	%	%	%	%
Southern Alta. (irrigated)	51	10	23	31	10	74
West-central Alta.	109	3	6	0	0	9
Clover Bar	97	25	20	10	0	55
All Alberta	257					39

Bacterial wilt was found in all except the youngest stands examined in the irrigated districts. In the first survey of the relatively new irrigation district at Rolling Hills slight to moderate damage was found in several of the older fields. The disease was found for the first time causing slight damage in a few fields in the seed growing districts at Cherhill, Sangudo, and Westlock. The detailed survey conducted in the Clover Bar district, east of Edmonton, for 3 years has disclosed the disease in 55% of the fields in 1946 compared with 32% in 1945 and 24% in 1944; there was also a marked increase in the degree of damage in several of these fields (M.W. Cormack).

Bacterial wilt was found for the first time in 4 plantings near Weirdale and Snowden in the White Fox district, Sask.; only a few plants were as yet affected. No trace of the disease was found in any other of the seed growing areas of northern Sask. Later, Mr. R.E. McKenzie, Dom. Experimental Station, Swift Current, who had assisted in the wilt survey in southern Alta. in July reported that bacterial wilt was very prevalent in the irrigated areas of south-western Sask. Of the 18 fields, mainly in the Val Marie, East End and Maple Creek projects, damage was estimated as slight in 4, moderate in 4 and severe in 7. Wilt was also causing moderate damage to alfalfa under irrigation on the river flats at North Battleford (M.W. Cormack, H.W. Mead). Bacterial wilt was first reported in Man. in 1945. This year it was observed in several widely scattered localities. It seems probable that the disease has been here for several years, but had escaped notice. The pathogen was isolated,

identified and typical symptoms of wilt were produced by inoculating Grimm alfalfa plants in the greenhouse. Severe damage was confined to fields 7 or more years old (W.A.F. Hagborg).

ROOT ROT (Cylindrocarpon Ehrenbergi and Fusarium spp.) caused slight damage to 3 fields in the Sangudo and Thorsby districts, Alta. (M.W. Cormack).

WILT (Fusarium Scirpi var. acuminatum) caused slight damage in the breeding plots, Saskatoon, Sask. (H.W.M.).

ROOT ROT (Fusarium spp.) caused a trace of damage in 2 fields, slight in 5 and moderate in 2 out of 77 examined in northern Sask. F. avenaceum was the predominant species isolated (M.W.C., H.W.M.).

STAGONOSPORA LEAF SPOT (Leptosphaeria pratensis (Stagonospora Meliloti). Infection was a trace in a field near Hudson Bay Junction and slight in one at Big River, Sask. (M.W.C., H.W.M.).

DOWNY MILDEW (Peronospora aestivalis) was reported as follows: slight infection at Smithers, B.C. (G.E. Woolliams); slight infection in 4 fields in central Alta.; appeared in the current year's seeding at Edmonton in August, becoming moderate to severe on a few plants in early September (M.W.C.); infection trace in 2 fields, slight in 2 and severe on a few plants in 1 out of 77 fields examined in northern Sask. (M.W.C., H.W.M.).

YELLOW LEAF BLOTCH (Pseudopeziza Jonesii). Infection was slight to moderate in 6 of the fields examined in central Alta. It was unusually prevalent in the plots at Edmonton early in the season and caused moderate defoliation prior to the first cutting. Very light infection occurred on the new growth in August (M.W. Cormack). The disease was very prevalent in northern Sask.; infection was slight in 8 fields, moderate in 19 and severe in 15. As with black stem, infection was less in the burned than in the unburned areas (M.W. Cormack, H.W. Mead). It was also abundant in the plots at Saskatoon (H.W.M.).

COMMON LEAF SPOT (Pseudopeziza Medicaginis) was reported as follows: Infection varied considerably with the variety in the University plots, Vancouver, B.C. (I.C. MacSwan); infection slight in only 3 fields in central Alta. in early August, but later becoming general (M.W.C.); relatively scarce in northern Sask. during July survey, infection trace in 3 fields, slight in 3 and moderate in 2 (M.W.C., H.W.M.); infection light at Saskatoon (H.W.M.); infection slight and less than usual at O.A.C., Guelph, Ont. (J.D. MacLachlan), slight in 3 fields and moderate in 2 in the Montreal district, Que., in late June (T. Simard), severe on all varieties in August at Ste. Anne de la Pocatiere (R.O. Lachance), and traces in Queens Co., P.E.I. in September (R.R. Hurst).

CROWN ROT (Rhizoctonia Solani) caused wilting in a few plants in 2 fields in the Hudson Bay Junction district, Sask. (M.W.C., H.W.M.).

ROOT ROT (Sclerotinia Trifoliorum) affected a trace to about 10% of the plants in one plot of Grimm alfalfa, Division of Forage Crops, C.E.F., Ottawa, Ont., in early June; a few plants in adjacent red clover plots were also infected (D.B.O. Savile, J.W. Groves).

WITCHES' BROOM (virus). A relatively high proportion (10-15%) of infected plants was seen in alfalfa stands, at least 5-6 years old, in the North Okanagan, B.C. A smaller proportion was affected in similar fields in the Cariboo district (N.S. Wright). One plant was severely affected in the plots at Edmonton, Alta. (M.W.C.). Witches' broom affected occasional plants in 2 fields in the White Fox district and in one field near Loon Lake, Sask. (M.W.C., H.W.M.).

YELLOWS (boron deficiency). Boron deficiency symptoms were observed in alfalfa in different sections of the Central Interior of B.C. from Prince George to Smithers during a survey in 1946 (G.E. Woolliams). It caused considerable stunting of the plants besides the yellowing of the tips in a cover crop of Grimm in a 10-acre block at West Creston, B.C. (M.F. Welsh).

COMMON CLOVER

WINTER CROWN ROT (low-temperature basidiomycete) was very prevalent in the early spring in the clover-growing areas of west-central Alta. It was found in all 17 fields of alsike clover examined, the damage being a trace in 1 field, slight in 7, moderate in 5 and severe in 4. Red clover was less severely affected with damage estimated as slight in 4 and moderate in 2 of the 7 fields examined. The pathogen was isolated for the first time from White Dutch clover plants which had been killed in a severely damaged field and in a natural pasture. Severe damage was reported in the early spring from a field at Nipawin, Sask.; the pathogen was isolated from diseased specimens (M.W. Cormack). Slight damage to Mammoth Red Clover was observed at Melfort (H.W. Mead).

A crown rot of undetermined cause was found at Prince George, B.C.; there were indications that it may become an important factor in fields intended for seed (G.E. Woolliams).

LEAF SPOT (Cercospora zebrina). Infection was slight in a field of alsike clover at Nipawin and moderate in one at Big River, Sask. (M.W.C. and H.W.M.). Trace was recorded in one field of red clover in the Montreal district, Que. (T. Simard).

SOOTY BLOTCH (Cymadothea Trifolii). A slight infection was found in 3 out of 8 fields of alsike clover examined in west-central Alta. (M.W.C.).

POWDERY MILDEW (Erysiphe Polygoni) was reported as follows: on red clover throughout the Prince George district, and general at Smithers, B.C.; also affected an occasional plant of alsike in the latter district (G.E. Woolliams); infection slight in 6 and moderate in 2 out of 8 fields of red clover and slight in 4 out of 8 fields of

alsike examined in west-central Alta.; infection slight on alsike and moderate on red clover in the plots at Edmonton (M.W. Cormack); slight on Redon red clover in the plots, O.A.C., Guelph, Ont. (J.D. MacLachlan).

ROOT ROT (Fusarium avenaceum). The pathogen was isolated from rotted roots of a moderately damaged old stand at Sangudo and from those of a young stand which had also suffered cutworm damage at Legal, Alta. (M.W. Cormack).

LEAF SPOT (Gloeosporium spadiceum). Infection was slight in 3 out of 8 fields of red clover examined in west-central Alta. (M.W.C.); and 2 fields of red clover near White Fox, Sask. (M.W.C. and H.W.M.).

ANTHRACNOSE (Kabatiella caulivora). Infection was slight in 2 fields of red clover at Westlock, Alta. It was moderate on Siberian Red and a trace to slight on other varieties in the plots at Lacombe and Olds (M.W. Cormack). Infection was a trace to slight on Redon (Elite) at O.A.C., Guelph, Ont. (J.D. MacLachlan).

LEAF SPOT (Leptosphaeria pratensis (Stagonospora Meliloti). Infection was a trace in 3 and slight in 5 out of 8 fields of alsike clover examined in west-central Alta. in August (M.W. Cormack). A trace was also found in 1 field of alsike at Nipawin, Sask. (M.W.C., H.W.M.).

COMMON LEAF SPOT (Pseudopeziza Trifolii). Traces were found in 6 fields of red clover out of 8 examined in the Montreal district, Que. (T. Simard).

LEAF SPOT (Stagonospora recedens). Infection was slight in 3 of the 8 fields of red clover examined in west-central Alta. The pathogen was also isolated from a stem canker found on a few plants in one of the fields (M.W. Cormack). A trace of presumably the same leaf spot was found in 5 fields in the Montreal district, Que. (T. Simard).

LEAF SPOT (Stemphylium sarcinaeforme). Traces were found in 5 fields in the Montreal district, Que. (T. Simard).

RUST (Uromyces spp.). A slight infection (U. Trifolii) was found in 2 fields of alsike clover in west-central Alta. (M.W. Cormack); traces were present on alsike at Nipawin and White Dutch clover at Big River, Sask. (M.W.C., H.W.M.). Infection was moderate to severe on Alon alsike clover at O.A.C., Guelph, Ont. (J.D. MacLachlan). Traces (U. fallens) were present on red clover in Queens Co., P.E.I. (R.R. Hurst).

A severe infection of a leaf spot, suspected of being bacterial, caused much defoliation in a field of red clover north of Montreal, Que. (T. Simard).

SWEET CLOVER

STEM CANKER (Ascochyta caulicola). A moderate infection was observed in 2 fields near Edmonton, Alta. (M.W. Cormack).

BLACK STEM (Ascochyta Meliloti (Trel.) Davis). Infection was moderate in a roadside stand near Edmonton, Alta. (M.W. Cormack). As pointed out by Dr. Cormack, F.R. Jones (Trans. Wisc. Acad. Sci. & Letters 35: 137-138. 1944) now considers that the imperfect stage of Mycosphaerella lethalis Stone is A. Meliloti (Trel.) Davis, not A. lethalis Ell. & Barth., which is properly a synonym of A. caulicola Laub. Both A. Meliloti and A. caulicola on Melilotus alba and M. officinalis are represented in the herbarium by specimens from Alta. (I.L. Conners).

Coniothyrium olivaceum Bon. was isolated twice from the same sample of sweet clover seed obtained from the Dominion Forage Crops Laboratory, Saskatoon, Susk. The fungus has been shown to be pathogenic on flax, q.v. (T.C. Vanterpool).

LEAF SPOT and STEM BLIGHT (Leptosphaeria pratensis (Stagonospora Meliloti). A slight infection was found in several stands in central and northern Alta. (M.W. Cormack).

ROOT ROT (Phytophthora Cactorum). A few plants were killed in a roadside stand near Turtleford, Sask. (M.W.C. and H.W.M.).

SEEDLING BLIGHT and BROWN STELE (Rhizoctonia Solani isolated). Seedling blight caused a marked reduction in the stand of sweet clover in the variety plots, Dominion Forage Crops Laboratory, Saskatoon, Sask., but infection was patchy. Seedling emergence ranged from 1 to 85% in 14 varieties or lines and from 5 to 75% in the 6 replicates of one variety. Plants continued to wilt and die through June and July and even into August. The latter plants had a brown stele (H.W. Mead, T.C. Vanterpool).

CORN

BASAL STALK ROT (?Gibberella Saubinetii). For the first time in 5 years, some open-pollinated varieties, viz. Bailey and Wisc. 7 (Silver King), were found affected by a root and basal stalk rot in southwestern Ont. Also, all plants in one inbred line in the test plots at the Harrow Station were affected. Its occurrence was probably occasioned by an extended period of very dry weather. The symptoms tally almost exactly with those of a root and basal stalk rot described from Australia (E.T. Edwards, Agr. Gaz. of N.S.W. 47(5): 259-261. 1936) (A.A. Hildebrand).

RUST (Puccinia Sorghi). A trace was present on fodder corn in Queens Co., P.E.I., in Aug. (R.R. Hurst).

SMUT (Ustilago Maydis) was less prevalent in the Guelph district, Ont., than in 1945 (J.D. MacLachlan).

FLAX

Prof. T.C. Vanterpool, University of Saskatchewan, Saskatoon, Sask., has again prepared a summary of his observations, entitled "Flax Diseases in Saskatchewan in 1946".

The weather during the growing season had considerable effect on the incidence of disease in flax. In the second half, the crop suffered severe heat damage, further aggravated by root rot in some instances. Leaf and stem diseases, such as rust and browning (Polyspora Lini) were very light. The period during which young flax plants were affected by seedling blight was unusually prolonged. The disease was apparently favoured by low moisture and relatively low temperatures (cf. L.F. Roth and A.J. Riker, Jour. Agr. Res. 67(11): 417-432. 1943).

SEEDLING BLIGHT (Rhizoctonia Solani, etc.) was more conspicuous in 1946 than usual, as it continued active longer, causing the death of seedlings up to 6 inches in height at Elrose, Saskatoon, and White Fox. Rhizoctonia Solani and Fusarium Scirpi var. acuminatum were the principal fungi isolated, the two fungi occurring in the ratio of 3:1 from the Elrose sample and 5:1 from the White Fox collection. At Saskatoon, Pythium spp. of the de Baryanum type were present. The low soil moisture and below-average temperatures apparently favoured the Rhizoctonia and Fusarium.

CONIOTHYRIUM SEEDLING BLIGHT and LEAF SPOT (Coniothyrium olivaceum Bonard.). A damping-off and seedling blight, with symptoms indistinguishable from those of the preceding disease, was first found in Saskatchewan in 1945. It has since been described and illustrated (T.C. Vanterpool, Can. Journ. Res. Sect. C. 25(1): 54-58. 1947). The organism was isolated, along with Rhizoctonia Solani, from blighted flax seedlings from the Experimental Station, Scott, in the spring of 1945. It proved to be slightly to moderately parasitic to flax in artificial inoculations. The same species was later isolated from 12 out of 32 flax-seed samples of the 1945 crop, the germination of which was low at the Seed Laboratory, Plant Products Division, Saskatoon. In the spring of 1946 it was again obtained from blighted seedlings from Saskatoon and Hudson Bay Junction and from lesioned cotyledons from Nipawin. In August the pathogen was causing a leaf spot with defoliation on Crystal flax in a plot at the University. The dry weather of late summer probably prevented its further spread and the formation of stem lesions (cf. H.W. Wollenweber and H. Hochapfel, Zeitschr. f. Parasitenkunde 9: 600-637. 1937). The sudden appearance of this pathogen on flax seed in 1945 cannot be explained, but the season was undoubtedly favourable for its development. A strain of the same organism was isolated from 1% of the seed in a sample of sweet clover seed from the 1945 crop.

RUST (Melampsora Lini) was very light, even on Redwing.

WILT (Fusarium oxysporum f. Lini). No typical wilt was seen. The fungus is sometimes isolated along with several other parasitic species from plants affected by late root rot.

STEM BREAK and BROWNING (Polyspora Lini). Infection by this disease was the lightest in the experience of the author. Only a small percentage of

the 1945 seed samples yielded the organism when tested. In the field lesions on the cotyledons were present in trace amounts. No reports of this disease were received, and only traces of stem break and browning were observed in August or September.

LATE ROOT ROT (miscellaneous fungi), like common root rot of wheat, may be found in every flax field, but it is difficult to assess the damage because affected plants are more likely to be killed prematurely in a season when scorching winds are common. On several occasions in 1946 much premature killing followed drying winds even though sub-soil moisture was fair; much of the damage could be attributed to an impaired root system caused by rot.

DIE-BACK and SCORCH (heat). Prolonged high temperature from July 26 to 30, with maxima ranging from 89° to 102° F., not only caused severe die-back (cf. P.D.S. 25: 31. 1946), but killed or scorched entire plants over large areas. In several fields north of Estevan the tops of the scorched plants were bent over, presumably away from the scorching wind. Any seed in such plants was badly shrivelled. Scorch was most common in flax on grass sod where moisture was likely to be a limiting factor, but the trouble was present in some fields in which root damage interfered with the absorption of water although subsoil moisture was reported to be fair. Flax in Saskatchewan suffered severely from die-back and scorch especially in the southeast, from Macoun to Estevan and Alameda, and north to Kisbey. Other badly affected areas were Assiniboia, Elbow, Asquith and Valparaiso. Because the seed bed was too dry in mid May, many fields were sown late and were not sufficiently advanced to withstand hot weather. This fact explained in part the occurrence of slightly damaged and heavily damaged fields in the same district.

HEAT CANKER. Only 3 reports of heat canker were received. Although rainfall was below average in June, the temperature was also low.

SELENOPHOMA BRANCH SPOT (Selenophoma linicola) was first encountered in Saskatchewan in 1944 and again in 1945 (P.D.S. 25: 32). The fungus was found on the branches and pedicels of flax in late August and early September, lightly distributed in the eastern half of Saskatchewan from White Fox to Estevan and from the south Saskatchewan river to the Manitoba boundary. No survey was made in the western part of the province. It has been found on the linseed varieties Arrow, Bison, Bolley's Golden, Buda, Crystal, Custer, Dakota, Malabrigo, Redson, Redwing, Rocket, Royal, Sheyenne, and Victory, and on the fibre flax Stormont Cirrus. In preliminary cross-inoculation experiments no infection was obtained on brome grass, crested wheat grass or slender wheat grass, when they were inoculated with the Selenophoma from flax, nor did flax become infected when it was inoculated with S. bromigena. No previous report of a Selenophoma on flax has been seen. The organism has been described as a new species, Selenophoma linicola, in Mycologia 39: 341-348. 1947.

PASMO (Septoria linicola). A collection of pasmo with the fungus sporulating freely was made on flax in the Irrigation Nursery at Saskatoon on Aug. 7, 1946. This collection appears to be the first made in Saskatchewan. In previous years several collections of suspected

pasmo have been made, but spores of the fungus could not be found. On Aug. 28 pasmo was fairly prevalent in an area in the southeast of the province including Macoun, Estevan, Alameda, and Kisbey. Stem infections, with pycnidia well formed, were moderate in fields of Royal and Victory at Macoun, Hitchcock, and Bienfait, but the damage was estimated to be slight as no definite shrivelling of the seed was apparent. Similar, but sterile, lesions were also common and could be found with diminishing frequency to near Yorkton. On Sept. 13, lesions of the same type but also without spores were found at Armley and White Fox.

These findings suggest that moist conditions following infection are not sufficiently prolonged to permit pycnidium formation in most districts of Saskatchewan. It is also probable that the suspected cases were genuine pasmo. Dry atmospheric conditions in August may be an important factor in the slow spread of pasmo in Saskatchewan in spite of its presence for several years in Manitoba and in adjoining states to the south.

ANTHRACNOSE (Colletotrichum Lini) has not been seen in the field during any of the surveys in Saskatchewan. Colletotrichum Lini has, however, been isolated from lesioned cotyledons of fibre flax at the Melfrot Station; the seed was from Ottawa. C. Lini was also present in the University plots and seed farm, Saskatoon, in 1942, but it has not been encountered since.

A similar report on "Flax Diseases in Manitoba in 1946" was prepared by W.E. Sackston, Dominion Laboratory of Plant Pathology, Winnipeg, Man.

More land was sown to flax in Man. in 1946 than any year previously. The yield per acre was good and a record crop was harvested. The soil was dry at seeding time and dry weather continued until late June. In consequence emergence was very irregular. Early plants were in bud by the time the late ones emerged, but because of favourable weather later in the season and an open fall even the late plants matured satisfactorily.

PASMO (Septoria linicola). Pasmo was observed on the stems of flax in a field on Aug. 9, about 3 weeks earlier than in 1945. The disease was also more severe than the previous year. In a survey of 60 fields in late August infection was a trace in 13, light in 20, moderate in 5, and severe in 6. The heaviest infections were seen at Morden, Brandon, Elm Creek and Gladstone.

In the experimental plots, heavier infections resulted from inoculations made on July 11 than from those made June 26. Leaf lesions developed in 12-14 days after the date of inoculation; but the first stem lesions were seen almost simultaneously, about July 25, in both series. As in 1945, heavy infections caused by artificial inoculation hastened the maturity of susceptible varieties and reduced their yield to 35-50% of that of the uninoculated plots of the same varieties.

Pasmo was also identified on Viking flax grown in a plot at Moath Park, Sask. and sent to the Laboratory. For its occurrence in Sask. see Prof. Vanterpool's report.

RUST (Melampsora Lini), although general on flax throughout Man., was usually only a trace. The heaviest infections observed occurred in 2 fields at Wawanesa, where infection averaged 2% and 4% respectively, and in one field at Portage la Prairie, where it averaged 5% (B. Peturson).

ANTHRACNOSE (Colletotrichum Lini) was seen in the field only in small plots of flax grown from seed supplied from Ottawa. At Morden, on July 11 it was confined to a two-row plot of a single variety, but by July 18 it had spread to adjacent plots and all plants in the original plot were infected. Anthracnose was found in the same variety at Winnipeg. The pathogen was isolated from the diseased tissue.

Colletotrichum Lini was isolated from 4% of the seed of Viking produced at Brandon in 1944. When seed from the same source was sown in the greenhouse sporulating lesions developed on the cotyledons of some seedlings.

ROOT ROT and WILT. Isolations were made from several wilted plants collected in the flax plots at Winnipeg in July. Green wilted plants yielded Pythium sp. from the distal parts of the roots and Fusarium sp. from the tissues near the crown. Plants, that were partly brown yielded Rhizoctonia Solani from the terminal section of the roots, R. Solani and Pythium sp. from the mid-section and Fusarium sp. from pieces of root near the crown. Wilted and completely brown plants yielded R. Solani from all parts of the roots, with Fusarium sp. also present from the upper sections of the root. No wilt was seen in farmers' fields.

TOP BROWNING. Discoloured plants were present singly or in patches in half of the 60 fields surveyed at the end of August. The amount of discoloration varied from the pedicels to the whole plant. The bolls on discoloured plants were often smaller than those on neighbouring green plants.

BOLL BLIGHT was conspicuous in flax in 1946, but was less severe than in 1945. The trouble was light in 14 fields, moderate in 21 and severe in 15 out of 60 examined. Several fungi, including Alternaria sp. and Penicillium sp., were isolated at random from blighted bolls. The two fungi mentioned did not prove p thogenic.

STEM BREAK and BROWNING (Polyspora Lini) was not observed on cultivated flax in Man. The fungus was found fruiting profusely on year-old stems of wild flax, Linum Lewisii, collected at Boissevain, Man., and Kerrobert, Sask. It was also isolated from seeds of L. Lewisii in Man. in 1945 and 1946. The 1945 isolations were used to inoculate cultivated flax in the greenhouse; the fungus proved pathogenic when the plants were kept under humid conditions.

Other Observations

WILT (Fusarium oxysporum f. Lini) was severe in one plot of Cirrus at the Station, Ste. Anne de la Pocatiere, Que. The pathogen was also isolated from specimens collected in an experimental plot at Maskinonge by L. Cabana, who reported the damage was severe (R.O. Lachance).

RUST (Melampsora Lini). A trace was present on some varieties in the plots at Lacombe, Alta. (M.W.C.). Late-sown fields of Liral Prince were severely affected by rust at Ste. Martine, Que. The seed had been imported from England from a section where rust is prevalent (R.O. Lachance).

