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DIVISION OF BOTANY AND PLANT PATHOLOGY

TWENTY-EIGHTH ANNUAL REPORT OF THE CANADIAN PLANT DISEASE SURVEY 1948

Compiled by:
I. L. CONNERS
Associate Plant Pathologist