DIE BACK slightly affected Cirrus and Gossamer in the plots at Ste. Anne de la Pocatiere and Normandin, Que. Several isolations of Alternaria were made, but all were identified as a non-sporulating strain of A. tenuis (R.O. Lachance).

SAFFLOWER

RUST (Puccinia Carthami). Infection was slight in the plots at Lethbridge, Alta. (G.B. Sanford).

SORGHUM

BACTERIAL LEAF SPOT (Pseudomonas syringae). Infection was moderate in the plots at Edmonton, Alta. (M.W. Cormack).

SOYBEAN

The observations below constitute a special report, "Soybean diseases in Southwestern Ontario in 1946" by L.W. Koch and A.A. Hildebrand.

For the third year in succession, soybeans were harvested under ideal weather conditions and the seed entered storage with a low moisture content. Soybean diseases were, therefore, much less prevalent in 1946 than in years when weather-damaged seed is planted. Observations were based on periodic examination of experimental plots at Guelph, Ridgetown and Harrow and surveys of commercial stands in Essex, Kent and Middlesex Counties.

DOWNY MILDEW (Peronospora manshurica) was more prevalent than for several years, even under the extremely dry conditions in Essex Co. in 1946. Infection was heaviest on Capital and its extreme susceptibility may affect its present success as a commercial variety. Infection was also heavier on A.K. Harrow than on the varieties Richland, O.A.C. 211, Goldsoy and Harman. It is always difficult to estimate the loss caused by downy mildew, but it must cause some reduction in yield in view of its widespread occurrence.

In last year's report (P.D.S. 25: 39) it was suggested that seed infected by downy mildew gives rise to systemically infected plants, which not only in turn produce infected seed but also become foci for current season infection. Histologic studies have borne out this assumption. Plants

from seeds encrusted with oospores of P. manshurica become systemically infected and the mycelium, having progressed up the stem, finally invades all parts of the plant including the developing seed. However, the disease can be greatly reduced by seed treatment. In May 1946, treated (Spergon) and untreated, mildew encrusted seed of the varieties A.K. Harrow and Harman were planted in randomized plots at Harrow. Incidence of plants systemically infected was as follows:

	Spergon treated	Untreated
A.K. Harrow	0%	5.4%
Harman	1.0%	12.9%

The effectiveness of seed treatment suggests that infection is not deeply seated in the seed.

STEM ROT (Sclerotinia sclerotiorum), although previously reported on field and snap beans in Canada, appears not to have been noticed on soybeans. On Sept. 11, near Blenheim, Kent Co., in one corner of a field of Lincoln soybeans, protected on two sides by a thick wind break, was found a small area within which most plants were dying from stem rot. By Sept. 27, the disease had spread over and destroyed almost completely 3½ acres of the 12-acre field. The destruction was the most complete and extensive encountered in 5 years' survey of soybeans. In most descriptions of the disease, the stem is said to be girdled at the point of attack near the soil line, the plant dying above the girdle. In the present instance, the fungus spread in many plants from the stem into the pods where seeds were displaced by sclerotia.

BUD BLIGHT (virus of tobacco ring-spot group) occurred sporadically for the most part. In a stand of Harman, A.K. Harrow, and Lincoln being grown for registration side by side in the same field infected plants occurred with much greater frequency in Lincoln than in the other two varieties. Evidence of 2 years' experimental work at Harrow indicates that the disease, unlike mosaic, is not seed-borne.

Several other diseases were noted now and then throughout the season, but they caused only slight damage and deserve only brief mention. The usual smattering of BACTERIAL BLIGHT (Pseudomonas glycines) resulted in slight defoliation. MOSAIC (Soja virus 1) was virtually absent except in some stands of Richmond; not over 2% of the plants were infected in any stand. BROWN SPOT (Septoria glycines) was present for a short time early in the season on the unifoliate or first true leaves of most varieties. PHYLLOSTICTA LEAF SPOT (P. sojaecola) also produced the typical tattered-leaf symptom for a short time early in the season. POD and STEM BLIGHT (Diaporthe Phaseolorum var. Sojae) occurred very sporadically. FUSARIUM BLIGHT (F. oxysporum f. tracheiphilum) was slightly more prevalent than last year more particularly on A.K. Harrow. SUN SCALD (non-parasitic) first diaghosed on field beans, was later recognized as affecting many stands of soybeans.

SUGAR BEET

LEAF SPOT (Cercospora beticola). Infection was slight to moderate on sugar beets and mangels about Guelph, Ont. (J.D. MacLachlan).

SUNFLOWER

DOWNY MILDEW (Peronospora Hulstedii). A moderate infection was observed in a field at Ste. Anne de la Pocatiere, Que. (C. Perrault).

WILT (Sclerotinia sclerotiorum) was present in a garden at Saskatoon, Sask., and a specimen was received from Togo (H.W.M.). Wilt or stem rot was general, but damage was usually slight, in the sunflower area of southern Man. However, at Emerson, in a 100-acre field following sweet clover, an average of 14% of the plants were affected. This disease of sunflowers merits attention (W.L. Gordon). Quite a number of plants were killed in a field at Ste. Anne de la Pocatiere, Que. (C. Perrault).

LEAF SPOT (Septoria Helianthi) was common in the sunflower area of southern Man. and was destructive to the leaves in some fields about mid-August (W.L. Gordon).

CULTIVATED GRASSES

AGROPYRON - Wheat Grass

Ergot (Claviceps purpurea), Infection trace on A. trachycaulum in the plots at Edmonton, Alta., and about 10% on A. repens at Innisfail (M.W.C.). Affected A. repens brought in to the Laboratory, Charlottetown, P.E.I. (R.R. Hurst).

Snow Mould (low-temperature basidiomycete) caused slight damage to A. cristatum at Fallis, Alta. (M.W. Cormack).

Leaf Spot (Ovularia pulchella (Ces.) Sacc. var. Agropyri J.J. Davis) collected on A. repens at Highland Park, near Ottawa, Ont. (D.B.O. Savile).

AGROSTIS ALBA - Red Top

Brown Stripe (Scoletotrichum graminis). Slight infection on Reton (Foundation crop) at O.A.C., Guelph, Ont. (J.D. MacLachlan).

ALOPECURUS PRATENSIS - Meadow Foxtail

Stem Rust (Puccinia graminis). Heavy on a few clumps, but none on most in plot, Division of Forage Crops, C.E.F., Ottawa, Ont. (D.B.O. Savile).

BROMUS - Brome Grass

Ergot (Claviceps purpurea). About 10% of ergot found in B. inermis at Innisfail, Alta. (G.B. Sanford).

Snow Mould (low-temperature basidiomycete). A trace of damage was found in a field of B. inermis at Fallis, Alta. This grass has proved highly resistant in field tests at Edmonton (M.W. Cormack).

Leaf Blotch (Helminthosporium Bromi). Infection was slight in 4 fields in central Alta. and in the plots at Olds (M.W.C.).

Scald (Rhyncosporium Secalis). Infection was slight in the plots at Edmonton, Alta. (M.W.C.).

Leaf Spot (Selenophoma bromigena). Infection lighter than in 1945, but very common at Saskatoon, Sask.; light at Melfort (H.W.M.).

DACTYLIS GLOMERATA - Orchard Grass

Rathay's Disease (Corynebacterium rathayi (E.F. Smith) Dowson). An outbreak of Rathay's disease occurred in the northeastern part of the main orchard at the Station, Ste. Anne de la Pocatiere in June. The affected area had been sown recently with seed, very probably of Danish origin. The symptoms on the leaves, stems and pedicels were typical of the disease. Half the plants were affected and the damage to these was severe. This is the first record of its occurrence in Canada (A. Payette).

Brown Stripe (Scoletotrichum graminis) was slight to moderate on seed plots of Oron at O.A.C., Guelph, Ont. (J.D. MacLachlan).

ELYMUS

Ergot (Claviceps purpurea) in the honey-dew stage was found in the University plots, Saskatoon, Sask., in July (H.W.M.).

Powdery Mildew (Erysiphe graminis). Infection slight on E. condensatus and moderate on E. junceus in the plots at Edmonton, Alta. (M.W. Cormack).

Leaf Rust (Puccinia Clematidis). Infection was a trace on E. junceus and slight on E. condensatus in the same plots (M.W.C.).

FESTUCA - Fescue

Leaf Blotch (Helminthosporium dictyoides). Trace on Mofon (F. pratense) in an O.A.C. seed plot, Guelph, Ont. (J.D. MacLachlan).

Bacterial Leaf Spot (Bacterium Agropyri). A trace of infection was found on F. rubra at Olds, Alta. (M.W. Cormack).

Snow Mould (low-temperature basidiomycete). The damage was severe in fields of F. rubra at Sangudo and Fallis, Alta. (M.W. Cormack).

LOLIUM PERENNE - Perennial Rye Grass

Leaf Spot (Helminthosporium siccans). Infection was mild on Peron in a seed plot at O.A.C., Guelph, Ont. (J.D. MacLachlan).

PHLEUM PRATENSE - Timothy

Snow Mould (low-temperature basidiomycete). Damage was found in all 16 fields of timothy examined in west central Alta. in the early spring. It was estimated to be slight in 5 fields, moderate in 2, and severe in 9. It was also severe in several mixed stands of timothy and alsike clover (M.W. Cormack).

Leaf Spot (Heterosporium Phlei). Infection was slight in 2 fields in central Alta. and in the plots at Edmonton and Olds (M.W.C.). It was also slight on both Paton and Medon varieties in plots at O.A.C., Guelph, Ont. (J.D. MacLachlan).

Stem Rust (Puccinia graminis var. Phlei-pratensis) was observed at York, P.E.I. (R. Bagnall).

Brown Stripe (Scoletotrichum graminis). Infection was moderate and mostly on the lower leaves of Paton and Medon in the plots at O.A.C., Guelph, Ont. (J.D. MacLachlan).

POA - Blue Grass

Powdery Mildew (Erysiphe graminis). Infection was moderate in the plots at Edmonton, Alta. (M.W.C.).

Brown Stripe (Scoletotrichum graminis). Infection was slight on P. pratensis in the plots at Edmonton, Alta. (M.W. Cormack). It was a trace on Kenon (P. pratensis) in the plots at O.A.C., Guelph, Ont. (J.D. MacLachlan).

LAWNS and GOLF COURSES

Snow Mould (low-temperature basidiomycete). Damage was prevalent and severe at Edmonton and at other points in central Alta. Lawns and golf greens which had been treated with mercurials suffered little or no damage (M.W.C.). Snow mould was very rarely observed again in 1946 at Saskatoon, Sask. (T.C. Vanterpool).

III. DISEASES OF VEGETABLE AND FIELD CROPS

ASPARAGUS

STALK BLIGHT (Fusarium sp.). A number of stalks were attacked in a ½-acre planting in Lincoln Co., Ont., but none of the plants appeared severely affected (J.K. Richardson).

RUST (Puccinia Asparagi) moderately affected a bed of asparagus at Beaumont, Que. (R.O. Lachance).

ROOT ROT (Rhizoctonia Solani) was reported as causing severe injury from 2 places in Ont. (J.E. Howitt).

BEAN

GREY MOULD (Botrytis cinerea) slightly affected Scarlet Runner beans in the U.B.C. plots, Vancouver, B.C. (I.C. MacSwan).

ANTHRACNOSE (Colletotrichum Lindemuthianum). Diseased specimens were received from Prince Albert, Sask.; the disease is not common in Sask. (T.C. Vanterpool).

Due to the unusual severity of certain diseases of the dry or field bean in southwestern Ont. in 1946, a series of surveys of the important bean-growing areas in Huron, Middlesex, Kent, and Essex Counties were made to record the prevalence of disease in this crop. Anthracnose began to spread late in August and continued to increase until about the third week of September. In consequence, there developed an epidemic probably as widespread, if not as severe, as any previously encountered in southwestern Ont. This year, the relatively cool, humid weather of late August and early September was apparently extremely favourable for the rapid development and spread of the pathogen and for infection of the host.

Although the epidemic was general throughout the whole bean growing area, it was more severe in Middlesex than in Kent or Huron Counties. In some stands in Middlesex Co., the infection was estimated to be 90%; so many plants were killed and pod infection was so severe that yield must have been seriously reduced. In the Chatham-Ridgetown area of Kent Co., and in the southern part of Huron Co. about Exeter, relatively few plants were killed. About 20% of the pods were infected but many of them showed only 1-2 lesions per pod. Thus, in these areas the disease affected yield only slightly and the seed would be much safer for planting than that from the severely affected fields in Middlesex Co.

The dry-bean varieties grown most extensively in southwestern Ont. are Michelite and Michigan Robust, both apparently equally susceptible to anthracnose. In general early planted stands of both varieties are least severely infected. In one instance the variety Corvette growing alongside a heavily infected stand of Michelite remained virtually free of anthracnose (A.A. Hildebrand and L.W. Koch).

Some anthracnose was observed in a few fields in the Montreal district, Que., but in general the disease was much less severe than usual (E. Lavallée). Traces only of anthracnose were observed in P.E.I. (R.R. Hurst).

POWDERY MILDEW (Erysiphe Polygoni) made its appearance on leaves, pods, and stems of plants in late-sown fields of dry beans in southwestern Ont. Because of the large number of fields affected, the disease was definitely of economic importance. The only previous report to the Survey was from Que. (P.D.S. 5: 41) (A.A. Hildebrand, L.W. Koch).

HALO BLIGHT (Pseudomonas medicaginis var. phaseolicola) was severe in a canning crop of Black Valentine at Vernon, B.C.; the seed had been purchased from a Montreal firm. Infection was severe on several varieties in the plots at the Station, Prince George. Diseased specimens were received from Revelstoke (G.E. Woolliams). Halo blight was prevalent and often severe in gardens at Edmonton and throughout central Alta. In southern Alta. the disease, although prevalent, was not severe, in part because the weather was unfavourable for its spread. The disease was particularly hard to find in fields of beans grown under contract for canning. A possible explanation of this scarcity may be that disease-free seed was supplied by the company to the growers. Infection ranged from a trace to severe, depending on the variety, in the plots at Edmonton, Lacombe, and Olds. A slight infection was present on only one variety, Round Pod Kidney Wax, at Lethbridge (M.W.C.). Halo blight was rather common and widespread in plantings throughout Sask. In some gardens, the crop was a total loss. Sometimes bacterial blight was also present (R.J. Ledingham). A slight infection was observed at Nappan, N.S. (D. Creelman).

STEM ROT (Sclerotinia sclerotiorum) affected less than 1% of the plants in a field grown for seed at Armstrong, B.C. (G.E. Woolliams).

RUST (Uromyces appendiculatus). Although rust was observed on both Michelite and Michigan Robust in southwestern Ont., only in a few fields of the latter variety was there possibly a reduction in yield (A.A. Hildebrand, L.W. Koch). A trace was recorded in Queens Co., P.E.I. (R.R. Hurst).

COMMON BLIGHT (Xanthomonas phaseoli) caused extensive damage to a seed crop at Armstrong, B.C.; it was found in several stringless varieties being grown in a trial plot at Grand Forks (G.E. Woolliams). The disease was seen in numerous gardens in Sask., frequently causing total loss of the crop. It sometimes occurred along with halo blight (R.J. Ledingham). A slight infection was present in Kidney Red at the Botanical Garden, Montreal, Que. (J.E. Jacques). A light infection was observed in Yellow Eye at Kentville, N.S. (J.F. Hockey). A trace was recorded in Queens Co., P.E.I. (R.R. Hurst).

BACTERIAL BLIGHT (Common Blight and Halo Blight). Diseased specimens mostly affected by common blight were received from Moose Jaw and Regina, Sask. (T.C. Vanterpool).

Near mid-August, 2 weeks prior to the outbreak of anthracnose, bacterial blight (both blights are believed to be present, but no attempt was made to isolate and identify the pathogens) was reaching epidemic proportions in southwestern Ont. The disease was most destructive in an area a few miles east of Chatham in Kent Co. Here, high mortality of the plants was due to stem girdle or joint-rot, a phase of the disease described by L.L. Harter and W.J. Zaumeyer (U.S.D.A. Techn. Bull. 868. 1944, p.62) and not previously recognized in Canada. Stem girdle seriously curtailed production in many commercial stands. In the same area, pod infection was also more severe. Michelite and Michigan Robust appeared to be equally susceptible (A.A. Hildebrand, L.W. Koch).

Bacterial blight was more prevalent than anthracnose in the Montreal district, Que., but in general it was less prevalent than in 1945 (E. Lavallée). Bacterial blight was severe in L'Islet and Kamouraska Counties on Brittlewax and Pencil Pod Black Wax. The Brittlewax seed was from a crop in which only traces of blight were present in 1945, the Pencil Pod from seed of a disease-free crop (R.O. Lachance).

CURLY TOP (Beta virus 1) affected 20 to 90% of the bean plants depending on the variety in small plots grown for seed at the Station, Summerland, B.C. (G.E. Woolliams).

MOSAIC (virus). Low percentages of affected plants were found in fields through the Okanagan Valley, B.C. (G.E. Woolliams). A few plants were affected at the Botanical Garden, Montreal, Que. (J.E. Jacques). Mosaic affected 1% of Bountiful Green Pod and 9% of Refugee in a planting at Ste. Anne de la Pocatière (B. Baribeau). Mosaic was observed occasionally in Queens Co., P.E.I. (R.R. Hurst).

BALDHEAD. In mid-June several stands of beans near Exeter, Huron Co., Ont., showed an abnormally high percentage of baldhead seedlings. The seed used in the affected fields was found to have come from a common source and upon examination proved to be dry and lifeless and obviously of poor quality. In the past, baldhead has been attributed to mechanical injury (L.L. Harter, Jour. Agr. Res. 40: 381-384, 1930). More recently, however, it has been shown that it may also be caused by a pathogen. R.H. Porter (Phytopath. 36: 168-170. 1946) has demonstrated that "soybean seed of high germinability when planted in Pythium-infested soil with a moisture content of 15% and retained at 10°C. for 7 or 10 days may be expected to produce a high percentage of "baldhead" seedlings". It may be noted that one grower who had a percentage of baldhead bean seedlings in one field lost a 20-acre adjoining field of sugar beet seedlings by black rot, caused by Pythium spp. (A.A. Hildebrand, L.W. Koch).

MAGNESIUM DEFICIENCY occurred in very small amounts in Queens Co., P.E.I. The deficiency was recognized by the characteristic chlorosis of the plants and was confirmed by tissue tests (R.R. Hurst).

SUN SCALD (non-parasitic) affected the leaves and more particularly the pods of plants in many stands in southwestern Ont. As the pods approach maturity it is often very difficult to distinguish incipient anthracnose lesions or dried-up bacterial lesions from the brown or reddish spots caused by sun scald. Such a distinction becomes important in the appraisal of the disease situation in beans being grown for registration. Examination of beans in several test plots indicated that varieties and selections are not equally subject to sun scald (L.W. Koch, A.A. Hildebrand).

BEET

SCAB (Actinomyces scabies) was observed in one field at St. Janvier, Terrebonne Co., and in another at St. Martin, Laval Co., Que. (E. Lavallée, R. Desmarteau). Traces were noted in a garden at Charlottetown, P.E.I. (R.R. Hurst).

CERCOSPORA LEAF SPOT (C. beticola) was observed at Charlottetown, P.E.I. (R. Bagnall).

DOWNY MILDEW (Peronospora Schachtii) again appeared on beet stecklings and seed crops at Grand Forks, B.C., but it was less prevalent than in 1945 probably because affected roots were largely used for food (G.E. Woolliams).

INTERNAL BLACK SPOT (boron deficiency). Affected specimens from the Montreal district, Que., were received from E. Lavallée (R.O. Lachance).

CABBAGE

CLUB ROOT (Plasmodiophora Brassicae). Diseased specimens were received from Fort William, Ont., where it was claimed that the disease was causing serious damage to the crop (J.E. Howitt). A special survey was made in 1946 about St. Martin, Ste. Dorothée, St. Elzéar and St. Vincent de Paul, Que. Club root was found in every one of the fields visited. This disease is second to none in importance to cabbage growers on Isle Jesus (E. Lavallée, R. Desmarteau). A scattered infection was observed in 2 gardens in Queens Co., P.E.I. (R.R. Hurst).

SCLEROTINIA ROT (S. sclerotiorum) severely affected one lot of 50 cabbages in storage at Charlottetown, P.E.I., in October (R.R. Hurst).

BLACK ROT (Xanthomonas campestris). In patches in a 2-acre field at Birds Hill, Man., 75% of the cabbages were destroyed by black rot, or an average loss of 15% of the crop (W.A.F. Hagborg). A diseased specimen was received from Foresters Falls, Ont. (L.T. Richardson).

CARROT

BLACK ROT (Alternaria radicina) caused some damage to carrot crops, both in storage and in the field in sections of the B.C. Interior (G.E. Woolliams). Black rot was not uncommon on carrots from the 1946 crop at the University, Saskatoon, Sask.; the roots had been stored at a low temperature (R.J. Ledingham).

GREY MOULD (Botrytis cinerea) caused a rot of 42% of the roots in a market lot at Charlottetown, P.E.I.; the roots were not of local origin (R.R. Hurst).

LEAF SPOT (Cercospora Carotae) caused severe defoliation in 2 gardens in the Guelph district, Ont. (J.D. MacLachlan). It was found in late summer in about 10 fields about St. Martin, Que. It appeared to be quite widespread (E. Lavallée).

SOFT ROT (Erwinia carotovora) caused severe damage to winter carrots in a few gardens in Que., up to 50% of the roots being destroyed (B. Baribeau).

ROOT KNOT (Heterodera marioni) was found in 15 fields of carrots at St. Janvier, Terrebonne Co., Que. Two of the fields were severely infested, 90-95% of the plants being affected. Certain growers declared that some of their fields are so badly infested that carrots can no longer be grown in them. This disease has not previously been observed (E. Lavallée, R. Desmarteau). Bottled specimens of carrots affected by root knot are preserved in the Mycological Herbarium. These specimens were collected by H.N. Racicot as follows: (1) St. Flore, St. Maurice Co., July 8, 1930; (2) do. Aug. 15, 1932; (3) Charlemagne, L'Assomption Co., Sept. 19, 1935. According to Mr. Racicot about 25% of the carrots were affected by root knot at St. Flore and 60% at Charlemagne. Inadvertently the nematode was not reported in the Survey (I.L. Conners).

SCLEROTINIA ROT (S. sclerotiorum) was found causing a rot in carrots in storage at Calgary, Alta., in November (A.W. Henry). Affected carrots were received from Moosimin, Sask., where it was stated to have been common in 1945 and 1946. Mention is made of its spread from carrots to potatoes in storage (T.C. Vanterpool). Specimen was received from St. Raymond, Que. (L.T. Richardson).

BACTERIAL BLIGHT (Xanthomonas carotae) was found affecting leaves and umbels of seed crops at Armstrong, Cawston, and Grand Forks, B.C. In one field at Armstrong a 10% infection was present on Guerande and Danvers (G.E. Woolliams). Trace to slight infections were found in many plantings in Man. (W.L. Gordon).

YELLOWS (Callistephus virus 1) occurred sporadically in some carrot seed crops at Grand Forks, B.C. (G.E. Woolliams). As in 1944 and 1945, symptoms of yellows developed in plants grown at Edmonton, Alta., from a seed lot from South America and were more pronounced than in plants in the check rows from seed produced in Canada (G.B. Sanford). Yellows was common in the Saskatoon area, Sask., in 1946, but the disease was late in showing up and no cases of severe injury were seen. It was also slight in a garden at Codette (R.J. Ledingham). Yellows was widespread in Man. (W.L. Gordon). Yellows affected 5 to 10% of Red-Cored Chantenay in a field in Norfolk Co., Ont.; many carrots were dwarfed and roots very hairy. A lighter infection was seen in carrots planted in a young peach orchard in Lincoln Co. (J.K. Richardson). Traces of yellows were found in about 20 fields about St. Martin, St. Janvier and Ste. Thérèse, Que.; infected plants were mostly at the ends of the rows. In general it was less prevalent than in recent years (E. Lavallée, R. Desmarteau). Infection varied from a trace

to 10% of the plants in the fields observed in Kings and Annapolis Counties, N.S.; it was commoner in earlier plantings (J.F. Hockey). Yellows affected 71% of the plants of Chantenay and 38% of Danvers Half Long in a planting in Queens Co., P.E.I.; this particular record is typical of the yellows situation in 1946 (R.R. Hurst).

CAULIFLOWER

YELLOWS (Fusarium conglutinans). About 50% of the plants were severely affected for several rows in the centre of a ¼-acre patch of Snowball in Lincoln Co., Ont., whereas the rest of the field was apparently healthy. Where the disease was present, a crop of Danish Ballhead cabbage showing similar symptoms was grown in 1945 (J.K. Richardson).

CLUB ROOT (Plasmodiophora Brassicae) was found very severely affecting 3 large fields at St. Martin, Laval Co., Que.; probably many other growers suffered losses from this disease (E. Lavallée).

WIRE STEM (Rhizoctonia Solani). Cauliflower seedlings were a complete loss in one hotbed at St. Martin and another at Côte de Liesse, Que., on account of wire stem (E. Lavallée).

CELERY

BLACK CROWN ROT (Centrospora acerina (Hartig) Newhall). In a recent note (Phytopath. 36 (10): 893-896) A.G. Newhall has reviewed the synonymy of and proposed the above combination for this species, originally reported by him as Ansatospora macrospora (Ost.) Newhall (I.L.C.). Black crown rot was found affecting 75% of the plants in a shipment of 150 cases from Thedford, Ont.; isolations from specimens submitted to the laboratory yielded several pure cultures of the organism (H.N. Racicot).

LATE BLIGHT (Septoria Apii-graveolentis). A slight infection was seen at Armstrong, B.C. (G.E. Woolliams). Late blight caused severe damage at Saskatoon, Sask., in a small garden where moisture was abundant. It also caused severe damage in a small planting at the Station, Scott (R.J. Ledingham, B.J. Sallans). Late blight was found in most fields inspected in the Montreal district, Que., but it was less prevalent than usual (E. Lavallée). A few infections were observed in the Quebec district, early in the season, but they were quickly controlled by the appropriate treatment (D. Leblond).

BLACK HEART (non-parasitic) caused severe injury in one small planting in Sask. (R.J. Ledingham).

STEM CRACKING (boron deficiency). One field on muck soil at St. Michel, Laval Co., Que. was severely affected. In 3 others damage was a trace to slight. Most growers now apply boron with the fertilizer with good results (E. Lavallée). A few plants of Golden Self Blanching bordering a field of Salt Lake at Deschambault were severely affected. The whole field of Salt Lake was generally stunted and a few plants were definitely diseased (R.O. Lachance).

CUCUMBER

SCAB (Cladosporium cucumerinum) was present in nearly every greenhouse crop of cucumbers in the Leamington district, Ont., in June, but the damage was slight (C.D. McKeen). A slight general infection was seen in a planting of nearly an acre in Norfolk Co. (J.K. Richardson). Traces of scab were observed in Queens Co., P.E.I. (R.R. Hurst).

BACTERIAL WILT (Erwinia tracheiphila). A trace to 2% of the plants were affected in fields in the Windsor-Leamington area, Ont.; disease incidence was very low in plots dusted to control the beetles (C.D. McKeen). Light, scattered infections were present in 3 large fields at St. Martin, Laval Co., Que. (E. Lavallée). Traces were present in a varietal test at the Station, Ste. Anne de la Pocatière (R.O. Lachance).

POWDERY MILDEW (Erysiphe Cichoracearum). Infection was generally heavy on leaves and petioles in a greenhouse planting in Lincoln Co., Ont.; the damage was negligible (G.G. Chamberlain). Powdery mildew was present in a few greenhouses with inadequate ventilation in Essex Co.; damage was moderate in one large greenhouse (C.D. McKeen).

WILT (Fusarium sp.). In several greenhouses in the Leamington area, Ont., a small number of plants were found infected (C.D. McKeen).

WILT (Mycosphaerella citrullina (O.C. Sm.) Gross.) caused moderate damage in many greenhouses in the Leamington area, Ont. (C.D. McKeen). This disease has been reported only once previously - in Alta. (P.D.S. 21: 35).

STEM ROT (Sclerotinia sclerotiorum). A few plants were killed in several greenhouses in Essex Co., Ont. (C.D. McKeen).

ANGULAR LEAF SPOT (Pseudomonas lachrymans). Infection was severe in gardens near Tofield, Drumheller, and Lethbridge, Alta. (M.W.C.).

MOSAIC (virus) caused severe damage with heavy losses in late spring and early summer in greenhouse cucumbers in the Leamington district, Ont.; in a few houses 30-50% of the crop was lost (C.D. McKeen).

EGG PLANT

VERTICILLIUM WILT (V. Dahliae) affected about 10% of the Black Beauty plants being grown for seed at the Station, Summerland, B.C. (G.E. Woolliams). Wilt severely affected 25% of the plants in one plot in Essex Co., Ont.; there was some evidence of varietal resistance (C.D. McKeen). Wilt affected about 15% of the Black Beauty plants, killing some and seriously affecting the yield of others in a planting in Norfolk Co. (J.K. Richardson).

KOHLRABI

CLUB ROOT (Plasmodiophora Brassicae). An affected specimen received from Montreal, Que. (L.T. Richardson).

LETTUCE

GREY MOULD (Botrytis cinerea) moderately affected lettuce, causing a rot of the leaves in contact with the ground in the vegetable plots, U.B.C., Vancouver, B.C. (I.C. MacSwan). Grey mould was observed about Grand Forks in some fields of seed lettuce in areas where air drainage was poor. In a field at Lytton, 5% of the plants in a seed crop of New York 12 were dying from grey mould and drop (q.v.) (G.E. Woolliams).

DOWNY MILDEW (Bremia Lactucae) was quite prevalent on most varieties in the vegetable plots, U.B.C., Vancouver, B.C., especially during sunny weather immediately after a rain (I.C. MacSwan). Downy mildew was quite general in the Armstrong district; as it attacked only the basal leaves, the damage was negligible (G.E. Woolliams).

BOTTOM ROT (Rhizoctonia Solani) was reported to have caused the loss of 5,000 heads in a market garden at Winnipeg and a serious loss of crop at Brandon, Man. The causal organism was isolated from diseased specimens (W.L. Gordon).

DROP (Sclerotinia sclerotiorum) was reported as follows: affecting 1% of the plants in a seed crop of Imperial 456, where it attacked the base of the stems and killed the plants, at Armstrong, B.C. (G.E. Woolliams); damage slight to severe in several gardens at Edmonton, Alta. (M.W.C.); specimen from greenhouse at Moose Jaw, Sask. (T.C. Vanterpool); 15% of the plants were destroyed in a 4-acre field of early lettuce in the Kingsville district, Ont. (C.D. McKeen).

MELON

BACTERIAL WILT (Erwinia tracheiphila) caused the death of up to 2% of the muskmelon plants in plots in which the beetles had not been controlled in Essex Co., Ont. (C.D. McKeen).

FUSARIUM WILT (F. sp.) was quite general in a commercial field of cantaloupes at Lillooet, B.C.; the pathogen was isolated. Infection was also a trace in a plot of Hales Best grown for seed at the Station, Summerland, B.C. (G.E. Woolliams). Wilt (F. bulbigenum var. niveum) could be found in every melon field in the Harrow, area, Ont. Damage was variable. In one field, in which the plants became infected early in the season, 35% of the crop was destroyed before harvesting. In most heavily infected fields some melons were picked before the plants died. In some plantations, the fungus caused a lesion at the stem end of the fruit (C.D. McKeen). A slight infection was observed in a patch in Norfolk Co., Ont. (J.K. Richardson).

LEAF SPOT (Alternaria cucumerina) appeared shortly before harvest in the Leamington area, Ont., and caused moderate damage in nearly all plantations. Defoliation was negligible where effective sprays were applied (C.D. McKeen).

ONION

NECK ROT (Botrytis Allii) caused slight to moderate damage to onions in storage at Edmonton, Alta. (M.W.C.). Few specimens of neck rot were received during the winter of 1945-46 and none in the fall of 1946. Weather conditions at harvest were undoubtedly better the past 2 seasons than in the fall of 1944 (R.J. Ledingham). Several samples were received in the fall of 1946 from Lincoln Co., Ont., but losses do not appear to be abnormally high (J.K. Richardson). Neck rot caused the loss of 20-25% of onions stored in private homes during winter 1945-46 in Kamouraska Co., Que. There was very little disease apparent in the field or at harvest, but it became prevalent after the onions were in storage for 2 months (C. Perrault).

SOFT ROT (Erwinia carotovora). Specimens were received from St. Raymond, Que. (L.T. Richardson).

DOWNY MILDEW (Peronospora destructor) appeared in only some fields of onion seed crops in the Grand Forks district, B.C.; infection was usually slight. The disease suddenly developed on both seed and bulb crops in some sections about Kelowna following cool, showery weather in June and early July (G.E. Woolliams). Diseased specimens were received from Chatham, Ont. (C.D. McKeen). Downy mildew was reported from several onion marshes in Ont. this year, but the damage was not as severe as in 1945 (J.E. Howitt). Downy mildew appeared at the Botanical Garden, Montreal, Que., and caused severe injury (J.E. Jacques). A moderate infection followed by Stemphylium, etc., was found at Ste. Pamphile (A. Payette).

SMUT (Urocystis Cepulae). Diseased onions were noted at Leamington, Ont. (C.D. McKeen). Smut affected 20% of the plants and caused about 10% loss in a field at St. Laurent, Que. (E. Lavallée).

YELLOW DWARF (virus) developed for the first time in the Grand Forks area, B.C., in 1946. The district is zoned for seed production and the disease was found only in the zone where Ebenezer is grown for seed. In one field 25% of the plants were affected, but in most infection ranged from a trace to 1%. Yellow dwarf was quite severe in 1945 at Vernon in seed crops of Yellow Globe Danvers, the bulbs of which had all come from one source. The disease was practically eliminated this year by using for seed production bulbs of the same strain grown in an isolated area. Bulbs that had been raised near affected seed crops were used only for food (G.E. Woolliams).

PARSNIP

STEM BLIGHT (Phomopsis canadensis Bubak & Dearn.). A specimen collected at the Station, Charlottetown, P.E.I., was received from R.R. Hurst. This is the first report to the Survey (I.L. Conners).

LEAF SPOT (Ramularia Pastinacae) moderately infected a planting in Brant Co., Ont. (J.K. Richardson).

PEA

LEAF and POD SPOT (Ascochyta Pisi) was found usually moderately infecting Early Windermere, Laxtonian, Giant Stride, Stratagem, and Director at Prince George, B.C. (G.E. Woolliams). The disease was present in many gardens at Edmonton, Alta., late in the season; infection was slight in the Olds plots (M.W.C.). Leaf and pod spot was apparently present in many fields and gardens in Man. Infection was only a trace in the Portage plains on July 15, but the disease was more common later. The organism was isolated from specimens from Portage la Prairie and Winnipeg (W.L. Gordon). A slight infection was found on late-sown Alderman in a garden at Beaumont, Que. (R.O. Lachance), and on Fenland Wonder at the Station, Kentville, N.S. (R.J. Baylis).

POWDERY MILDEW (Erysiphe Polygoni) was observed at Lytton, B.C. (G.E. Woolliams). Infection was severe in many gardens at Edmonton, Alta. in September; infection was a trace to moderate in plots at Olds and trace to slight at Lacombe (M.W.C.). Powdery mildew was common on both garden and field peas towards the end of the season in Man. (W.L. Gordon). Infection was moderate on all late varieties at Ste. Anne de la Pocatière (R.O. Lachance).

ROOT ROT (Fusarium spp.) affected small patches to entire fields of peas in the Creston area, B.C. In many cases, peas have been grown on the same ground for several years. The water level is high during early summer. Isolations yielded species of Fusarium contaminated by bacteria (M.F. Welsh). Root rot was found scattered through a field being grown for seed at Houston; affected roots showed a red discoloration characteristic of Fusarium, but isolations were not attempted (G.E. Woolliams).

Root rot destroyed virtually all the peas in nearly 2 acres of experimental plots at St. Sébastien, St. Jean Co., Que.; peas had been grown on the plots for 2 or 3 years (R. Desmarteau).

A field survey made of 8 pea-growing districts in northeast Sask. in 1946 revealed that the prevalence of Ascochyta diseases varied greatly in different areas. The crop was clean or infection was very slight in a few isolated areas where peas were being grown for the first or second year. In the Nipawin-Codette-Aylsham area, where a large acreage of peas had been grown for several years, MYCOSPHAERELLA BLIGHT (M. pinodes) was as prevalent as in 1945, in spite of the fact that care was taken to use only disease-free seed in the area. When pea stubble of the 1945 crop was examined in June the asci of Mycosphaerella were nearly mature. In general, pea trash is destroyed or buried by the farmers in the spring or summer, but it is not difficult to find infected straw in fields where the trash had been raked up and burned and barley sown. An experimental plot was established in a field in peas in 1944 and adjacent to one in peas in 1945. In part of the plot were sown seed from lots which were (a) free of disease, (b) slightly infected, and (c) moderately infected with M. pinodes. The plots were examined when the crop was ripening and were found to be uniformy infected. Disease-free seed of eight varieties, McKay, Guinivere, Austrian Winter, Early Blue, Dashaway, Chancellor, Alaska, and Laxton's Progress, was sown in another part; vines and pods of all varieties were uniformly infected when examined.

Four fields in the Kelvington area, which were found by field survey and seed examination in 1945 to be almost free of Ascochyta diseases, were inspected this year and found to be infected. Subsequent enquiries indicate that these diseases are now well established in the area.

All the fields surveyed in 2 well-isolated areas around Bjorkdale and Pelly were found free of Ascochyta. These areas were growing peas for the first time using seed free of disease from the Kelvington area. Severe frosts caused extensive damage to the crop and little seed is expected to be available for 1947. Smaller areas around Tisdale and Borden were also free of disease.

The largest pea-growing area in Sask., near Domremy, was diseased. This area is well suited to peas from the standpoint of climate and soil. Seed produced locally is planted year after year and no attempt has been made to have crops and seed inspected (H.W. Mead).

DOWNY MILDEW (Peronospora Pisi). A trace was found at Bridgetown, N.S. (J.F. Hockey).

BACTERIAL BLIGHT (Pseudomonas Pisi). Infection was slight to moderate in the plots at Olds, Alta.; the 8 standard varieties being grown were about equally affected. A trace was found on the varieties at Lacombe (G.B. Sanford). Bacterial blight was common in gardens at Saskatoon, Sask., and was moderate to severe on Dashaway at the University. It was present in the northeast pea area (H.W.M.). Surveys indicate that nearly 50% of the fields of field peas in the Portage plains, Man., were infected, some of them severely (W.A.F. Hagborg).

ROOT ROT (Rhizoctonia Solani) caused slight damage to Early Sweet at Lacombe, Alta. (M.W.C.).

LEAF SPOT (Septoria Pisi). Infection ranged from a trace to slight in the plots at Olds and from a trace to moderate at Lethbridge, Alta. (M.W.C.).

RUST (Uromyces Pisi). A trace occurred in a planting of Wis. Early Sweet at Lawrencetown, N.S. (J.F. Hockey).

PEPPER

VERTICILLIUM WILT (V. Dahliae). In two large fields of peppers in the Harrow district, Ont., 1% of the plants was infected; in both fields the disease appeared in localized areas (C.D. McKeen).

MOSAIC (virus) affected a small percentage of the plants in a ¼-acre planting in Norfolk Co., Ont. (J.K. Richardson).

POD SPOT (non-parasitic) was widespread in Essex Co., Ont.; losses were heavy in some fields (C.D. McKeen).

POTATO

The Plant Protection Division, Science Service, has supplied the data on the certified seed potatoes produced, the acreages of the leading varieties passing inspection, the number of fields that failed to pass inspection, and the average percentage of black leg, leaf roll, and mosaic found in the fields. All fields entered for certification are planted with foundation or foundation A seed.

Table 4. Seed Potato Certification:
Number of Fields and Acres Inspected, 1946

Province	Number of Fields		Fields Passed	Number of Acres		Acres Passed
	Entered	Passed	%	Entered	Passed	%
P.E.I.	7,530	6,590	87.4	35,583	31,675	89.0
N.S.	552	498	90.2	1,273	1,158	90.9
N.B.	3,079	2,282	74.1	20,692	15,528	75.0
Que.	894	617	69.0	2,205	1,486	67.4
Ont.	939	661	70.4	3,036	2,168	71.4
Man.	137	91	66.4	373	211	56.6
Sask.	142	101	71.1	128	103	80.5
Alta.	263	224	85.1	709	592	83.5
B.C.	662	564	85.2	2,666	2,335	87.5
Total	14,198	11,628	81.9	66,665	55,256	82.8
Previous Yearly Totals						
1945	11,267	9,501	84.3	50,646	40,866	80.7
1944	8,500	7,567	89.0	31,633	28,616	90.4
1943	9,562	5,520	57.7	34,947	19,148	54.8
1942	7,947	5,023	62.2	29,981	18,875	62.9

Acres Entered		Acres Passed	
1945	50,646	1945	40,866
1946	66,665	1946	55,256
Increase of 16,019 or 31.6%		Increase of 14,390 or 35.2%	

Table 5. Seed Potato Certification: Acreage Passed by Varieties, 1946.

Variety	P.E.I.	N.S.	N.B.	Que.	Ont.	Man. Alta.	B.C.	Total
Irish Cobbler	13,765	176	1,390	148	390	169	3	16,041
Green Mountain	9,264	158	3,887	1331	81	1	154	14,876
Katahdin	2,388	525	8,150	5	1274		25	12,367
Sebago	6,188	186	172	1	48	10		6,605
Bliss Triumph	5	91	1,757			60	1	1,914
Netted Gem	1					529	1211	1,741
White Rose						12	789	801
Chippewa	4		27		302	6	5	344
Warba		15	2		21	51	58	147
White Bliss			142					142
Sequoia	55						2	57
Rural New Yorker					44			44
Early Ohio						38		38
Other Varieties	5	7	1	1	8	30	87	139
TOTAL	31,675	1158	15,528	1486	2168	906	2335	55,256

Table 6. Seed Potato Certification: Rejected on Field Inspection, 1946.

Province	Leaf Roll	Mosaic	Ring Rot in field	Ring Rot on farm	Black Leg	Adjacent Diseased Fields	Foreign Varieties	Misc.	Total
P.E.I.	321	181	24		72	78	98	166	940
N.S.	26	5			8	5	1	9	54
N.B.	489	5	197	61	9	24	12		757
Que.	29	21	107	18	26	31	2	43	277
Ont.	62	2	40	50	13	36	17	58	278
Man.			24	9	4	2		7	46
Sask.	1		21		1			18	41
Alta.	12				10	4		13	39
B.C.	21	11			10	14	6	36	98
TOTAL	961	225	413	138	153	194	136	350	2,570
Rejections as a percentage of fields:									
Entered	6.7	1.6	2.9	1.0	1.1	1.4	1.0	2.5	18%
Rejected	37.4	8.7	16.0	5.4	5.9	7.5	5.4	13.7	100%

Table 7. Seed Potato Certification: Average Percentage of Disease found in Fields, 1946.

Average Percentage of disease found in	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
Fields entered: (first inspection)	%	%	%	%	%	%	%	%	%
Black Leg	.12	.06	.02	.19	.02	.19	.07	.23	.10
Leaf Roll	.54	.39	1.30	.20	.09	-	.16	.17	.20
Mosaic	.22	.10	.07	.14	.02	.01	.04	.01	.28
Fields passed (final inspection)									
Black Leg	.04	.05	.01	.07	.01	.14	.02	.07	.03
Leaf Roll	.17	.23	.30	.11	.05	-	.07	.06	.05
Mosaic	.07	.06	.08	.08	-	-	.01	-	.05

The potato seed crop grown in 1946 was the largest since the certification service was organized. The percentage of crop passing certification was also high. Although leaf roll accounted for the largest number of rejections, ring rot was the chief cause of rejection in Sask., Man., Ont., and Que. and was second only to leaf roll in N.B.

COMMON SCAB (Actinomyces scabies) was observed in all parts of B.C., but was more severe in the Interior and Northern sections than elsewhere (H.S. MacLeod). Common scab was a greater problem than usual in the Central and Northern districts of Alta.; over 50% of the seed lots are affected by scab, the amount being mostly slight to moderate. Some Netted Gem lots were also affected, which is unusual for the variety (J.W. Marritt). An attempt to increase the amount of Irish Cobbler seed in Sask. was only partially successful due to scab. Many lots averaged 45% slight scab on clay soil and 100% severe scab on some bush soils in south and central Sask. (A. Charlebois). A trace may be found in most fields in Man. and northwest Ont. (D.J. Petty). Slight scab was general in southwestern Ont., but it was less prevalent than in 1945 (F.J. Hudson). It was rather prevalent in central Ont. in 1946. In Dufferin, Durham, Peel, and Wellington Counties, the soil is fairly alkaline and loose textured, and with suitable temperature and moisture scab frequently reduces the percentage of marketable crop by 25-50%. A good mid-season scab-resistant variety would be of great value. The disease was of minor importance in northern Ont. (W.L.S. Kemp). Scab was prevalent along the lower St. Lawrence, Que. The season was favourable for scab development, the temperatures being high and rainfall low in July. In some cases where fresh manure was used infection was 10-30% (B. Baribeau). Scab was more noticeable than usual in N.B., but only in a few instances was a high percentage of tubers affected (C.H. Godwin). Common scab was prevalent in most districts in N.S. in 1946. Infection usually was not more than 10% of the tubers, but in one lot 90% were affected (R.C. Layton). As is usual in a dry season, common scab was more or less prevalent in all parts of P.E.I. In some instances infection was severe and the scabby tubers went to starch factories (S.G. Peppin). Scab infection was trace to severe on Irish Cobbler and Green Mountain, trace on Katahdin, and absent on Sebago (R.R. Hurst).

EARLY BLIGHT (Alternaria Solani) was reported in less than 10% of the fields inspected in B.C., mainly in the Fraser Valley. Infection was slight or, in 2 fields, moderate (H.S. MacLeod). Infection was severe in one garden at Edmonton, Alta., and was observed in several others (M.W.C.). Early blight was observed in few fields in Alta., but on one farm infection was moderate to severe (J.W. Marritt). The disease was severe in a garden at Codette, Sask., causing heavy defoliation. Tomatoes in the same garden were also heavily infected (H.W. Mead). Early blight was severe in a garden at Camp Morton, Man., where it was present the previous year. In general it was less prevalent than in 1945 (W.L. Gordon). Only traces of early blight were seen in Man., but in northwestern Ont. infection was slight to moderate and in two fields severe (D.J. Petty). Slight infections were noted in a few fields in Ont. (F.J. Hudson, W.L.S. Kemp). A slight infection developed in a few fields in Que. in early August (B. Baribeau), and in a few fields in each area in N.B. (C.H. Godwin). Early blight was fairly common in most fields in N.S. particularly in Green Mountain and Irish Cobbler. It was first reported in Colchester Co. on Aug. 10 and in King's Co. on Aug. 16. In one crop 12% Alternaria tuber rot was reported (R.C. Layton). Early blight was present in slight to moderate amounts in a few fields in P.E.I. (S.G. Peppin). Early blight was very prevalent and destructive on the late-blight resistant potato lines (Fredericton material) when grown at Charlottetown (R.R. Hurst).

GREY MOULD (Botrytis cinerea) caused the premature death of affected plants in several fields along the Lower St. Lawrence, Que. The yield of affected plants was one half or less that of healthy plants. Infection usually took place at the base of the lower petioles and then spread rapidly up and down the stem. The disease was favoured by moist weather (C. Perrault).

BACTERIAL RING ROT (Corynebacterium sepedonicum). British Columbia is particularly fortunate in being virtually free of bacterial ring rot. Several factors are believed to have contributed to this position. Besides the provincial regulations and publicity concerning this disease, a high percentage of the crop is grown from certified seed, and most of the table stock brought into the province has been inspected by the Dominion Fruit Inspectors and is handled through 40 agents.

In a careful re-survey of the Courtenay district, a trace of ring rot was found on 4 farms. The seed was all from the same source, in which a trace of ring rot was suspected the year before, but its presence was not confirmed upon laboratory examination. Field inspections for ring rot in the coastal areas had to be abandoned because late blight greatly reduced the possibility of detection.

Due to a shortage of table potatoes considerable quantities were imported during the winter and spring of 1946. Over 13,500 tons were inspected. No ring rot was detected in some 4000 tons of new potatoes imported from California. In the 9,500 tons of old potatoes, which were received from Wash., Ore., Ida., Mont., Neb., and Calif., ring rot was detected in almost 25% of the tonnage. Most of the shipments were U.S. No. 1 size B grade; and "left a lot to be desired from the standpoint of quality and freedom from disease." All lots in which ring rot was detected were detained and could only be sold to large users away from potato

producing areas, and storage spaces were disinfected before new stocks were moved in.

No ring rot was detected in 50 cars of certified seed potatoes brought into B.C., 32 from other provinces and 18 from the United States (W.R. Foster).

The amount of ring rot present in Alta. was again reduced in 1946. The disease was found on 103 farms out of 1637 inspected. It was present in nearly 900 acres, a decline of 180 acres from the previous year. There was also less disease than formerly in the infected fields.

Measures to control ring rot were adversely affected by two factors. Due to table stock being in short supply it was necessary to import potatoes from the United States. Many of these stocks were infected with ring rot and efforts to restrict their distribution to the institutional trade were only partially successful. It is known that some were planted in outlying districts of the province. In consequence, ring rot now probably occurs outside the quarantine areas.

Due to the extreme shortage of seed potatoes of early varieties, 5 carloads of U.S. Certified Irish Cobbler seed potatoes were imported from one firm in North Dakota for planting in the quarantine areas in southern Alta. Later it was found that each carload contained ring-rot infected tubers in spite of them being certified (J.L. Eaglesham). Upon enquiry from Mr. Eaglesham, it was learned that 67 growers are known to have planted these potatoes on their farms. Instructions were given in the spring, as soon as it was learned that the seed was infected, that all the crop be dug and sold on the early market as new potatoes. When the survey was made in September it was found that only a small number of fields were left undug. Most of these fields were too ripe to diagnose the disease by foliage symptoms. In the few remaining fields, it was estimated that 1/3 to ½ of the fields were affected by ring rot. In 7 infected fields percentage of infected plants was 1% in 2 fields, 5% in 3, 10% in one, and 25% in one. It seems that quite substantial amounts of ring rot must have been present in some of the seed lots in these 5 carloads (I.L. Conners).

In Sask., 21 fields out of 142 entered for certification were rejected on account of ring rot. The disease was also seen in several commercial fields; damage was particularly severe in a field of Netted Gem at Lumsden (A. Charlebois). No special survey was made for ring rot in Sask. in 1946. However, diseased specimens were received from 8 new places. The spread is in part due to the planting of table stock imported from Minn. and N.D.; ring rot was found in 8 of 14 such carloads examined at Saskatoon. Due to a crop failure in some sections of Sask. some of these potatoes were probably used for seed, in spite of warnings to the contrary (R.J. Ledingham).

Bacterial ring rot caused the rejection of 33 fields in Man. and 15 in northwest Ont. (D.J. Petty). In Ont., most of the rejections were in Durham Co. and about Sudbury (W.L.S. Kemp). The Provincial Department of Ontario conducted its annual survey of table stock. The area surveyed in 1946 was greatly enlarged to include important sections in Northern and Eastern Ont. In all, 635 cases of ring rot were found of which 499 were new. The percentage of repeat cases was unusually high - 60 fields from 264.

The cases last year were in areas which had been surveyed before and on most farms the disease was causing little damage. In consequence growers, it is thought, were not careful about their clean-up (J.K. Richardson, L.T. Richardson, H.N. Racicot).

In Que., bacterial ring rot was present in 107 fields out of 894 inspected, or 11.9% compared with 8.6% in 1945. This increase is attributed to poor disinfection of implements and lack of sanitary precautions. This disease was particularly prevalent in Témiscouata, Chicoutimi and Lake St. John districts where 78 fields were disqualified out of 463.

During inspection of the crop entered for certification, 378 commercial fields planted with table stock were visited on neighbouring farms throughout Que. Of this number 74.6% were found affected by ring rot, a trace to 10% of the plants showing foliage symptoms. Bacterial ring rot was also prevalent in the southern districts of the province (B. Baribeau). Ring rot caused the rejection of 52 strains of seed in N.B. Conditions were favourable for the development of symptoms. Table stock is in very bad condition and 1946 was the worst season on record (C.H. Godwin).

A survey for bacterial ring rot was conducted by the N.S. Department of Agriculture under the supervision of A.E. McCallum, Plant Protection Office, St. John. The survey covered Kings Co., most of Annapolis Co. and portions of six others. In all 1414 fields comprising 1546.7 acres were examined. Ring rot was found in 24 plantings as follows: Annapolis 2 garden plots, Digby 1 garden, Hants 2 gardens, Cumberland 7 fields (4 acres) and 1 garden, Kings 6 farms with 8 fields (9 acres) and Pictou 3 fields (4 acres). No infection was found in Antigonish and Colchester Counties. Suspected material was sent to J.F. Hockey for verification. An intensive survey was also conducted in the seed producing area on the North Mountain, Kings Co., and in that of Colchester Co. No ring rot was found in either area. In Kings Co., infection almost certainly came from the dehydration plant, where potatoes from other provinces were processed, through the use of contaminated bags or barrels. In other counties growers had purchased table stock potatoes, in part of U.S. origin, and used them for seed. One grower bought from P.E.I. table stock known to have had ring rot the year before. These potatoes were planted by himself and a neighbour. Previous to this survey bacterial ring rot was not known to exist in N.S. As the disease was found to occur in small fields and garden plots and was not found established in any of the main potato sections, there is considerable hope that it can be brought under control. More intensive work will be carried out in 1947 (A.E. Roland, R.C. Layton). Ring rot was found in P.E.I. in one district where the disease was detected 2 years before and in 2 districts previously free from it. In all there were 27 positive cases, 8 in seed and 19 in table stock (S.G. Peppin).

In the past year, a new variety, Teton, was distributed by the U.S. Department of Agriculture. Tests under the National Potato Breeding Programme in Maine and Wyoming have shown that Teton is resistant but not immune to ring rot (W.A. Riedl, F.J. Stevenson and Reiner Bonde, Am. Potato Jour. 23(11) : 379-389. 1946). Trials conducted at Ottawa in 1946 showed

that Teton is resistant, but that a fairly high percentage of plants may become lightly infected. The variety might, therefore, act as a carrier, and growers of the variety were warned to take extra precautions to prevent their stocks becoming infected (H.N. Racicot).

Mr. B. Baribeau, Seed Potato Certification Office, Post Office Bldg., Ste. Anne de la Pocatière, Que., has prepared a useful mimeographed bibliography on bacterial ring rot (I.L.C.).

BLACK LEG (Erwinia phytophthora) was found in 97 (14.6%) of the fields entered for certification in B.C. and caused the rejection of 10. This was an increase over 1945. The disease was particularly severe in the Fraser valley on peat soils. In this district rainfall was abundant until July 1 (H.S. MacLeod). Black leg was unusually prevalent in garden and commercial plantings at Edmonton, Lacombe and Red Deer, Alta. (G.B. Sanford). Black leg was more prevalent than usual in seed potatoes in Alta. (J.W. Marritt). In general black leg was not prevalent in Sask., but in a few fields 5-10% of the plants were affected; one field was rejected. (R.J. Ledingham, A. Charlebois). Some rejections were recorded in Man. and Ont. (cf. Table 6). In Que., 26 fields were rejected out of 894 inspected. The disease was again almost entirely confined to the Chicoutimi and Lake St. John districts (B. Baribeau). Black leg was confined in N.B. to the Sebago variety imported for seed purposes. In several fields a high percentage of plants was infected and rot in the tubers caused some loss (C.H. Godwin). Black leg was quite severe in N.S., especially in Sebago; of the 8 fields rejected 7 were Sebago (R.C. Layton). Black leg was quite prevalent in P.E.I. especially in Sebago (S.G. Peppin). The average percentage of black leg was 2% in 10 fields of Green Mountain table stock, 1% in 15 fields of Irish Cobbler, and 4% in 15 fields of Sebago (R.R. Hurst).

BACTERIAL SOFT ROT (Erwinia ?carotovora) caused rapid breakdown and extensive damage to a crop of Netted Gem after harvest at Norquay, Sask. (A. Charlebois, L.T. Richardson). The disease was very prevalent in many lots of table stock and some seed potato fields in southwestern Ont. due, apparently, to high temperatures especially at digging time (F.J. Hudson).

WILT (Fusarium oxysporum) was reported in 116 or 17.3% of the fields inspected in B.C. and 3 were rejected. The disease was slightly less prevalent than in 1945 due probably to moisture being more abundant. It was much more severe in White Rose and Green Mountain than in Netted Gem (H.S. MacLeod). Wilt was moderate on light soils in Sask. (R.J. Ledingham). The disease was again prevalent in south, central and western Sask. (A. Charlebois). Wilt was much more prevalent in Man. and to some extent in northwestern Ont. than in 1945 (A. Petty). In central Ont. there was a marked increase of wilt over the previous year; seven fields were rejected (W.L.S. Kemp).

WILT (Fusarium and Verticillium). A small amount of wilt was found in 5% of the fields inspected and mostly located in southern Alta. (J.W. Marritt). The disease was not observed in the field in Que. (B. Baribeau). Wilt was quite common in fields throughout N.B. This is the first time that wilt was so pronounced (C.H. Godwin).

STORAGE ROT (Fusarium spp.). In all, 58 cases of storage rot were brought in for examination, January to April 1946, exclusive of cases found during the ring rot and nematode surveys in P.E.I. (R.R. Hurst).

STEM-END ROT (Fusarium Solani var. eumartii). A slight infection was found in a lot in Témiscouata Co., Que., during bin inspection (B. Baribeau).

RHIZOCTONIA (Pellicularia filamentosa (Rhizoctonia Solani) was slight in 459 fields, moderate in 49 and severe in 18 out of 662 inspected in B.C., being less prevalent than in 1945. Tuber infection was not severe (H.S. MacLeod). Rhizoctonia was general in a field at Houston, the perfect stage developing at ground level on most infected stems (G.E. Woolliams). Damage was moderate in 10% of the fields inspected and slight in the others in Alta.; the crop matured late and thus sclerotia were not abundant on the tubers at harvest (J.W. Marritt).

A slight infection was present in most fields in Man. and northwestern Ont. (D.J. Petty). Sclerotium development was usually slight to moderate on tubers at bin inspection in Ont. It was severe in one 13-acre field of Irish Cobbler on muck soil planted April 1 and still quite green in early September. The period of growth was apparently prolonged by use of DDT (F.J. Hudson, W.L.S. Kemp). A slight infection was noticed in fields in the Montreal and Chicoutimi districts, Que., with traces elsewhere. At bin inspection, a slight infection was found to be general (B. Baribeau).

Although rhizoctonia was reported in fields especially of the early varieties in N.B., the tubers were found to be singularly free of scurf at bin inspection (C.H. Godwin). Rhizoctonia was not noticeable in the field in N.S. but tuber infection was fairly general (R.C. Layton). Rhizoctonia was rarely noted in the field in P.E.I. but some sclerotia were found on tubers of Irish Cobbler from fields that matured early (S.G. Peppin).

STEM-END HARD ROT (Phomopsis tuberivora). A number of specimens were received from Courtenay, B.C. (W.R. Foster).

LATE BLIGHT (Phytophthora infestans) was found in 31% of the fields inspected in B.C. in 1946 compared to 6.7% in 1945. Where the crop was not protected losses were heavy. However, properly sprayed and dusted fields showed little foliage infection and tuber rot was negligible (H.S. MacLeod). A slight infection was observed on the lower leaves in a field of Netted Gem at Springside, Sask. An affected tuber was received from Norquay (A. Charlebois). Late blight was first observed in Man. on July 16 in the potato plots at the University by O. Olsen. Later in the month it was reported from Fort Garry, Rathwell, Kelwood, Neepawa, and Ste. Annes. Hot, dry weather in late July checked the disease and it was much less prevalent that in 1945 (W.L. Gordon). Infection was moderate to severe in the Dryden area, northwestern Ont. (D.J. Petty). Late blight was of little importance on potatoes in Ont. due to the absence of humid weather in late summer and fall and to improved spraying and dusting practice (W.L.S. Kemp). On account of the

excessively dry season there was no late blight reported in Quebec except from the Lake St. John and Chicoutimi districts and the South Gaspé, where precipitation was normal. It was reported in the Gaspé about Aug. 3, in the Eastern Townships on Aug. 12 and in Chicoutimi Aug. 23. Some tuber rot occurred, infection being a trace to 1% (C. Perrault, B. Baribeau). Owing to the hot, dry summer late blight did not appear in N.B. until September. The disease was most prevalent in late-planted fields and as high as 5% of the tubers were affected. Tuber infection in table stocks amounted to 30% in some cases (C.H. Godwin). Late blight was fairly general in N.S. but infection was light except in some late fields, which were not sprayed. It appeared first in mid-August. Some crops in unsprayed garden plots were reported a complete loss from rot. Infection was highest 50% (average 5%) in Cumberland Co., and highest 6.5% (average 1%) in Pictou. Little rot developed where a spray programme was carried out (R.C. Layton). Late blight was very prevalent in P.E.I. late in the season. Most of the Irish Cobbler crop escaped the disease as the season was dry and plants died down early. All late varieties stayed green due to the absence of killing frost. Nor was it possible to kill the vines artificially due to lack of material. In consequence blight continued to spread late in the season (S.G. Peppin).

PINK ROT (Phytophthora erythroseptica) was isolated in pure culture from tubers received from Cochrane, Ont. (L.T. Richardson).

PYTHIUM ROT (P. ultimum). W. Newton and C. Lines (Sci. Agr. 27 (2): 72-73. 1947) have shown that dusting the freshly cut sets with certain fungicides, particularly Fermate, greatly reduces the amount of rot that develops when the sets are planted (I.L.C.).

LEAK (?Pythium ultimum). Affected specimens were received from Trout Mills, Ont.; the trouble developed in 7-10 days after digging (L.T. Richardson).

STEM ROT (Sclerotinia sclerotiorum) was observed in several fields in the Fraser Valley, B.C. In two fields of White Rose it was severe and caused the death of many haulms, but the attack came late and apparently caused little reduction of yield (H.S. MacLeod).

SILVER SCURF (Spondylocladium atrovirens) was reported as follows: slight infection in a few lots at bin inspection in Que. (B. Baribeau); prevalent in one lot of tubers submitted for tuber indexing in N.B.; infection varied from slight to severe on the individual tubers (C.H. Godwin); very little seen in N.S. (R.C. Layton); slight infection in a few late fall shipments from P.E.I. (S.G. Peppin).

POWDERY SCAB (Spongospora subterranea) was very severe on smooth-skinned varieties on peat soils in the Cloverdale district, B.C. Many fields produced crops fit only for the glucose factory. One 10-acre field entered for certification passed field inspection but at harvest the 200 ton crop was unfit for seed. The crop was sold to the factory for $15 per ton on account of powdery scab, instead of realizing $35-40 per ton as table stock or even better prices as certified seed (H.S. MacLeod). A slight to moderate infection was observed in Témiscouata and Kamouraska Counties, Que.; a slight infection was found in one bin in the Chicoutimi

district (B. Baribeau). A little powdery scab was found in 3 lots in N.S. (R.C. Layton).

STEMPHYLIUM LEAF SPOT (S. consortiale (Thum.) Groves & Skolko) is similar to early blight except that the spots are lighter brown and lack the concentric rings typical of early blight. This leaf spot is general, although usually slight, in B.C., as is early blight. It is favoured by high humidity. Groves and Skolko have reported its occurrence on seeds of agricultural crops, but the fungus has not been previously recorded as a pathogen of potato. An account of the disease has been published in Sci. Agr. 27(3); 130-135. 1947 (N.S. Wright).

WILT (Verticillium spp.) was observed in several fields of White Rose and 2 of Green Mountain in B.C. (H.S. MacLeod). Wilt was not uncommon on light soils in Sask. (R.J.L.). Wilt was reported in 29 fields out of 498 inspected in N.S. and the average infection in the infected fields was 0.4%. Specimens from all affected fields were sent to the laboratory, Kentville, for determination (R.C. Layton). Wilt is very common in Sebago and is particularly troublesome in fields of table stock in P.E.I. (R.R. Hurst). Wilt caused the rejection of 43 fields in P.E.I.; it is more prevalent in Sebago than in other varieties (S.G. Peppin).

LEAF ROLL (virus) was found in 170, or 25.9% of the fields inspected in B.C. and caused the rejection of 21. It was about half as prevalent as the previous year (H.S. MacLeod). It was recorded in 29% of the fields inspected in Alta., but infection was generally low. The increase in affected fields was in part due to leaf roll being present in imported stock (J.W. Marritt). Leaf roll caused rejection of one field and percentage of infection was higher than usual in Sask. (A. Charlebois). Leaf roll was severe in some plantings, particularly in city gardens (R.J. Ledingham). Only traces of leaf roll were noted in Man. and northwestern Ont. (D.J. Petty). The increased use of DDT has greatly improved control of leaf hoppers, but not, apparently, of aphids. Leaf roll caused more rejections in central Ont. than all other diseases combined (W.L.S. Kemp). Leaf roll was slightly more prevalent in Que. than in 1945 and caused the rejection of 29 fields. Leaf roll became more prevalent the closer the fields were to the south and southwestern parts of the province (B. Baribeau). Leaf roll continues to be a serious problem in N.B. Although the disease was about as prevalent as last year, conditions were favourable for current season spread and it is suspected that some spread may have occurred (C.H. Godwin). Leaf roll was much more prevalent in N.S. compared with the all-time low of 1945. (R.C. Layton). Leaf roll was more prevalent than in 1945 and again infection was greatest in those sections of P.E.I. nearest to the mainland of N.B. (S.G. Peppin). Examination of table stock fields in August revealed average infection of 23% in Irish Cobbler and Green Mountain fields (R.R. Hurst).

MOSAIC (virus) was found in 283 fields and caused the rejection of 11 in B.C. The disease was present in more fields but the level of infection was lower than in 1945 (H.S. MacLeod). Very little mosaic was recorded in Alta., Sask., Man., and Ont. (J.W. Marritt et al.). Mosaic caused the rejection of 21 fields as against 5 in 1945 in Que. This increase is attributed to the prevalence of aphids in potato fields in 1945.

In early August a mild type of mosaic appeared in some fields of Green Mountain in the Chicoutimi district but disappeared in about 2 weeks (B. Baribeau). Little change occurred in the amount of mosaic in N.B. in 1946 (C.H. Godwin). Mosaic was more noticeable than in past years in N.S. However, inbreeding appears to be more effective against mosaic than other virus diseases (R.C. Layton). Mosaic caused the rejection of 181 fields out of 752? inspected in P.E.I. As in previous years, Green Mountain was more affected than other varieties (S.G. Peppin). In a survey of table stock fields, the average infection was 29% in 35 fields of Green Mountain in P.E.I., 17% in 21 of Irish Cobbler, 6% in 7 of Sebago and 5% in 5 of Katahdin (R.R. Hurst).

PURPLE DWARF or HAY WIRE (virus) was found in 13% of the fields inspected in Alta., but the percentage of infected plants did not exceed 1% (J.W. Marritt).

PURPLE or BUNCH TOP (virus) was seen in 22% of the fields inspected in Alta. and in 13 fields the percentage of infected plants exceeded 1% on second inspection (J.W. Marritt). A low percentage of plants showing symptoms of purple top was observed in fields at Olds, Innisfail, Red Deer, Lacombe, and Edmonton. Tubers from plants affected in 1945 produced, without exception, normal plants in 1946 (G.B. Sanford). Purple top could be found in all districts of Man. and northwestern Ont., percentage of infected plants being a trace to 3% (D.J. Petty). An occasional plant was found for the first time in fields entered for certification in the London area (F.J. Hudson). Only an odd plant was found affected in fields inspected in central Ont. These plants were mostly located near road fences. It is believed that insects had transferred the virus from the common milkweed (W.L.S. Kemp). Purple top was seen in nearly every field visited between Toronto and Penetang. Symptoms suggestive of aster yellows were also seen on wild carrot and goldenrod growing along the fences (L.T. Richardson). Purple top was fairly common in Sebago and Katahdin in N.B. (C.H. Godwin). Purple top was observed in 54 fields, all of Katahdin and Sebago, in N.S. The percentage of infected plants was over 1% in 15 fields and the maximum was 2.4%. DDT was used quite generally with good results (R.C. Layton). Purple top was prevalent in P.E.I. in some fields of Irish Cobbler, in which it caused premature death and reduced yields. The disease affected a trace to 25% of the plants in some fields of Sebago (R.R. Hurst).

G. Beal and F.M. Gannon (Am. Pot. Jour. 22(12): 362-372. 1945) have made a statistical study of the distribution of purple top within fields planted in tuber units. They conclude that "the cause of purple top may operate variously over a field but with similar freedom along and across the rows of potatoes". There is also no tendency for the condition to be transmitted from an infected plant to its neighbour. In discussing these findings with D.J. MacLeod the hypothesis was advanced "that in the field an alternation between potatoes and some weed occurs and that the transmission of the disease from one potato plant to its neighbour may be rare" (I.L. Conners).

SPINDLE TUBER (virus) was found in one field in the Lethbridge district, Alta. (J.W. Marritt). A few affected plants were found in the Winkler district, Man. (D.J. Petty). A trace was observed in fields in central and eastern Ont. (W.L.S. Kemp). Spindle tuber was not reported in Que. this year, but some offshape tubers were found in some lots during bin inspection (B. Baribeau). The disease was reported in N.B. in a few cases, which were brought out by the extreme hot weather (C.H. Godwin). Spindle tuber was not reported in the field in N.S., but a few off-shape tubers were found in Katahdin, Sebago, and Green Mountain (R.C. Layton). The disease was found in P.E.I. in more fields than in 1945; it occurred mostly in Katahdin and Sebago (S.G. Peppin). Spindle tuber rarely exceeded a trace in table stock fields in P.E.I. (R.R. Hurst).

WITCHES' BROOM (virus) was the principal virus disease in crops of White Rose and Netted Gem grown for seed in the Cariboo district, B.C., in 1946. Infection ranged from 0.1% to 2.0%. Plants showing all stages of the symptoms from extreme dwarfing to very slight involvement of the upper foliage were seen within the same tuber unit (N.S. Wright). Witches' broom was found in 77 fields entered for certification in B.C. (H.S. MacLeod). Only about 2% of the fields inspected in Alta. contained witches' broom and the percentage was small (J.W. Marritt). Under Witches' Broom of potato (P.D.S. 25: 74) read: "15" for "12" in the phrase "the typical symptoms of Solanum virus 12" (I.L.C.).

BOLTERS (cause undetermined) were very widespread in Irish Cobbler in Kings and Queens Counties, P.E.I., and affected a very low to a high percentage of plants. Affected plants remained green long past the normal life of the variety giving the fields a spotty appearance. The name for the trouble was proposed by D.J. MacLeod (R.R. Hurst, H.L. McLaren).

CHEMICAL INJURY. One grower in N.B. lost a portion of his crop from storing his potatoes in barrels that originally contained copper dust (C.H. Godwin).

FALSE LEAF ROLL was general in a planting of Katahdin at Innisfail, Alta. (M.W.C.).

FROST INJURY. Due to unfavourable weather harvesting the potato crop in the Eastern Irrigation District, Alta., was delayed. About 25% of the tubers were still unharvested when they were frozen in the ground the third week of October (J.W. Marritt). Many fields of potatoes were frozen to the ground on July 23 across northern Sask. particularly towards the west and potato tops throughout Sask. were killed during the nights of Aug. 31 and Sept. 1 (A. Charlebois). Frost caused some damage in districts north of Montreal, Que.; elsewhere damage was slight (B. Baribeau). Frost caused over 2% loss in some fields of the late varieties in N.S. (R.C. Layton). There was considerable damage from contact frost throughout P.E.I. following heavy frosts freezing the soil and then the potatoes being turned out on the frozen ground by the potato digger before it has had time to thaw out. There were also several cases of low-temperature injury due to frost entering the storage house, which was, in at least one instance, improperly constructed (R.R. Hurst).

GIANT HILL was reported in 121 or 18.3% of the fields in B.C., compared with 40% in 1945 (H.S. MacLeod). Giant hill was seen in 29 fields in Alta., the infection never exceeding 1% (J.W. Marritt). An occasional affected hill was seen in fields inspected in Que. The number seems to be increasing, especially in Green Mountain (B. Baribeau). Giant hill was found in 7 fields of Green Mountain in N.S. and in 2 fields 1% of the plants were affected (R.C. Layton). Giant hill was reported from several districts in P.E.I. (S.G. Peppin).

MAGNESIUM DEFICIENCY was unusually severe in P.E.I. in 1946. There was a significant reduction in yield and grade due to this deficiency (G.W. Ayers).

NET NECROSIS was severe in some districts in B.C., particularly about Cloverdale, and caused the rejection of several crops. It seems to be most serious in Netted Gem, less so in Green Mountain and is rarely, if ever, found in White Rose (H.S. MacLeod). Net necrosis caused the rejection of one lot in Alta. A high percentage of necrosis was present in table stock grown on vacant lots about Calgary (J.W. Marritt). Net necrosis was found in a few lots at bin inspection in Que., a few tubers being slightly affected (B. Baribeau).

PHLOEM NECROSIS (?psyllids) caused severe damage to a planting of Warba at Calgary, Alta. (G.B. Sanford).

POTASH DEFICIENCY caused moderate to severe damage to a field of Irish Cobbler in Queens Co., P.E.I. We were first attracted by the general bronzing over the field. Closer examination revealed: young plants a dark green, older leaves yellowish, bronzing of leaves at tips and edges (R.R. Hurst).

STEM-END BROWNING. Slight browning was seen in a very small percentage of tubers in one lot at bin inspection in Que. (B. Baribeau). A few cases were reported in P.E.I. in December (S.G. Peppin).

VASCULAR DISCOLORATION varying from almost nothing to nearly 100% resulted from the application of herbicides to kill the tops in B.C., where many growers used herbicides this season. When lots were examined about 2 months later it appeared that the discoloration was disappearing (H.S. MacLeod). Severe vascular discoloration was observed in Chippewa potatoes which had been sprayed with Dow 66, Sinox General and Krenite in experiments in Ont. From 50 to 90% of tubers showed some browning throughout the vascular ring. Tests conducted 2 weeks later on Katahdin potatoes in a different locality caused very little discoloration (J.K. Richardson). Some stem-end browning was observed in N.B. during tuber inspection in crops from fields on which chemicals were used to kill the tops (C.H. Godwin).

SPLIT TUBERS were observed in a few fields along the lower St. Lawrence, Que. This condition was probably due to soil moisture permitting rapid development of the tubers after a prolonged period of drought. Rapid suberization of the exposed tissues prevented tuber rot (C. Perrault).

PUMPKIN

CURLY TOP (Beta virus 1). A trace was found in a seed crop at the Station, Summerland, B.C. (G.E. Woolliams).

RADISH

BLACK ROT (Alternaria Raphani). A small percentage of the roots was found infected in a seed crop at Kelowna, B.C., but no lesions were found on parts of the plant above ground. The pathogen was isolated (G.E. Woolliams).

BLACK ROT (Aphanomyces Raphani). Diseased specimens were received from Normandin, Que. (L.T. Richardson).

CLUB ROOT (Plasmodiophora Brassicae) was observed occasionally on radish in Queens Co., P.E.I. (R.R. Hurst).

RHUBARB

?MOSAIC (virus) has affected 7 plants in a planting of 16 in Queens Co., P.E.I. There is considerable necrosis of the stalks (R.R. Hurst).

CROWN ROT (cause unknown). Two plants out of five were affected in a 3-year-old planting in a city garden, Saskatoon, Sask. The plants grew from old plants that have never shown the disease (T.C. Vanterpool). The disease was prevalent in 1946 and caused severe damage in some plantings in and about Saskatoon (R.J. Ledingham).

SALSIFY

WHITE RUST (Cystopus cubicus) heavily infected Sandwich Island salsify in the Botanical Garden, Montreal, Que. (J.E. Jacques).

SHALLOT

YELLOW DWARF (Allium virus 1) affected 6% of plants in a garden planting at Kentville, N.S. (J.F. Hockey). Previously reported only on onion in B.C.

SPEARMINT

RUST (Puccinia Menthae) was reported to be causing damage to spearmint in the Thedford Marshes, Ont. (J.B. Howitt).

SQUASH

WILT (Erwinia tracheiphila). About 15% of the plants were stunted and showing the early stages of wilt in about ½-acre field of Hubbard squash in Lincoln Co., Ont. (J.K. Richardson).

POWDERY MILDEW (Erysiphe Cichoracearum) was observed on squash at Lytton, B.C. (G.E. Woolliams).

SWEET CORN

RUST (Puccinia Sorghi). Infection was a trace on Vineland Inbred #1 and moderate on V.I. #3 in a planting in Lincoln Co., Ont. (J.K. Richardson).

SMUT (Ustilago Maydis). A light infection was noted at Saskatoon and in a garden at Codette, Sask. (H.W.M.). Smut was prevalent again on sweet corn in many parts of Ont. (J.E. Howitt). Traces were observed in Queens Co., P.E.I. (R.R. Hurst).

PHOSPHORUS DEFICIENCY affected 2% of the ears in a garden in Queens Co., P.E.I. The deficiency was apparent by delayed maturity during the pollination period. Silks developed slowly; the cobs were defective, showing many seed rudiments and irregular kernel rows (R.R. Hurst).

TAMPALA

WILT (Sclerotinia sclerotiorum) destroyed 30% of the plants in a small planting in the University garden, Ft. Garry, Man. (W.L. Gordon).

TOBACCO

Dr. L.W. Koch has prepared the usual summary of tobacco diseases in Ont. and Que.

Diseases in the Seedbed

YELLOW PATCH (excessive nutrients) was prevalent in the new tobacco belt in Ont. during the early part of the season. However most cases were mild or moderate and with the advent of higher temperatures and better growing conditions recovery was the rule rather than the exception. In the old tobacco belt this trouble was reported or observed in only a few seedbeds.

DAMPING-OFF (Pythium sp., Rhizoctonia sp., etc.) was both prevalent and serious in seedbeds of all Ont. districts more particularly in the early part of the season. Most damage occurred in outside, cotton-covered seedbeds in Kent Co. where the rainfall was excessive soon after the seed was sown. In this area numerous beds were sown a second or a

third time due to death of the seedlings either prior to emergence or soon afterwards. Applications of Fermate later in the season definitely appeared to check the disease although early applications resulted in some injury.

BLACK ROOT ROT (Thielaviopsis basicola) caused some damage in Kent Co. and also in parts of Norfolk Co. In the latter district cases were usually traceable to imperfect steaming at the edge of seedbeds and sometimes along the central walks. Mild damage was reported from the tobacco-growing districts in Que. Little damage was reported from Essex Co., Probably because resistant varieties now comprise most of the acreage grown.

BLUE MOULD (Peronospora tabacina) again occurred in epidemic form throughout the tobacco-growing areas of Ont. The disease has not yet appeared in Que. Strong evidence of overwintering was observed in Norfolk Co. in a greenhouse where sanitation measures were not practised following an outbreak last year. This greenhouse was well isolated from others and no other outbreaks occurred elsewhere in the district for more than a week. There was also strong evidence of infection in both the old and new tobacco belts as the result of spore showers from across Lake Erie. This conclusion was reached because widespread outbreaks occurred within very short periods in certain districts with no previous cases of the disease having been reported or observed.

The symptoms of blue mould were unusual in a few seedbeds in the Leamington area where the fungus frequently invaded the main stem tissues causing elongated, black, necrotic streaks resembling those caused by black leg (Erwinia aroideae).

Attempts to control the disease in glass-covered seedbeds by periodically raising the temperature to 100-110°F, 3-4 hours per treatment, failed completely in certain beds whereas the treatment effectively checked the disease in others. Apparently the humidity is also an important factor: high temperature should probably be combined with low humidity for effective control.

Blue mould was responsible for the complete loss of some seedbeds in the old tobacco belt and for delayed development in more than half of the seedbeds in the entire province. In consequence, there was a shortage of tobacco seedlings of all types in certain districts and a general delay in planting throughout all districts.

BLACK LEG (Erwinia aroideae) was observed in some seedbeds of Essex and Kent counties, Ont. Loss of plants occurred only in outside, cotton-covered seedbeds.

MUSHROOMS caused considerable damage in cotton-covered seedbeds in Kent Co., Ont. Damage resulting from these fungi is of real importance in this area and has increased greatly during the past five years.

FRENCHING was observed in a few seedbeds of flue-cured tobacco in the Norfolk area, Ont. Damage was slight.

GRAY MOULD (Botrytis cinerea) was observed in one seedbed in Norfolk Co., Ont., being apparently responsible for considerable leaf destruction. It was observed that the seedlings were too numerous and consequently ventilation was inadequate in the affected bed.

Diseases in the Field

BLUE MOULD (Peronospora tabacina) caused less damage in the field in Ont. than during the previous year. Numerous infected plants were transplanted and infection was frquently observed on the lower leaves of plants in the field, but it usually did not continue to spread throughout the growing season as it did in 1945.

BROWN ROOT ROT (cause undetermined) was prevalent in the old tobacco belt on susceptible varieties and where tobacco was grown on the lighter soils usually after corn. Where the disease appeared symptoms were more severe than usual. In the experimental plots, the severest symptoms developed where no fertilizer was applied.

BLACK ROOT ROT (Thielaviopsis basicola) was mild throughout Essex and Kent counties, Ont., where drought conditions prevailed particularly during the latter part of the season. In certain parts of the new tobacco belt considerable damage occurred in poorly-drained fields. The affected areas appear to be gradually increasing throughout this belt. Black root rot was responsible for some damage in the L'Assomption area, Que.

MOSAIC (virus) was prevalent throughout both the old and new tobacco belts of Ont. and some damage resulted in both Ont. and Que. Apparently cucumber mosaic was responsible for most of the damage in Essex and Kent Counties.

STREAK (virus) again occurred in the Erieau district of Kent Co., Ont., and at various locations throughout the burley-growing districts; damage was slight.

FRENCHING (cause undetermined) was prevalent in certain areas of the new tobacco belt, Ont. It caused considerable damage in the Port Hope district.

SORE SHIN (Rhizoctonia Solani) was observed in some fields of Essex Co., Ont., where it was the primary cause of breakage of some mature plants at the ground level by high winds.

ANGULAR LEAF SPOT (Pseudomonas angulata) caused widespread damage in the old tobacco belt, Ont., towards the end of the growing season.

LEAF SPOT (physiological) was widespread on burley varieties throughout the old tobacco belt, Ont.; damage was severe in some fields.

RING SPOT (virus) was observed on isolated plants in numerous fields throughout the burley districts in Ont.

Other Observations

MOSAIC (virus) was general in flue-cured tobacco fields in Que., but heavy infections were found only in those where rotation was not practised (F. Godbout).

TOMATO

EARLY BLIGHT (Alternaria Solani) was reported as follows: heavy infection chiefly on the lower mature leaves in the University garden, Point Grey, B.C. (I.C. MacSwan); severe in a garden, near a patch of severely infected potatoes at Codette, Sask. (H.W. Mead); mixed infections of early blight and Septoria leaf spot in many fields in Essex Co., Ont. (C.D. McKeen); causing severe defoliation, which reduced quality of fruit in Norfolk Co. (J.K. Richardson); slight defoliation in a planting of staked tomatoes in Lincoln Co., Ont. (G.C. Chamberlain); infection heavy causing considerable defoliation in a field at St. Martin, Que. (R. Desmarteau); very common late in the summer in P.E.I. (R.R. Hurst).

NAIL-HEAD SPOT (Alternaria tomato). Diseased specimens from tomatoes being marketed at Lethbridge, Alta., were sent for identification (A.W. Henry). Nailhead spot affected 25% of the fruit in a planting in Carleton Co., Ont. (L.T. Richardson).

GREY MOULD (Botrytis cinerea). The fungus was found fruiting on flower pedicels and adjacent parts of the stem in a field of early tomatoes near Leamington, Ont. (C.D. McKeen).

LEAF MOULD (Cladosporium fulvum). In the spring crop of greenhouse tomatoes, V121 was heavily infected in most houses in southwestern Ont. In the fall crop, V121 is also becoming heavily infected. The variety V473 is being grown in a few houses; in some infection is negligible, whereas in others a light infection is developing (C.D. McKeen).

BACTERIAL CANKER (Corynebacterium michiganense). A slight infection was seen in several fields of Earleana being grown for processing at Cawston, B.C. (G.E. Woolliams). Infection was severe on plants from one seed source in a planting at Edmonton, Alta. (M.W. Cormack). The disease was severe in some rows of Bounty in test plots of C.S.G.A. at the University, Fort Garry, Man. (W.A.F. Hagborg). A slight infection was reported by a grower from Waterford, Ont., who submitted specimens (J.K. Richardson).

WILT (Fusarium sp.). In several greenhouses in southwestern Ont. a few plants were infected by Fusarium in both the spring and fall crops. A diseased plant seldom produces any fruit, but losses are generally light because the number of affected plants is usually small (C.D. McKeen).

FRUIT ROT (Phoma destructiva). Severe rotting was found at Edmonton, Alta., in fruit which were stacked with the vines and covered in the fields for a short period before being placed in storage. The pathogen was isolated (M.W. Cormack).

LATE BLIGHT (Phytophthora infestans). During the latter part of Aug. late blight reached epidemic proportions throughout most of Kent Co., Ont., and was severe in parts of Essex, Elgin, and Norfolk Counties. The disease was checked when the temperature became higher (70-90°F) in September. Some fields were destroyed, but in others the loss was only one to a few sets (L.W. Koch, C.D. McKeen). Infection from late blight was a trace to 100% in Norfolk and Lincoln Counties. In many 5-10 acre fields the crop was a total loss after the first picking. In Norfolk Co. it was estimated that the loss was close to 50% of crop. The disease was most severe in plantings set with southern-grown stock (J.K. Richardson). Late blight was very prevalent throughout Ont. in 1946. Specimens were received from nearly every tomato-growing county in the province. In many cases the foliage was badly blighted and a large percentage of the fruits affected (J.E. Howitt). Late blight was prevalent late in the season at Ottawa and vicinity. From observations made in the plots of the Division of Horticulture, it appeared that some varieties were much more susceptible than others (I.L.C.). Late blight destroyed 15% of the green fruit after they were picked from a planting at Ste. Anne de la Pocatière, Que., and left to ripen inside (R. Pelletier). Due to the hot dry weather only a trace of late blight occurred on tomatoes in N.B. (J.L. Howatt). Infection was usually only a trace in P.E.I. (R.R. Hurst).

DAMPING OFF and STEM ROT (Phytophthora parasitica) reached epidemic proportions in the hothouses, Belle River, Ont., causing the damping off of 50% or 15,000 seedlings. An additional 10% of the plants developed stem lesions, wilted and died after they were set out in the greenhouses (C.D. McKeen).

BACTERIAL SPECK (Pseudomonas tomato). A moderate infection was observed on the leaves and fruit of Bounty in the plots at the University, Fort Garry, Man. (W.A.F. Hagborg).

BACTERIAL SPECK (Pseudomonas punctulans) was found in several fields in Essex and Kent Counties, Ont. in both early and late crops. In most fields the damage was slight, but one grower suffered a 4% loss (C.D. McKeen).

SEPTORIA LEAF SPOT (S. Lycopersici) was very common and severe in many fields of both early and late tomatoes in Essex and Kent Counties, Ont. In one field near Leamington, defoliation was extensive (C.D. McKeen). The disease caused severe defoliation with losses particularly of quality in fields of canning tomatoes in the Niagara Peninsula (J.K. Richardson). Leaf spot was general in most fields on Isle Jésus, Que., but infection was less than usual causing no de oliation (E. Lavallée).

WILT (Verticillium albo-atrum) was general throughout the Lillooet district, B.C. Nearly every plant was affected and the loss was estimated to be 35%. The small amount of foliage remaining after the attack exposed many of the fruits to sunscald. The disease was also present on several varieties being grown for seed at the Summerland Station. In greenhouses, the use of the buried tile system to steam and also to warm the soil has controlled the disease almost completely (G.E. Woolliams, R.E. Foster).

BACTERIAL SPOT (Xanthomonas vesicatoria). Infection was severe in several varieties, including Earliana, Best of All and Alacrity, in the plots at Lacombe, Alta. (G.B. Sanford). The disease affected 2-3% of the green fruits in one field in Kent Co., Ont. (C.D. McKeen).

FERN LEAF (virus). A few affected plants were found in the fall crop in every greenhouse inspected in southwestern Ont. (C.D. McKeen).

MOSAIC (virus) was found in several sections of the B.C. Interior, both in the greenhouse and in the field (G.E. Woolliams). In plantings for seed purposes in Lincoln Co., Ont., the percentage of mosaic-infected plants was: 19.5% in John Baer, 17.7% in Stokesdale, 7.0% in Harkness, 4% in V121 and none in Rutgers, Penn., Heart, Vetomold, Valiant and Bounty (G.C. Chamberlain). Mosaic severely affected 80% of the plants in a 5-acre field at St. Martin, Laval Co., Que. (E. Lavallée, R. Desmarteau).

SPOTTED WILT (virus) affected a few plants in a greenhouse in Prince Albert, Sask. (R.J. Ledingham, T.C. Vanterpool). A few plants were noticed to be infected at planting time at the Laboratory, St. Catharines, Ont.; they produced no fruit in the field (J.K. Richardson).

STREAK (virus). A few affected plants were seen in a greenhouse at Leamington, Ont., in the fall crop (C.D. McKeen).

BLOSSOM-END ROT (non-parasitic) affected 5% of the fruit of V121 in a greenhouse at Victoria, B.C., in June. The root system was small, due to overwatering when the plants were transplanted (W.R. Foster). Blossom-end rot was common in Sask., especially in city and town gardens, but loss in any one garden was small (T.C. Vanterpool, R.J. Ledingham). The trouble was prevalent and caused moderate damage in early and late crops in Essex Co., Ont. (C.D. McKeen). Very dry weather followed by heavy rains at the end of summer caused considerable blossom-end rot about Quebec City (D. Leblond). An occasional case of blossom-end rot was seen in gardens at Charlottetown, P.E.I. (R.R. Hurst).

MAGNESIUM DEFICIENCY was found to be general in one greenhouse near Victoria, B.C., in which heavy applications of potash had been applied for many years. Application of magnesium sulphate appeared to correct the condition (W.R. Foster). Magnesium deficiency was observed in 13 gardens in Queens Co., P.E.I.; the damage was moderate (R.R. Hurst).

TURNIP

SCAB (Actinomyces scabies) was reported on Swede turnips as follows: moderate infection on Laurentian in a field at St. Joachim de Tourelle and in another at Matane, Que. (C. Perrault); slight infection on Acadia in a field near Truro, N.S. (J.F. Hockey); trace on Laurentian in Queens Co., P.E.I. (R.R. Hurst).

BLACK LEG (Phoma lingam) caused severe damage as a dry rot in 40 tons of turnips at Calgary, Alta. The fungus was isolated and its pathogenicity proved (G.B. Sanford). Black leg caused severe losses in several

districts in Ont. The disease was not observed by the shippers until after the roots were waxed when decay rapidly developed. In a few instances car lots were condemned upon arrival in the United States (J.D. MacLachlan). Black leg caused considerable loss in a crop of Laurentian at Wolfville, N.S. (J.F. Hockey). Black leg caused slight to severe damage to swede turnips throughout P.E.I. (R.R. Hurst).

CLUB ROOT (Plasmodiophora Brassicae) caused the loss of over 50% of the roots in a 3-acre field of turnips at Rivière des Prairies, Que. (R. Desmarteau, J.E. Jacques). It caused slight to severe losses to Laurentian swede turnips in Queens Co., P.E.I. (R.R. Hurst).

BLACK ROT (Xanthomonas campestris) caused little damage in Ont. Apparently seed treatment has reduced the incidence of the disease to the point where it is virtually no longer a problem (J.D. MacLachlan).

DAMPING OFF (various fungi) caused severe damage in a 5-acre plot at Edmonton, Alta. Treatment of the seed with Arasan gave protection (L.E. Tyner).

STERILITY (virus). A single affected plant of Laurentian brought in from Prince Co., P.E.I. (R.R. Hurst).

MOSAIC (virus). In a small area in a field of Laurentian swede turnips near Walkerton, Ont., affected plants displayed the following symptoms: leaves few per plant, spindly, both blade and petiole brittle, blade with marked mosaic pattern, basal leaves dying; roots very stunted, much branched, no commercial value. From kodochromes and samples G.H. Berkeley identified the disease as mosaic (J.D. MacLachlan).

BROWN HEART (boron deficiency) was moderate to severe in many localities in Ont. Spraying or dusting the foliage with borax is giving satisfactory control (J.D. MacLachlan). Brown heart affected every root in a field of Laurentian at Deschambault, Que.; trace was present in the plots at Ste. Anne de la Pocatière (R.O. Lachance). Traces were present in Laurentian in Queens Co., P.E.I. (R.R. Hurst).

WATERMELON

WILT (Fusarium spp.) was quite general in a commercial field at Lillooet, B.C.; the pathogen was isolated (G.E. Woolliams). Two affected plants received from Fenwick, Ont. (J.K. Richardson).

IV. DISEASES OF FRUIT CROPS

A. POME FRUITS

APPLE

BRANCH ROT (Daldinia sp.). D. sp. was found fruiting on several branches of apple trees in the University orchard, Edmonton, Alta. It was associated with deformity and splitting (A.W. Henry). Specimens were also collected from an orchard near Athabasca (G.B. Sanford).

FIRE BLIGHT (Erwinia amylovora) was present and caused severe damage to many susceptible trees in the University orchard, and elsewhere in Edmonton, Alta.; but it has not yet spread to the orchard at Oliver. It was also seen at Lethbridge and Calgary (M.W.C.). Blight was general but not severe in the Montreal district, Que. (F. Godbout). Considerable infection occurred in a block of Wealthy at Hemmingford, but little elsewhere in the orchard; it was cut out and little spread occurred (C.E. Petch). A specimen was received from Franklin Center (L.T. Richardson). Considerable early infection was seen near Quebec City, but it did not spread greatly; infection comes mainly from neglected orchards (O. Caron).

STORAGE ROT (Gloeosporium album). A trace only was seen in the storage cellar of the Experimental Station, Fredericton, N.B. (J.L. Howatt). Mr. E.M. Mason, Imperial Mycological Institute, found the Fredericton fungus to be identical with that known as G. album Osterw. (1907) in England. Some years ago Dr. John Dearness found the conidia of the Fredericton fungus to average slightly larger than those of the type and co-type of G. allantoideum Pk. (1891) but noted no other differences. It may be necessary to reduce G. album to synonymy (S.F. Clarkson).

BITTER ROT (Glomerella cingulata). A single infected Wagener was found at Kentville, N.S., in April, 1946; the organism was cultured and yielded ascospores 14-17 x 5 microns (K.A. Harrison).

RUST (Gymnosporangium clavipes). A scattered infection of McIntosh, confined to the calyx end of the fruit, occurred in the laboratory orchard, St. Catharines, Ont., near a cedar tree (G.C. Chamberlain).

STORAGE ROT (Penicillium expansum) caused losses up to 50% in stored seedling stock of the Experimental Station, Fredericton, N.B. (J.L. Howatt).

BLACK ROT (Physalospora obtusa) was conspicuous on McIntosh in an orchard at Guelph, Ont. Large cankers showing S. Malorum were seen on a single unidentified tree in Lincoln Co. (G.C. Chamberlain). Specimens affected by black rot were received from Knowlton, Que. (L.T. Richardson). S. Malorum occurred on dead twigs in a young orchard at Ste. Anne de la Pocatiere, Que., in April, 1946, but it is possible that winter injury contributed to the damage (C. Perrault). A leaf spot thought to be due to the black rot organism was seen in Queens Co., P.E.I. (R.R. Hurst).

POWDERY MILDEW (Podosphaera leucotricha) was very prevalent in the Okanagan Valley, B.C., on the susceptible varieties Jonathan and McIntosh; it is the most serious foliage disease in the district (H.R. McLarty). The new growth of a single tree was severely affected at the Botanical Garden, Montreal, Que. (J.E. Jacques).

SCAB (Venturia inaequalis) was severe on leaves and twigs of two crab apples in the University orchard, Vancouver, B.C. (I.C. MacSwan). Scab was not severe in the northern part of the Okanagan Valley; 3 sprays gave almost 100% control (H.R. McLarty). Severe damage was found in an orchard at Innisfail, Alta. (G.B. Sanford).

In Ont. scab was in general fairly well controlled. On McIntosh in the experimental orchard at St. Catharines infection of harvested fruit ranged from 2.5% for the most effective sprays to 50% for the least effective; infection was 80-90% on unsprayed trees (G.C. Chamberlain). In the Montreal district, Que., perithecia were numerous in the spring. Heaviest infections occurred during pre-pink and pink stages. Hot, dry weather in late June and early July enabled growers to check the infection and most commercial crops were quite clean (F. Godbout). Scab was much less serious than in 1945 near Quebec City (O. Caron). Scab was seen in late June at Ste. Anne de la Pocatiere, but was checked by dry weather that lasted until late August. Infection was seen in September even in well-sprayed orchards (C. Perrault). Small orchards at St. Roch des Aulnaies and on Ile aux Coudres were heavily infected (F. Godbout).

In the St. John River valleys, N.B., ascospores were mature on May 22, and discharge started June 6 during bloom. On June 14 about 65% of the ascospores were still undischarged; and further discharge occurred during the week of June 21. Primary infection was seen on June 28. Secondary infection was easily controlled because of dry weather (S.F. Clarkson). The crop was one of the cleanest in the history of N.S., scab being easily controlled even with the milder fungicides; but infection was abundant on unsprayed trees (J.L. Howatt). Perithecia were abundant in N.B. The first mature spores were found April 15; but they were not abundant until April 30, when a few empty asci were found. The first general discharge occurred May 5-8. Primary infections produced conidia by May 20. Spraying conditions were favorable except on wet ground, and applications were generally thorough. Dry weather in June and July aided scab control. The crop was exceptionally clean, although some storage scab appeared on unsprayed fruit. (J.F. Hockey).

CRINKLE MOSAIC (virus). Severe symptoms again developed on a 13-year-old seedling at Fredericton; see P.D.S. 25: 88 (D.J. MacLeod).

MOSAIC (virus). One infected tree was seen in Kings Co., P.E.I. (R.R. Hurst).

CHLOROSIS (?excess lime). What may be lime-induced chlorosis of apple, pear, plum, raspberry, strawberry, and other plants was severe on the irrigated plots at the Experimental Station, Lethbridge, Alta. Similar symptoms occurred on apple and pear near an alkali spot at Edmonton (G.B. Sanford).

DROUGHT SPOT, etc. (boron deficiency). Drought spot was found on an unidentified apple in an experimental home planting at Fort Fraser, B.C. (G.E. Woolliams). A Delicious tree at Creston, left untreated in an orchard in which McIntosh had been given boron, showed rough bark and serious die-back (M.F. Welsh). Corky core was severe in untreated, and unusually prevalent in treated, orchards in N.B., owing to dry weather. McIntosh was seriously affected (J.L. Howatt). Because of the drought, symptoms were particularly severe on hillside orchards. In McIntosh there were no external symptoms, but in Fameuse there was typical cork and in Cortland the fruit was rough to the touch (S.F. Clarkson).

HAIL INJURY was severe in a few orchards in the New Minas and Gaspereaux districts, N.S., and 80% of the fruit was marked in the Experimental Station orchard, Kentville (J.F. Hockey).

SPRAY INJURY. Very little russetting resulted in N.B. this year from the use of early copper sprays or of Formate and Puratized (J.L. Howatt). Leaf injury from arsenical sprays was severe on Cortland, Delicious, Gravenstein and McIntosh in Queens Co., P.E.I., considerably reducing the crop (F.M. Cannon).

PEAR

DAMPING OFF (Botrytis cinerea). Pear seedlings in the greenhouse at the Experimental Station, Kentville, N.S., showed 40% infection in flats sown with seed pressed from the cores and with some pulp and carpel tissue adherent. Flats sown with clean seed from another source were unaffected (D. Creelman).

FIRE BLIGHT (Erwinia amylovora) was not pronounced in the Okanagan Valley, B.C., but a few isolated cases were seen (H.R. McLarty). In a block of 400 Bartletts in Lincoln Co., Ont., 3-4% in one corner showed extensive crotch cankers and were cut down; infection spread from neglected trees on the adjacent property. Several trees in a block of 30 5-year-old Bartletts in Niagara Twp. Lincoln Co., showed serious cankers and two were lost; infection was from nearby old apple trees (G.C. Chamberlain).

EUROPEAN CANKER (Nectria galligena) was quite general on Anjou in the orchard at Univ. of British Columbia, Vancouver, B.C., girdling twigs and small branches (R.E. Fitzpatrick).

SCAB (Venturia pirina). A moderate infection occurred on leaves and fruit of several trees at Univ. of British Columbia (I.C. MacSwan). It severely damaged the fruit of a single Flemish Beauty at Creston, B.C.; Anjou and Bartlett in the same orchard were unaffected (M.F. Welsh). Specimens of Bartlett and Kieffer were received from Simcoe, Ont.; one third of the fruit was stated to be conspicuously scabbed; these varieties are not usually affected (G.C. Chamberlain). Flemish Beauty was severely affected in Queens Co., P.E.I. (R.R. Hurst).

STONY PIT (virus) was seen on Bosc in the orchard at Univ., of British Columbia (R.E. Fitzpatrick). Stony pit was seen on various varieties in the Okanagan Valley rather more often than in previous years (T.B. Lott).

BLACK END (cause unknown) appeared in a block of young Kieffer pears in Niagara Twp., Ont. (G.C. Chamberlain).

CHLOROSIS. See Apple.

QUINCE

RUST (Gymnosporangium clavipes). A sample of fruit bearing aecia was received from Thornbury, Ont., in July (J.D. MacLachlan).

BLACK ROT (Physalospora obtusa). Affected fruits sent in from Lincoln Co., Ont., showed swellings and blackening; pycnidia were readily induced (G.C. Chamberlain).

B. STONE FRUITS

APRICOT

CORYNEUM BLIGHT (Clasterosporium carpophilum) caused severe leaf and fruit spots and cankers throughout the Kootenay and Creston districts, B.C., except in Lakeview, near Creston. This anomaly is difficult to explain as no spraying was done (M.F. Welsh). It was less severe than usual in the few orchards in which it occurs in the Okanagan Valley (H.R. McLarty).

BLACK KNOT (Dibotryon morbosum). A specimen was received from Agassiz, B.C. (R.E. Fitzpatrick). Apricot is recorded as a host, but this seems to be the first Canadian record (I.L. Conners).

TWIG BLIGHT (Sclerotinia laxa). Slight to moderate infection occurred in the Univ. of British Columbia orchard, Vancouver, B.C. (I.C. MacSwan).

DIE BACK (boron deficiency). Observations indicate that apricots and peaches are sometimes affected in the Okanagan Valley, B.C., when boron is applied at 3-year intervals. More frequent applications seem to be needed where the soil is very light (H.R. McLarty).

CHERRY

GREY MOULD (Botrytis cinerea) seriously affected Bing sweet cherries after packing at Creston and Erickson, B.C., infection varying from pin-point to complete decay. Wet weather just as this variety ripened was apparently responsible; no trouble was found with Lambert, which was unripe during the wet spell. Where packing houses handled fruit quickly under dry conditions there was much less trouble than where it was held in boxes for several days (M.F. Welsh).

BLACK KNOT (Dibotryon morbosum) was heavy in small, unsprayed blocks in Ont. (J.E. Howitt). It was severe on sour cherries in Queens Co., P.E.I., and was very abundant on wild cherries (R.R. Hurst).

LEAF SPOT (Higginsia hiemalis) was light to heavy on all cherries in the Kootenay district, B.C., and caused considerable leaf drop; the fungus fruited freely on the pedicels (M.F. Welsh). Leaf spot was of minor importance in the Niagara Peninsula, Ont., until late in the season; it caused some premature defoliation in September. In the Laboratory orchard, St. Catharines, leaf infection was 26.3% on unsprayed and 0.3-2.5% on sprayed Montmorency (G.C. Chamberlain). Specimens were received from Windsor, Ont. (L.T. Richardson).

POWDERY MILDEW (Podosphaera Oxyacanthae). Two trees of Bing sweet cherries at West Creston, B.C., had half the leaves infected on July 11, and immature perithecia were found on a few leaves. Later the disease was found at Kaslo, Willow Point and Grey Creek; and perithecia became abundant around Creston (M.F. Welsh).

BROWN ROT (Sclerotinia fructicola) was heavy on all varieties of sweet cherry in an orchard at Kootenay Bay, B.C., apparently owing to a wet spell just before Bing ripened. Many reports were received from the Creston, and Nelson districts but in some cases Botrytis and Rhizopus rots may have been confused with brown rot (M.F. Welsh). In Ont. approximately 1-2% blossom blight occurred in sweet cherries, and only a trace of stem rot was seen in sour cherries. The weather was unfavorable for the development of the fungus (G.C. Chamberlain).

WITCHES' BROOM (Taphrina Cerasi) was seen on a single sweet cherry in the Univ. of British Columbia orchard (R.E. Fitzpatrick).

LAMBERT MOTTLE (virus). What seems to be a severe and quick-acting strain of Lambert mottle was seen in three orchards not previously visited in the Kelowna district, B.C. In one a single tree was infected; in a second there seems to have been slight spread for several years; and in a 5-acre block, of which 1/3 were originally Lamberts, where the disease is believed to have been present for 11 years, most Lamberts have now been removed and the rest are severely affected, whereas there is little or no effect in other varieties (T.B. Lott). A trouble allied to Lambert mottle, and identical with that reported from Kelowna, was seen in Lambert at Long Beach in the Kootenay area. One tree developed symptoms in 1944 and was pulled in the spring of 1946 when almost dead; meanwhile two adjacent trees have become severely affected (M.F. Welsh).

LITTLE CHERRY (virus) has now spread into every fruit district in the Kootenay area, B.C., and, according to a newspaper report, has been found in Washington. It was seen in Kaslo, Denver and Renata for the first time, and fruit apparently infected were received from Nakusp (W.R. Foster). A single Bing tree in Osoyoos showed symptoms indistinguishable from little cherry; however, diagnosis from one tree is unreliable and there have been no other reports of the disease from the Okanagan valley (T.B. Lott). Little cherry has spread considerably in the Kootenay area. A packing-house at Nelson received affected fruit from several points along the Arrow Lakes. Prevalence was decidedly higher in the Creston-Erickson district and the

disease appeared in isolated orchards on the edge of the district. Several orchards in Erickson have been slightly affected for three years without significant increase - an exceptional situation (M.F. Welsh). See W.R. Foster and T.B. Lott. "Little cherry", a virus disease. Sci. Agr. 27: 1-6. 1947.

?NECROTIC LEAF SPOT (virus). Six trees of Montmorency in Wentworth Co., Ont., were suspected of being infected by this disease. Leaves were small, delayed in opening, and sparse. Buds were small and no growth was made (G.C. Chamberlain).

TATTER LEAF (virus). One 20-year-old sweet cherry in a block of 25 trees in Lincoln Co., Ont., showed extremely ragged foliage (G.C. Chamberlain).

TWISTED LEAF (virus). Small numbers of affected trees were seen in several orchards in the Okanagan valley, B.C., in which it was not previously known. Growers believed the infections to be recent (T.B. Lott).

YELLOWS (virus) is widespread on Montmorency in the Niagara Peninsula, Ont. (G.C. Chamberlain).

PEACH

CORYNEUM BLIGHT (*Clasterosporium carpophilum*) is severe on several varieties, notably Rochester, wherever peaches are grown in the Creston and Kootenay districts, killing large limbs or even whole trees. No spray programme for this disease is practised in the area (M.F. Welsh).

BROWN ROT (*Sclerotinia fructicola*) was seen on fruit at the Univ. of British Columbia, Vancouver, B.C. (R.E. Fitzpatrick). In the Laboratory blocks, St. Catharines, Ont., blossom blight did not exceed 3% in Rochester or Elberta. Fruit infection in Rochester was 7-8% in unsprayed and 1-2% in sprayed fruit at harvest; corresponding figures were 31.4% and 2.4-11.5% 4 days after picking, and 59% and 12-19% 6 days after picking. In Valiant and other mid-season varieties infection varied widely from orchard to orchard in the Niagara Peninsula. Although 1946 was not regarded as a bad brown rot year, the incidence of rot in the packed fruit was above average. The recommended spray programme properly applied gave good control; and fair weather during harvest prevented any serious outbreaks. In Elberta there was also little rot in the orchard but more than usual in the packed fruit. Control was good with the regular spray programme, and was improved by an extra mid-season spray when conditions were favorable to brown rot. Great variation in the incidence of rot in the harvested fruit, kept under uniform conditions, indicates that brown rot control is largely a matter of orchard management and harvesting practice (R.S. Willison).

POWDERY MILDEW (*Sphaerotheca pannosa*). A scattered infection on Golden Jubilee in Lincoln Co., Ont., caused some fruit blemishes (G.C. Chamberlain).

LEAF CURL (Taphrina deformans) heavily infected 20 trees in three orchards at Creston, B.C.; two had not been sprayed, but the owner of the third claimed to have used a 1-12 lime sulphur dormant spray. Eight trees in an orchard of 4-year-old Vedette and Rochester at Nelson were badly damaged; the owner had used 1-10 lime sulphur, applied with a hand sprayer (M.F. Welsh). In the Okanagan Valley an occasional tree was seen with a few leaves infected; leaf curl is rarely important in this area even in unsprayed orchards (H.R. McLarty). In the Niagara Peninsula, Ont., leaf curl is of no importance in sprayed orchards, but caused severe leaf distortion in a block of Elberta that had not received the dormant spray (G.C. Chamberlain). Leaf curl was reported from many parts of Ont., especially sections where peaches are not grown commercially and are seldom sprayed (J.E. Howitt). Specimens were received from the Toronto district (D.B.O. Savile). Light infections were seen at Kentville, Deep Brook and New Germany, N.S. (D. Creelman).

WESTERN X-DISEASE (virus). As in former years small numbers of new infections occurred in the Okanagan valley, B.C. In 13 mapped orchards new infections amounted to 0.4% of the trees (T.B. Lott).

CROWN INJURY (wet soil). Mortality has been heavy in young orchards on poorly drained or shallow soil in the Niagara Peninsula, Ont., owing to crown injury following very heavy rain in the fall of 1945 G.C. Chamberlain).

DIE BACK (boron deficiency). See Apricot.

PLUM

SCAB (Cladosporium carpophilum). A specimen was received from Ottawa, Ont. (L.T. Richardson).

BLACK KNOT (Dibotryon morbosum) is very prevalent in the Fraser Valley, B.C. (R.E. Fitzpatrick). It was abundant in small unsprayed blocks throughout Ont. (J.E. Howitt). Infection was heavy in an orchard at Greenwich, N.S., in contrast to its complete absence in a nearby orchard in which the recommended spray programme had been followed for several years (D. Creelman). Black knot was heavy in a small orchard near Charlottetown, P.E.I. (R.R. Hurst, F.M. Cannon).

SHOT HOLE (Phyllosticta circumscissa) was heavy on most of the leaves of four trees in a small orchard at Ste. Anne de la Pocatiere, Que. (B. Baribeau).

BROWN ROT (Sclerotinia fructicola). In the Laboratory orchard, St. Catharines, Ont., incidence of brown rot on unsprayed trees was: Lombard 15.5%, Imperial Gage 12.2%. On sprayed trees the loss was negligible (G.C. Chamberlain). A specimen of twigs of Compass from Hatley, Que., was received in June with Monilia fruiting freely on it (H.N. Racicot). Considerable damage was caused to both Japanese and domestic varieties at Greenwich, N.S., by blossom blight, infection being heaviest on Burbank. No difference was observed on plots sprayed with Fermate, Zerlate or Mulsoid sulphur (D. Creelman). Brown rot was severe in untended orchards in P.E.I. but not where spraying was adequate (R.R. Hurst).

PLUM POCKET (Taphrina communis). An enquiry from Colmer, Sask., indicated the occurrence of plum pocket there in 1945 (T.C. Vanterpool). A specimen was received from St. Francois Xavier, Richmond Co., Que. (L.T. Richardson). At Ste. Genevieve, Champlain Co., a block of 12 trees was severely attacked; at least 95% of the fruits were infected (B. Baribeau). Heavily infected wild Prunus nigra was found in Queens and Northumberland Co., N.B. (S.F. Clarkson). Two trees were heavily infected at St. Leonards, Madawaska Co. (D.J. MacLeod). Plum pocket was widespread in Kings and Hants Co., N.S., being seen at Somerset, Canard, Berwick, Port Williams, Currys Corner, and Windsor Forks; and a specimen was received from West Northfield, Lunenburg Co. No infection was seen in two orchards known to have received dormant Bordeaux sprays (M.E. Neary, D. Creelman).

RUST (Tranzschelia Pruni-spinosae (Pers.) Diet. var. discolor (E. Fischer) Dunegan). A specimen was collected by Dr. H.T. Gussow, 21 Oct. 46, at Cowichan, B.C., on a purple English plum; 2 adjacent trees of Italian Prune were unaffected. Comparison with DAOM 6047 (TRT 12053) collected on Prunus serotina, near Burford, Ont., supports the distinction made by J.C. Dunegan (The rusts of the stone fruits. Phytopath. 28: 411-427. 1938). In the B.C. specimen the warts are largely confined to the upper cell, which is larger and more nearly globose than the lower cell and is thickened at the apex (I.L. Conners).

WILT (Verticillium ?albo-atrum). Twenty-five per cent of the trees in a 5-year-old block of Burbank in Saltfleet Twp., Wentworth Co., Ont., showed killing of branches. Interplanting with raspberries seems to have been a factor in the trouble (G.C. Chamberlain).

PRUNE DWARF (Prunus virus 6). Three scattered trees of Lombard were infected in an orchard of 400 trees of various plum varieties at Grimsby, Ont.; no other varieties were affected. The diseased trees lacked vigour and bore no crop (G.C. Chamberlain).

CHLOROSIS. See Apple.

DROUGHT SPOT (?boron deficiency). Fruits of Reine Claude in Barton Twp., Wentworth Co., Ont., showed water-soaked spots and gum pockets (G.C. Chamberlain).

SPRAY INJURY, due to calcium arsenate, was severe in Queens Co., P.E.I. (R.R. Hurst, F.M. Cannon).

SAND CHERRY

BROWN ROT (Sclerotinia fructicola) was heavy on a specimen received from Billings' Bridge, near Ottawa, Ont. (D.B.O. Savile). In the Arboretum at Ottawa blossom and twig blight was a trace on Prunus glandulosa, trace to slight on P. Besseyi, slight on P. pumila, and severe on P. sp. (H.N. Racicot).

C. RIBES FRUITS

CURRANT

WHITE PINE BLISTER RUST (Cronartium ribicola) was reported at the Experimental Station, Charlottetown, P.E.I. (R. Bagnall).

CANE BLIGHT (Nectria cinnabarina) caused slight damage at Kentville, N.S. (D. Creelman).

CLUSTER CUP RUST (Puccinia Pringsheimiana). A light infection was found on black currant at Lacombe and Olds, Alta. (G.B. Sanford).

SEPTORIA LEAF SPOT (Mycosphaerella Grossulariae) attacked one of the rust-resistant black currants from Ottawa, on trial at Ste. Anne de la Pocatiere, Que. (A. Payette).

POWDERY MILDEW (Sphaerotheca mors-uvae). All but one of the rust-resistant black currants from Ottawa, on trial at Ste. Anne de la Pocatiere, Que., were heavily mildewed; the exception was attacked by Septoria. Wild Ribes in the vicinity were attacked by Cronartium ribicola and Puccinia Pringsheimiana only (A. Payette).

GOOSEBERRY

WHITE PINE BLISTER RUST (Cronartium ribicola) developed early near Quebec City, Que., and became heavy (O. Caron). A light infection occurred in Queens Co., P.E.I. (R.R. Hurst).

POWDERY MILDEW (Sphaerotheca mors-uvae). A light infection was recorded in Queens Co., P.E.I. (R.R. Hurst).

D. RUBUS FRUITS

BLACKBERRY

ORANGE RUST (Gymnoconia Peckiana). A specimen was received from Lac Marois, Que. (H.N. Racicot). Infection was 100% on wild blackberries at Kentville, N.S. (D. Creelman).

RASPBERRY

CROWN GALL (Agrobacterium tumefaciens). Marked stunting occurred in 5% of Latham growing in light, sandy soil in Pelham Twp., Welland Co., Ont.; the affected plants bore conspicuous galls at the crown (G.C. Chamberlain). Six per cent of the plants in an old Viking plantation in Queens Co., P.E.I., were severely affected (R.R. Hurst).

FRUIT ROT (Botrytis sp.). Severe infection resulted in drying up of fruit at Chilliwack, B.C. (I.C. MacSwan).

SPUR BLIGHT (Didymella applanata) was commonly found on Latham in nursery and commercial plantings in southern Ont. Taylor, Marcy, and Indian Summer also seem to be quite susceptible under nursery conditions; 80-90% of the canes of Latham bore extensive lesions in a planting in Louth Twp., Lincoln Co. (G.C. Chamberlain). Spur blight was reported from many plantations throughout Ont. (J.E. Howitt). It was severe in a small field at Bordeaux, near Montreal, Que. (R. Desmarteau). It was destructive in Queens Co., P.E.I. (R.R. Hurst).

ANTHRACNOSE (Elsinoe veneta) caused moderate damage to 90% of a commercial plantation of Taylor in Niagara Twp., Lincoln Co., Ont.; the canes split open and dried out and the tips died back. It was also found in Madawaska, Washington and Marcy in nursery plantings (G.C. Chamberlain). Anthracnose was less important than in 1945 near Quebec City, Que., but a serious outbreak was seen at Berthier, Montmagny Co. (O. Caron).

CANE BLIGHT (Leptosphaeria Coniothyrium) severely damaged 30% of the canes of Latham in a poorly drained location in Peel Co., Ont.; the plants had been seriously weakened by excessive soil moisture (G.C. Chamberlain).

LATE YELLOW RUST (Pucciniastrum americanum) caused some defoliation in a Viking plantation at Goderich, Ont. (G.C. Chamberlain). A sample was received from Forest, on wild red raspberry, Rubus idaeus var. strigosus, (J.D. MacLachlan).

POWDERY MILDEW (Sphaerotheca Humuli). General and moderately severe infection occurred in a Latham planting at Clinton, Ont., causing stunting of the new canes. The rows were wide with too many canes (G.C. Chamberlain).

WILT (Verticillium albo-atrum) killed 6% of the canes of Cumberland black raspberry in a plantation in Louth Twp., Lincoln Co., Ont., (G.C. Chamberlain).

LEAF CURL (virus). All varieties except Newburg were slightly affected in a nursery at Lacombe, Alta. (G.B. Sanford). Damage was severe in a small garden planting at Saskatoon, Sask. Specimens were also received from East End (R.J. Ledingham). A single infected plant of Taylor was seen at Louth Twp., Ont.; it is rarely found in this variety (G.C. Chamberlain). A Viking plantation near Fredericton, N.B., showed 1% infection (D.J. MacLeod).

MOSAIC (virus). Several infected plants were found in a garden at Colleymount, near Francois Lake, B.C. (G.E. Woolliams). Mosaic was heavy in Washington, but apparently absent from Newberg in a nursery at Lacombe, Alta. (G.B. Sanford). It caused severe stunting of 10% of Columbia in a planting in Grantham Twp., Lincoln Co., Ont. Infection was 100% in a patch of 50 Sadus purple raspberry in Simcoe Co.; the variety is very susceptible but seems to be quite tolerant; there was no pronounced stunting (G.C. Chamberlain). Mosaic severely injured 1% of Viking in a new plantation near Oromocto, Sunbury Co., N.B. It was common on wild raspberries in York, Sunbury Westmorland, Carleton, Queens, and Victoria Co. (D.J. MacLeod). Mosaic was abundant in some varieties in Queens Co., P.E.I. (R. Bagnall). Infections of 2% in Latham, 3% in Lloyd George, and 17% in Viking were found (R.R. Hurst).

E. OTHER FRUITS

GRAPE

DEAD ARM (Fusicoccum viticola). A scattered infection is commonly seen in Concord vineyards in Lincoln Co., Ont. (G.C. Chamberlain).

BLACK ROT (Guignardia Bidwellii). Infected leaves of Saunders were received from Egmont, B.C. (L.T. Richardson).

DOWNY MILDEW (Plasmopara viticola) was severe on an unsprayed vine in a garden at Outremont, Que. (J.E. Jacques).

CHLOROSIS (cause unknown affected 45% of Concord in a vineyard in Niagara Twp., Lincoln Co., Ont.; the chlorosis was followed by scorching. Niagara in the same vineyard was unaffected. The soil was a shallow clay loam (G.C. Chamberlain).

2-4-D INJURY. The application of 2-4-D to a lawn at Kentville, N.S., injured the young growth of an adjacent vine. Mature leaves were not noticeably affected, but young leaves were curled, pale, and stunted for several weeks (J.F. Hockey).

STRAWBERRY

GREY MOULD (Botrytis cinerea). Botrytis caused a severe blossom blight at Big River, Sask. (T.C. Vanterpool). Grey mould caused considerable damage to seedlings held all winter in flats in a warehouse at Kentville, N.S.; some flats were completely over-run (D. Creelman).

LEAF SCORCH (Diplocarpon Earliana). A light infection was recorded at Charlottetown, P.E.I. (R. Bagnall).

LEAF SPOT (Mycosphaerella Fragariae) was collected at Mission City, B.C. (R.E. Fitzpatrick). It varied from a trace to severe throughout N.B. (J.L. Howatt).

RED STELE (Phytophthora Fragariae) is common, widely distributed and serious in coastal B.C. Most growers in coastal regions lost some of their crop. The estimated loss in the Fraser Valley area is 20% (1,000 tons) of fruit and 10% of plants killed. The disease is also important on Vancouver Island and in the Kootenays. Improving the drainage by ridging seems to reduce the severity of attack (W.R. Foster).

POWDERY MILDEW (Sphaerotheca Humuli). Infection was light at Ste. Anne de la Pocatiere, Que. (R.O. Lachance). Infection was 100% but damage slight at the Experimental Station, Fredericton, N.B. (J.L. Howatt).

JUNE YELLOWS (genetic breakdown) was seen several times in plantings of Premier, in Niagara Twp., Lincoln Co., Ont. About 15% of the plants were affected, being stunted and completely yellow (G.C. Chamberlain). About 90% of the plants were affected in a planting of Premier at Cambridge, Queens Co., N.B.; other varieties were unaffected (D.J. MacLeod). One specimen was brought in for examination at Charlottetown, P.E.I. (R.R. Hurst).

ROOT ROT (cause unknown) was reported from many districts in Ont. It seems to become more destructive and widespread each year (J.E. Howitt). It was encountered wherever strawberries are grown in N.B.; infection varied from 1 to 50% (J.L. Howatt).

V. DISEASES OF TREES AND SHRUBS

ABIES - Fir

Witches' Broom (Melampsora Caryophyllacearum). A low incidence seems to be general through the Prince George area, B.C., on A. lasiocarpa (P.J. Salisbury). It was collected on A. balsamea in P.E.I. (R. Bagnall).

ACER - Maple

Tar Spot (Rhytisma acerinum) was a trace at Glenmont, N.S. (J.A. Boyle).

AESCULUS - Horsechestnut

Leaf Blight (Guignardia Aesculi) was reported from Prince Edward Co., Ont. (J.E. Howitt). It caused severe damage in Queens Co., P.E.I. (R.R. Hurst).

AMELANCHIER

Rust (Gymnosporangium spp.). G. clavariaeforme infected 20% of the fruit of A. spicata at Auburn, N.S. G. clavipes was common and severe in the province on A. spp. (J.F. Hockey).

BETULA - Birch

Canker (Nectria galligena). A few badly infected trees of B. papyrifera had to be removed from an estate at Dorval, near Montreal, Que. Asci were clavate, 92-100 x 13.5 microns; spores 8, 1-septate, slightly constricted, hyaline, smooth, 13-17.5 x 6-8 microns. The fungus agrees with the conception of N. galligena of M.L. Lohman and Alice J. Watson (Lloydia 6: 77-108. 1943) (J.E. Jacques). First report to the Survey.

CARAGANA

Crown Rot (Fusarium Solani) caused lesions at soil level and wilting of the plants at the Forestry Farm, Sutherland, Sask. Fusarium sp. also caused heavy loss from wilting of seeded stands, affecting plants from 2 weeks to 2 years old; the root systems showed extensive lesioning (H.W.M.). See P.D.S. 14: 81. 1935.

Leaf Spot (Septoria Caraganae). A light infection occurred in several hedges at Edmonton, Alta. (M.W.C.). Defoliation was severe at the Forestry Farm, Sutherland, Sask. (H.W.M.).

CATALPA

Blight (Botrytis sp.). A slight to moderate infection occurred on leaves and pods at the Univ. of British Columbia, Vancouver, in July, following wet weather (I.C. MacSwan).

CRATAEGUS - Hawthorn

Scald (Fabraea maculata (Entomosporium Thuemenii). Leaves of a double red hawthorn, showing heavy infection were received from New Westminster, B.C. (I.L. Conners).

Rust (Gymnosporangium clavariaeforme) caused slight damage to C. Oxyacantha at Charlottetown, P.E.I. (R.R. Hurst).

FRAXINUS - Ash

Anthracnose (Gloeosporium aridum) was heavy on young trees in shade in the Arboretum, Ottawa, Ont., and caused considerable defoliation; lesions often involved half the leaflet. Previously reported from London, Ont. (D.B.O. Savile).

Rust (Puccinia spargenioides) was heavy on young trees of F. americana near the Ottawa R., Ile Perrot, Que. (I.L. Conners, D.B.O. Savile).

JUGLANS

Leaf Spot (Marssonina Juglandis) was moderately heavy on J. cinerea and a trace on J. nigra in the Arboretum, Ottawa, Ont. (D.B.O. Savile).

Canker (Melanconis Juglandis). A light to moderate infection was seen on J. cinerea, J. Sieboldiana and J. spp. in the Arboretum, Ottawa, Ont., and on J. sp. at Macdonald College, Que. (D.B.O. Savile, I.L. Conners).

JUNIPERUS

Rust (Gymnosporangium spp.). Many galls of G. sp. were found on J. scopulorum at Edmonton, Alta. (G.B. Sanford). G. clavipes was moderately heavy on J. communis var. depressa at Wellington, slight on J. virginiana at Wellington, and moderate on J. virginiana at Glenora, Prince Edward Co., Ont. Not previously collected in Prince Edward Co., on the latter host (H.N. Racicot, I.L. Conners). G. clavariaeforme and G. clavipes lightly infected J. communis at Greenwich, N.S. (D. Creelman).

Needle Cast (Lophodermium juniperinum (Fr.) de Notaris) was collected at Rockwood, Ont., on J. communis (J.D. MacLachlan). First report in the Survey, but reported by G.D. Darker (The Hypodermataceae of Conifers. Contrib. Arnold Arb. I. 1-131. 1932) from Ont. on J. communis var. depressa, J. horizontalis, and J. virginiana.

Twig Blight (Phomopsis juniperovora Hahn). Affected specimens of J. virginiana were received from a nursery at Sheridan, Ont. The disease first appears on the tips of the young shoots and progressive dying back follows. Several hundred trees had to be destroyed during the previous year because of this disease; but this year the trees were sprayed early with lime sulphur, followed after 20 days by Bordeaux mixture, and a fair degree of control seems to have been obtained (coll. H.G. Carmody, det. Ruth Macrae).

MALUS

Rust (Gymnosporangium clavipes). Seedlings of M. pumila var. Niedwetskyana showed 5% infection at Kentville, N.S. (J.F. Hockey).

MORUS - Mulberry

Canker (Pseudomonas mori). A scattered infection throughout a nursery at Port Burwell, Ont., caused slight damage; some leaf infection was seen in addition to twig cankers (L.T. Richardson, G.C. Chamberlain). About one-third of 1,400 young plants of M. alba in a nursery at Brantford, Ont., was affected. Dark, sunken lesions, especially near the ground line, caused the stems to break over (J.D. MacLachlan).

OSTRYA - Hop-Hornbeam

Leaf Spot (Cylindrosporium Dearnessii) was heavy near Ottawa, Ont., to the tops of 15 ft. trees and was very heavy on the lower branches. It was also heavy on small trees at Vankleek Hill and at Hermit Trail, Que.; first report from Que. (D.B.O. Savile).

PICEA - Spruce

Rust (Chrysomyxa spp.). C. ledicola caused serious defoliation of young P. sitchensis in parts of the Queen Charlotte Islands, B.C. (P.J. Salisbury). It was seen on P. pungens at St. Alexandre, Que., for the second successive year; no ericaceous host could be found within a mile; nearby native spruce were unaffected (A. Payette). Cones of P. glauca attacked by C. Pyrolae were collected at Kananaskis, Alta. (P.J. Salisbury).

Witches' Broom (Peridermium coloradense) was seen sporadically near Prince George, B.C. (P.J. Salisbury).

PINUS - Pine

Blister Rust (Cronartium ribicola). About 70% of the trees in a plantation of P. Strobus at Ste. Anne de la Pocatiere, Que., were attacked and it is feared that the planting will be almost worthless in a few years (A. Payette). A single tree was slightly damaged at Wood Islands, P.E.I. (R.R. Hurst).

Needle Cast (Lophodermium pinastri). An experimental stand of P. ponderosa on Thurlow Island, outside the natural range of the host, suffered severe defoliation (P.J. Salisbury).

PLANTANUS - Plane Tree

Anthracnose (Gnomonia veneta) caused severe defoliation in a cemetery at Victoria, B.C.; it seems to be general in southern Vancouver Island (P.J. Salisbury).

POPULUS - Poplar

Canker (Dothichiza populea). A specimen on Lombardy poplar, P. nigra var. italica, grown as a windbreak, was received from Oakville, Ont. (J.D. MacLachlan). Previously known from N.B. and N.S.

Leaf Blight (Linospora tetrasnora). Infection was light to moderate at Edmonton, Alta. (M.W.C.).

Leaf Spot (Marssonina Castagnei) was commonly found doing much damage to foliage of young P. tremuloides near Okanagan L. at Summerland, B.C. (G.E. Woolliams).

Rust (Melampsora albertensis) was prevalent on P. tremuloides at Summerland, B.C., especially near Okanagan L. (G.E. Woolliams).

Leaf Spot (Septoria populicola) was frequently seen on mature P. trichocarpa near Okanagan L. at Summerland, B.C. (G.E. Woolliams).

PRUNUS

Black Knot (Dibotryon morbosum) moderately infected P. triloba (flowering almond) at Kentville, N.S. It caused considerable damage to wild Prunus at Kentville and Greenwich (D. Creelman).

Powdery Mildew (Podosphaera Oxyacanthae) caused loss of lower leaves of P. emarginata at Camp Lister, B.C., in mid September. Perithecia were abundant (M.F. Welsh).

Blossom Blight (Sclerotinia fructicola). About 1/3 of the blossoms of P. japonica were killed throughout the Annapolis Valley, N.S. (J.F. Hockey).

Pockets (Taphrina ?confusa). Occasional fruits of P. virginiana var. demissa were hypertrophied near Creston, B.C. (M.F. Welsh).

PSEUDOTSUGA - Douglas Fir

Canker (Phomopsis lokoyae). Extensive top-killing of P. taxifolia at Cowichan Lake Forest Experimental Sta., B.C., was apparently due to this organism, though it was not in good fruit at the time of collection (P.J. Salisbury). See G.G. Hahn, Mycol. 25: 369-375. 1933; and J.S. Boyce, Journ. For. 31: 664-672. 1933. First reported from Cowichan Lake and Green Timbers in 1942 (P.D.S. 21: 84).

QUERCUS - Oak

Anthracnose (Gnomonia veneta). Oaks in the vicinity of Niagara-on-the-Lake, Ont., showed general leaf distortion and some die-back (R.S. Willison). Specimens were obtained from Richmond Hill on Q. alba, from Niagara-on-the-Lake and Woodroffe on Q. macrocarpa, and from Queenston on Q. sp.; it was heavy on Q. alba on Ile Perrot, Que. (D.B.O. Savile).

Leaf Blister (Taphrina caerulescens). Specimens were received from Hemmingford, Que., on Q. ?alba, and from L. Memphremagog on Q. borealis (I.L. Conners).

RHAMNUS - Buckthorn

Canker (Phomopsis sp.) occurred especially at ground level in a demonstration plot of R. Purshiana at the Experimental Sta., Saanichton, B.C. (P.J. Salisbury).

Rust (Puccinia coronata). Shoots of R. cathartica bearing pycnia were collected at Kemptville, Ont., on May 29 (I.L. Conners). Rust was common on R. alnifolia and R. cathartica at Laval des Rapides, Que. (J.E. Jacques). Infection was a trace on R. cathartica at Kentville, N.S. (J.F. Hockey), and at Charlottetown, P.E.I. (R.R. Hurst).

Mosaic (virus) attacked several bushes in a hedge of R. cathartica at Charlottetown, P.E.I. (R.R. Hurst).

SALIX - Willow

Die-back (?Cytospora chrysosperma). This organism was apparently responsible for severe bark killing in a planting of S. alba tristis at Winnipeg, Man. (W.L. Gordon, T. Johnson).

SORBUS - Mountain Ash

Rust (Gymnosporangium Juniperi) was found on S. americana at Key Harbour, Georgian Bay, Ont. (E.G. Anderson, det. D.B.O. Savile).

Canker (Polyporus pubescens). Isolations from new cankers, starting from pruning cuts, on S. aucuparia at Victoria, B.C., yielded this fungus (P.J. Salisbury).

ULMUS - Elm

Dutch Elm Disease (Ceratostomella Ulmi). During 1946 work on this disease was again carried out on a co-operative basis by the Dominion Department of Agriculture and the Quebec Department of Lands and Forests. Scouting was largely confined to the general area of infection in Quebec and to eastern Ontario. Although all of the 1321 infected trees found in 1945 had been removed approximately 2,100 additional diseased trees were located in almost the same area in 1946. There was apparently some slight extension of the infected area to the west and to the northwest, north of the Ottawa River, but it is doubtful if this indicates that the disease has spread to these localities since 1945. The smaller European elm bark beetle (Scolytus multistriatus) has not yet been found in Quebec so that apparently the native elm bark beetle (Hylurgopinus rufipes) is responsible for the widespread condition of infection there.

In the vicinity of Sorel the number of infected trees was found to be so high that the policy of eradicating all diseased trees had to be abandoned. Instead an area of the most heavily infected part of the province has been delimited and in this no further control work will be carried out. It is hoped that, by continuing the eradication of diseased trees in the outlying districts, it will be possible to confine the disease to the central part of the infected area (A.W. McCallum).

Cephalosporium Wilt (Dothiorella Ulmi (Cephalosporium sp.). A sample on Ulmus sp. was received from London, Ont. These were young trees, recently obtained from a nursery and were stated to be seriously affected. Abundant pycnidia were present on the twigs (J.D. MacLachlan).

Black Spot (Gnomonia ulmea). A severely infected specimen of Chinese elm (U. ?parvifolia) was received from London, Ont. (G.C. Chamberlain). Infected leaves of U. americana, collected at Ottawa on Mar. 28, contained mature ascospores (D.B.O. Savile). A few trees of U. pumila were heavily spotted at the Botanical Garden, Montreal, Que. (J.E. Jacques).

Coral Spot (Nectria cinnabarina). A specimen of infected U. parvifolia was received from Sault Ste. Marie, Ont. (I.L. Conners). Material from a hedge of U. ?pumila or parvifolia was received from Barrie, Ont. (Ruth Macrae). The disease continued to be destructive to U. pumila at the Botanical Garden, Montreal, Que. (J.E. Jacques).

Leaf Spot (Mycosphaerella Ulmi Kleb. (Phleospora Ulmi (Fr.) Wallr.) was heavy on young trees of U. americana at Hermit Trail, Que.; it causes numerous small yellow spots on the leaves. Spores were 18.5-37 x 5.7-7.5 microns, generally 3-septate; agreeing well with specimens from Kansas and Denmark, but shorter and broader than in other specimens and the description. A micro-conidial stage also present. Recorded previously from southern Ont. (D.B.O. Savile).

Die-back (?nutritional). Many trees of a European elm were affected at Charlottetown, P.E.I. A number of trees that were fertilized in 1945 showed complete recovery (R.R. Hurst).

VI. DISEASES OF ORNAMENTAL PLANTS

ACHILLEA

Rust (Puccinia Ptarmicae Karst.) was collected, for the first time in North America, at Greenfield Park, near St. Lambert, Que., on wild plants of A. Ptarmica, on Aug. 2. It was later found on The Pearl, a cultivated variety of the same host, at Ste. Anne de la Pocatiere, and at Notre Dame du Portage, Kamouraska Co., where it was particularly severe and caused almost complete defoliation. Finally it was found at St. Pamphile and St. Roch des Aulnaies, L'Islet Co. (A. Payette).

ALTHAEA ROSEA - Hollyhock

Rust (Puccinia Malvacearum) was collected at Grand Forks and Summerland, B.C. It is general throughout the Okanagan Valley (G.E. Woolliams). Infection was heavy in a planting at Edmonton, Alta. (L.E. Tyner). Rust caused severe damage at Charlottetown, P.E.I. (R.R. Hurst).

ANTIRRHINUM - Snapdragon

Rust (Puccinia Antirrhini) was found on snapdragons in various sections of the interior of B.C., but was usually not very severe (G.E. Woolliams).

Stem Rot (Sclerotinia sclerotiorum) caused serious injury in two gardens in Ont. (J.E. Howitt).

Sulphur Dioxide Injury. Specimens of A. majus with prominent white lesions on the leaves were received from a greenhouse at Etobicoke, near Toronto, Ont. The injury was stated to be heavy at one end of the house. See also Dianthus (D.B.O. Savile).

AQUILEGIA - Columbine

Mildew (Erysiphe Polygoni) was heavy at Brackley Beach, P.E.I. (R.R. Hurst).

ASTER

Powdery Mildew (Erysiphe Cichoracearum) was light on A. dumosus var. Maiden Bush at the Botanical Garden, Montreal, Que. (J.E. Jacques).

BEGONIA

Bacterial Leaf Spot (Xanthomonas begoniae (Buchwald) Dowson). Heavily spotted leaves received from Toronto yielded small Gram negative short rods. The symptoms agreed with those illustrated by P.A. Ark and C.M. Tompkins (Phytopath. 29: 633-637. 1939). There is no clue to the source of the infection. What may have been the same trouble was later received from Ottawa; but in this material the bacteria were very scarce (D.B.O. Savile).

BERBERIS - Barberry

Rust (Puccinia graminis). Pycnia were mature at Ottawa, Ont., 27 May but infection was sparse. Specimens of common barberry and a purple-leaved variety, collected at Martintown 29 May by Mr. J.N. MacRae, bore aecia that were just mature. A heavily infected leaf with mature aecia was received from Lanark on June 18 (I.L. Conners). At the Botanical Garden, Montreal, Que., rust was abundant on B. heteropoda, B. Poiretii, B. sibirica, and B. Tischleri (J.E. Jacques). Only a trace of rust was seen on B.

vulgaris at Summerside, P.E.I., and none at Charlottetown (R.R. Hurst).

Wilt (Verticillium sp.) was severe on B. Thunbergii in Queens Co., P.E.I., in a section of a hedge under trees (R.R. Hurst).

CALENDULA

Yellows (Callistephus virus 1) varied from 10 to 100% in gardens at Charlottetown, P.E.I. (R.R. Hurst).

CALLISTEPHUS CHINENSIS - China Aster

Wilt (Fusarium oxysporum f. Callistephi) was prevalent in aster beds throughout Ont., destroying over 50% of the plants in some gardens (J.E. Howitt).

Foot Rot (Phytophthora cryptogea) caused heavy losses in a commercial planting at St. Vincent de Paul, Que. (J.E. Jacques).

Yellows (Callistephus virus 1) was seen in several gardens in Ont. (J.E. Howitt). Specimens were received from Hamilton, Ont., and Gatineau, Que. (D.B.O. Savile). Yellows caused slight damage at the Botanical Garden, Montreal, Que. (J.E. Jacques). Damage was severe in Queens Co., P.E.I. (R.R. Hurst).

CAMPANULA

Rust (Coleosporium Campanulae). Material was received from Fonthill, Ont. (G.C. Chamberlain). It was collected on C. rotundifolia var. intercedens at Riviere Quelle, Kamouraska Co., Que., 23 June, and was later found on this host at Notre Dame du Portage, St. Roch des Aulnaies, and elsewhere along the shore of the St. Lawrence (A. Payette). This appears to be the first report of C. Campanulae on this host in North America. According to Klebahn the form on C. rapunculoides in Europe will not infect C. rotundifolia. Maine (Pap. Mich. Acad. Sci., Arts and Letters 23: 171-175. 1938) showed that the common rust of northeastern North America, on C. americana which is known from Ont., Que., and N.S. on C. rapunculoides, would not attack 3 strains of C. rotundifolia. Observations at Ottawa in 1943 supported this view. It is probable that the rust here reported is a distinct strain (D.B.O. Savile).

Rust (Puccinia Campanulae Carm.). A trace of this rust was found accompanying Coleosporium Campanulae on C. rotundifolia var. intercedens at St. Roch des Aulnaies, Que. First Canadian record. A collection made in November from the same site showed abundant infection of the new shoots at the bases of the old stems. The rust is very inconspicuous (A. Payette).

CHRYSANTHEMUM

Rot (Sclerotinia sclerotiorum). Infection through disbudding scars in a greenhouse plant at Kentville, N.S., caused dying back (R.J. Baylis).

Spotted Wilt (virus). A few plants were slightly damaged in a greenhouse at the Botanical Garden, Montreal, Que. (J.E. Jacques).

COREOPSIS

Yellows (virus) was heavy and caused severe damage in Queens Co., P.E.I. (R.R. Hurst).

DAHLIA

Grey Mould (Botrytis cinerea). Specimens received from St. Aubert, L'Islet Co., showed severe injury of buds and shoots (J.E. Jacques).

Mosaic (virus) was seen on Jane Cowl, Jersey's Beacon, Jersey's Beauty, Margaret Woodrow Wilson, Cigarette, and several unidentified varieties at Charlottetown, P.E.I. (R.R. Hurst).

DAPHNE

Anthracnose (?Marssonina Daphnes). A stand of D. Mezereum near Charlottetown, P.E.I., was so severely defoliated that it failed to recover. Specimens were not seen, but, from the owner's description, this disease is thought to have been responsible (R.R. Hurst).

DELPHINIUM - Larkspur

Powdery Mildew (Erysiphe Polygoni) was heavy and caused considerable injury to D. sp. at Pembroke, Ont. (D.B.O. Savile). Traces of mildew were seen on odd plants at the Botanical Garden, Montreal, Que. (J.E. Jacques). Infection was a trace to heavy in Queens Co., P.E.I.; late infection often caused considerable damage (R.R. Hurst).

Bacterial Blight (Pseudomonas delphinii). Occasional plants were attacked at the Botanical Garden, Montreal, Que. (J.E. Jacques). Traces were seen late in the season at Charlottetown, P.E.I. (R.R. Hurst).

DIANTHUS

Blight (Alternaria dianthicola Neerg.) was found at Ottawa, Ont. by Dr. Paul Neergaard (J.W. Groves), and at the Botanical Garden, Montreal, Que. (J.E. Jacques). Study of scanty material from West Hill, Ont., suggests that this species was involved, and it now seems probable that some of the earlier reports of A. Dianthi should have been referred to this species. According to Neergaard (Danish species of Alternaria and Stemphylium. Copenhagen. 1945) the spores of A. Dianthi are 13.5 to 66 microns long including the beak, which is $\frac{1}{4}$ to 1/3 of the total length, whereas those of A. dianthicola are 33 to 142.5 microns, of which the beak is often one half (D.B.O. Savile).

Rust (Uromyces caryophyllinus). A slight infection occurred at Vancouver, B.C. (I.C. MacSwan).

Mosaic (virus). A disease agreeing with that described by D.B. Creager (Florists' Review. 27 Jan. 1947) has been increasing for some time in most greenhouses in the Guelph district, Ont. It is stated to be a limiting factor in the growing of many varieties (S.A. Simmons).

Sulphur Dioxide Injury. Specimens of D. caryophyllus var. Peter Fisher received from Etobicoke, Ont., bore conspicuous white lesions. They had been grown in a greenhouse bed adjacent to similarly affected Antirrhinum (q.v.) (D.B.O. Savile).

DIGITALIS - Foxglove

Leaf Spot (Phyllosticta Digitalis). A moderately infected specimen of D. purpurea was received from Georgetown, P.E.I.; pycnidia pale, inconspicuous; spores 6.5-10.5 x 2.0-3.5 microns (R.R. Hurst, D.B.O. Savile).

FILIPENDULA

Powdery Mildew (Sphaerotheca Humuli). Infected specimens of F. rubra were received from Highland Park and Ottawa, Ont. (D.B.O. Savile).

GAILLARDIA

Yellows (Callistephus virus 1). Infection was heavy in Queens Co., P.E.I. (R.R. Hurst).

GLADIOLUS

Yellows (Fusarium oxysporum). Infected plants were received from St. Catharines, Ont., and Acton Vale, Que. (D.B.O. Savile).

Penicillium Rot (P. Gladioli). Slightly infected samples of Leading Lady were received from St. Catharines, Ont. (D.B.O. Savile).

Scab (Pseudomonas marginata). Infection was serious in a large proportion of the corms of a grower at Erickson, B.C., who specializes in cut blooms. The plants had been grown on the same soil for the last two years (M.F. Welsh). Half the corms of a planting of Picardy in Lincoln Co., Ont., were attacked (G.C. Chamberlain). Scab was moderately prevalent in the Guelph district (S.A. Simmons). Specimens were received from Brantford and North Bay, Ont., and St. John, N.B. (D.B.O. Savile). Infection was 2-3% at Kentville, N.S. (D. Creelman).

Core Rot (Sclerotinia Draytoni Buddin & Wakef. (Botrytis sp.) is apparently increasing in Ont. In some storages up to 50% infection occurred in certain varieties (S.A. Simmons). Infected corms were received from Almaville, Que., in Feb. 1947 (D.B.O. Savile). The perfect stage of this organism is described in R.W.G. Dennis and E.M. Wakefield, Trans. Brit. Mycol. Soc. 29: 150. 1946.

Dry Rot (Sclerotinia Gladioli). Specimens were received from Colonsay and Saskatoon, Sask., and Brantford, Ont. Specimens received from St. Catharines showed severe infection on Orange Gold and moderate on Rosa van Lima; what was probably dry rot was stated to be severe in other varieties; later, corms of Leading Lady from the same source were received having unusual lesions that covered most of the corm but were generally shallow; isolations confirmed that these were due to dry rot (D.B.O. Savile). Some dry rot occurred in all storages examined in Ont. (S.A. Simmons). Severely infected specimens were received from St. John, N.B. (D.B.O. Savile).

Hard Rot (Septoria Gladioli). Severely damaged plants were received from North Bay, Ont., and thousands of plants were stated to be similarly affected. A trace was present in corms of Leading Lady received from St. Catharines. Severely infected corms were received from Montreal, with 75% of the crop stated to be affected, and Waterloo, Que., and from St. John, N.B. (D.B.O. Savile).

Bacterial Blight (Xanthomonas gummisudans). Specimens were received from London, Ont. It was stated to be heavy on the whole plantation, and what seemed to be the same disease was said to be common in the district (D.B.O. Savile).

Mosaic (?virus). Six plants received from Arnprior, Ont., showed a severe mottle. The owner stated that he had rogued out many similar plants in 1945, and then had discarded all his old corms and bought new ones; in 1946 a new location was used but the same trouble was showing up. Young plants with a severe leaf mottle were received from Montreal, Que. (D.B.O. Savile).

GYPSOPHILA

Sterility (?Callistephus virus 1). Two plants out of 25 of G. elegans in a garden at McKellar, near Ottawa, Ont., were sterile and spindly in habit. Five out of 50 plants of Callistephus chinensis in the same garden were infected by yellows (I.L. Conners).

HEDERA - Ivy

Bacterial Leaf Spot (Xanthomonas hederae). Leaves of H. Helix from Flin Flon, Man., received from Prof. T.C. Vanterpool, bore typical lesions (D.B.O. Savile).

HELIANTHUS - Sunflower

Powdery Mildew (Erysiphe Cichoraceārum) was severe at the Botanical Garden, Montreal, Que. (J.E. Jacques).

Downy Mildew (Plasmopara Halstedii). Part of a systemically infected plant of H. rigidus var. Miss Mellish was received from Gananoque, Ont.; other small plants were stated to have been severely damaged (D.B.O. Savile).

HELICHRYSUM - Everlasting

Yellows (Callistephus Virus 1). Occasional plants were infected in Queens Co., P.E.I. (R.R. Hurst).

IRIS

Leaf Spot (Didymellina macrospora) occurred quite generally throughout the interior of B.C. (G.E. Woolliams). At the Botanical Garden, Montreal, Que., plants in a sandy soil of pH 7 or lower were badly diseased, whereas plants in soils of pH 7.5 or higher were healthy (J.E. Jacques). Severely infected specimens with the apical half of each leaf killed were received from Rosemere; 500 plants were stated to be similarly affected (D.B.O. Savile). Damage varied from slight to severe in Queens Co., P.E.I. (R.R. Hurst).

Soft Rot (Erwinia carotovora). Odd plants were affected at the Botanical Garden, Montreal, Que. (J.E. Jacques).

Bulb Rot (Penicillium sp.). Infection was about 30% in plants of Wedgewood and I. tingitana received from a Windsor, Ont., greenhouse in Feb. 1947; the stock was of French origin (D.B.O. Savile).

Bacterial Leaf Blight (Phytomonas tardicrescens). At the Botanical Garden, Montreal, Que., nearly all plants of Queen Caterina showed symptoms of leaf blight; adjacent varieties were healthy (J.E. Jacques).

Rust (Puccinia Iridis). A single specimen was received (R.R. Hurst).

Mosaic (virus). Infection was about 50% in samples of Wedgewood, Excelsior, and I. tingitana received from a greenhouse at Windsor, Ont., in Feb. 1947; the stock was of French origin (D.B.O. Savile).

Blindness (?physiological). About 25% of Wedgewood and 50% of I. tingitana received from Windsor, Ont., in Feb. 1947 showed severe stunting and blossom failure; the symptoms were particularly marked in I. tingitana. Although some of these plants were infected by Penicillium and mosaic (v.s.), the damage could not be attributed to these diseases. This is believed to be the blindness referred to by W.C. Moore (Diseases of Bulbs, Bul. 117. Brit. Min. Agr. & Fish. 1939), who suggests that it is sometimes due to sunless weather during the previous summer; this may well be the explanation in this instance, since the summer of 1946 was extremely wet in much of western Europe. Similar plants from Dutch stock were received from Montreal, Que., in March (D.B.O. Savile).

LATHYRUS

Streak (Erwinia lathyri). Trace occurred on L. odoratus in Queens Co., P.E.I. (R.R. Hurst).

Root Rot (?Fusarium). A report from Dunham, Que., referred to sweet pea plants drying up in July (D.B.O. Savile).

Powdery Mildew (Microsphaera diffusa). A trace occurred in Queens Co., P.E.I. (R.R. Hurst).

Mosaic (virus). Odd infected plants were seen in Queens Co., P.E.I. (R.R. Hurst).

Bud Drop (excess nitrogen) was very heavy in four gardens at Charlottetown, P.E.I. (R.R. Hurst).

LILIUM - Lily

Blight (Botrytis elliptica) was reported to have caused serious injury to Madonna lily (L. candidum) at several points in Ont. (J.E. Howitt). Severely infected plants of L. regale were received from Mount Royal, Que. (D.B.O. Savile).

Mosaic (virus). All plants of L. canadense at the Botanical Garden, Montreal, Que., were severely mottled (J.E. Jacques). A single plant of L. sp. received from Montreal showed severe mottling and some distortion (D.B.O. Savile).

Chlorosis (non-parasitic). Several young plants of L. speciosum magnificum at Rockcliffe, Ont., showed poor growth and slight yellowing and mottling; one, when dug, proved to have made almost no root growth. The trouble is believed to have been due to late planting (Nov.) the previous fall (D.B.O. Savile).

LONICERA - Honeysuckle

Leaf Blight (Glomerularia Lonicerae). In the Arboretum, Ottawa, Ont., infection occurred on L. bella, L. bella var. candida, L. discolor, L. iberica var. microphylla, L. Maximowiczii, L. Morrowii, L. notha, L. orientalis, L. orientalis var. longifolia, L. tatarica, and L. sp.; some bushes were severely affected. A heavily blighted specimen was received from River Beaudette, Lake St. Francis, Que. (D.B.O. Savile).

Powdery Mildew (Microsphaera Alni) was severe and caused premature defoliation at the Botanical Garden, Montreal, Que. (J.E. Jacques).

LUPINUS - Lupine

Eye Spot (Ovularia lupinicola Pollack). DAOM 5975 on L. arcticus, Black Tusk, B.C., 1938, coll. J.W. Eastham, and DAOM 19136 on L. sp., Brentwood, B.C., 1945, coll. W. Jones, both agree well with this species, described in J.A. Stevenson, Mycol. 38: 531. 1946. See P.D.S. 23: 111 and 25: 116 (D.B.O. Savile).

Downy Mildew (Peronospora Trifoliorum de Bary) was moderately heavy on L. polyphyllus var. Russell at Agassiz, B.C. Downy mildew has previously been recorded on L. perennis in Ont. and Wis., and was assigned to this species in each case. As Gaumann points out (Beiträge zu einer Monographie der Gattung Peronospora Corda. Zurich. 1923) P. Trifoliorum is a collective species and the form on Lupinus is probably distinct. In the present specimen the conidia are 18-31.5 x 15-22, commonly 22-25 x 18-20 microns, pale brownish yellow, dark brown in mass (W. Jones, D.B.O. Savile).

NARCISSUS

Bulb Nematode (Ditylenchus dipsaci). Stunted and yellowed forced plants were brought for examination at Ottawa, Ont. (D.B.O. Savile). Plants in four beds at the Botanical Garden, Montreal, Que., were severely attacked and had to be discarded (J.E. Jacques).

Smoulder (Sclerotinia narcissicola). Specimens were sent in for identification from River Hebert, N.S. (T.F. Hockey).

NEMESIA

Yellows (Callistephus virus 1). A few affected plants were seen in Queens Co., P.E.I. (R.R. Hurst).

PAEONIA - Peony

Blight (Botrytis Paeoniae). Infection was severe on stems and buds in several plantings at Edmonton, Alta. (M.W.C.). Specimens were received from Shanty Bay, Ont., with the statement that it was heavy in a number of plants. A single blighted bud (probably B. cinerea) was received from Toronto (D.B.O. Savile). Blight was moderately severe at Ste. Anne de la Pocatiere, Que. (R.O. Lachance). It caused severe damage in Queens Co., P.E.I. (R.R. Hurst).

Leaf Blotch (Cladosporium Paeoniae). Severely marked leaves were received from Gananoque, Ont., 30 Sept. Some Cladosporium and some Alternaria were present; but the predominant organism was a Phyllostista with small, bacillar spores, which may have been a microconidial stage of the Cladosporium (D.B.O. Savile).

Root Knot (Heterodera marioni). Knots, with immature nematodes present, were found on roots in a garden at Ottawa, Ont., in April; the plants had been declining steadily for several years (D.B.O. Savile).

Mosaic (virus). Lecygne and Solange showed symptoms of mosaic at the Botanical Garden, Montreal, Que., but the disease does not seem to spread (J.E. Jacques).

Ring Spot (virus). Slight infections were seen at Scott (H.W. Mead) and Swift Current, Sask. (E.J. Sallans).

PAPAVER - Poppy

Leaf Spot (Alternaria sp.). A moderately heavy spotting occurred on two clumps of P. orientale in the Arboretum, Ottawa, Ont. A. sp., apparently not A. tenuis, fruited inconspicuously among the long epidermal hairs on many spots. The fungus does not fruit readily in culture and has not been positively identified, but, according to Dr. Neergaard, it seems to be distinct from those previously reported on Papaver (D.B.O. Savile).

PARTHENOCISSUS

Powdery Mildew (Uncinula necator). A trace was seen at Charlottetown, P.E.I. (R.R. Hurst).

PELARGONIUM - Geranium

Stem Rot (Pythium sp.). An affected plant was received from near Toronto, Ont. (D.B.O. Savile).

Leaf Curl (virus). Specimens were received from two greenhouses near Toronto, Ont.; in one instance 50 out of 200 plants were stated to be affected (D.B.O. Savile).

PETUNIA

Mosaic (virus). One variety, Blue Ball, carried about 40% infection in a planting near Victoria, B.C. (W.R. Foster).

PHLOX

Powdery Mildew (Erysiphe Cichoracearum) was prevalent and caused serious injury to P. paniculata in many parts of Ont. (J.E. Howitt). A heavily infected specimen was received from Virginiatown. Mildew was heavy in many plantings at Ottawa by the end of July (D.B.O. Savile). It was heavy at Kentville, N.S. (D. Creelman) and at Charlottetown, P.E.I. (R.R. Hurst).

Blight (?virus). At the Botanical Garden, Montreal, Que., infection was severe early in the season and many stalks died down. New stalks that developed later showed no symptoms on flowers or leaves (J.E. Jacques). Several plants were affected in a garden at Charlottetown, P.E.I. and this trouble was frequently submitted for examination (R.R. Hurst).

PORTULACA - Purslane

Wilt (Fusarium sp.) attacked a small percentage of plants in several fields being grown for seed at Grand Forks, B.C. (G.E. Woolliams).

ROSA - Rose

Crown Gall (Agrobacterium tumefaciens). One specimen was received from Ottawa, Ont. (L.T. Richardson). Four cases, involving severe damage to Dorothy Perkins and Paul's Scarlet, were seen at Charlottetown, P.E.I. (R.R. Hurst).

Die-back (Cytospora ambiens). Specimens of standard roses were received from Leamington, Ont. Thirty were stated to be infected out of an unspecified total (D.B.O. Savile).

Black Spot (Diplocarpon Rosae). In specimens submitted by Mr. James W. Bish, Waterloo, Ont., from bushes that had been heavily inoculated, a seedling thought to be R. xanthina x acicularis was heavily infected; but R. spinosa altaica and a hybrid seedling of R. spinosissima showed what seemed to be a resistant reaction, a few small, sterile lesions with the typical radiating hyphae being present. Black spot was moderate to severe on all polyanthas and on several unnamed species in the Arboretum, Ottawa (D.B.O. Savile). It caused premature defoliation of several varieties at the Botanical Garden, Montreal, Que. (J.E. Jacques). A lightly infected specimen was brough in at Charlottetown, P.E.I. (R.R. Hurst).

Stem Canker (Leptosphaeria Coniothyrium). Large cankered areas were found on Gloaming hybrid tea in Lincoln Co., Ont.; Valsa sp. was also associated with the cankers (G.C. Chamberlain).

Leaf Spot (Mycosphaerella (Cercospora) rosicola). A specimen was received from Moose Range, Sask. (G.C. Chamberlain).

Rust (Phragmidium americanum) caused moderate damage to several varieties at Kentville, N.S. (D. Creelman). A single specimen of Phragmidium sp. was brought in at Charlottetown, P.E.I. (R.R. Hurst).

Anthracnose (Sphaceloma Rosarum). A small specimen showing moderately severe injury was received from Strathroy, Ont. (D.B.O. Savile).

Powdery Mildew (Sphaerotheca spp.). A request for information concerning felty masses on canes and thorns indicated the presence of S. pannosa at Victoria, B.C. Moderate to heavy infection by S. pannosa occurrad in the Arboretum, Ottawa, Ont., on R. multiflora, R. polyantha var. Coralline, R. Pratti, R. rubiginosa, several varieties of R. rugosa, and several unnamed bushes (D.B.O. Savile). S. pannosa was general but not severe at the Botanical Garden, Montreal, Que. (J.E. Jacques). A specimen showing the conidial stage on the leaves was received from

Abbotsford (D.B.O. Savile). S. pannosa occurred on a rambler rose at Kentville, N.S. (D. Creelman). Powdery Mildew was very heavy and injurious to Crimson Rambler at Charlottetown, P.E.I. (R.R. Hurst).

Mosaic (virus) was seen on a single bush at Kentville, N.S. (D. Creelman).

SCHIZANTHUS - Butterfly Flower

Yellows (Callistephus virus 1) attacked occasional plants in Queens Co., P.E.I. (R.R. Hurst).

SOLIDAGO - Goldenrod

Powdery Mildew (Erysiphe Cichoracearum) was so heavy at the Botanical Garden, Montreal, Que., that the plants were almost white (J.E. Jacques).

TAGETES - Marigold

Yellows (Callistephus virus 1) caused slight damage in Queens Co., P.E.I. (R.R. Hurst).

TULIPA - Tulip

Fire (Botrytis Tulipae) was unusually severe in the Okanagan Valley, B.C., despite a dry spring. Late melting of the snow may have contributed to the outbreak. Pin-point infection of leaves and blossoms was seen at Kelowna, where the disease does not usually occur. No fire was found in one large commercial planting at Vernon, where the air drainage was good; but it was very prevalent elsewhere in the district, one grower suffering considerable loss from severe leaf and blossom lesions on which the fungus fruited freely. At Salmon Arm and Enderby infection was largely of the pin-point type (G.E. Woolliams). Nearly every bloom of red varieties was marked at St. Jean de Dieu Hospital and the Botanical Garden, Montreal, Que. (J.E. Jacques). Heavily infected specimens were received from Quebec City (D.B.O. Savile). Fire caused severe damage in a bed of mixed tulips at Kentville, N.S.; at digging time a few of the bulbs bore sclerotia on the scales (J.F. Hockey). Traces of fire occurred in a number of gardens at Charlottetown, P.E.I., and one severe outbreak was reported (R.R. Hurst).

Break (virus). In a commercial planting at Kelowna, B.C., break increased from 0.06% in 1945 to 1.0%; but at Vernon there were only very small increases and at Salmon Arm there was a slight reduction (G.E. Woolliams). A trace was seen in a red variety at the Botanical Garden, Montreal, Que. (J.E. Jacques).

VIOLA

Root Rot (Pythium sp.). Pansies from Vankleek Hill, Ont.; with rotted roots and bases of stems yielded Pythium sp. (L.T. Richardson).

Powdery Mildew (Sphaerotheca Humuli). Specimens of infected pansy were received from Goderich, Ont. (J.E. Howitt).

YUCCA

Leaf Spot (Coniothyrium concentricum) heavily infected the lower leaves of Y. sp. at the Experimental Farm, Saanichton, B.C., producing dark bordered, ashy centered spots up to 1¼ x 3/4 in. Previously reported in the

Survey from Kentville, N.S., but there are specimens in the Herbarium from Agassiz, B.C., and London and Ottawa, Ont. (W. Jones, D.B.O. Savile).

ZINNIA

Stem Rot (?Sclerotinia sclerotiorum) was destructive in a nursery at Charlottetown, P.E.I. (R.R. Hurst).

Yellows (Callistephus virus 1) caused slight damage in P.E.I. (R.R. Hurst).

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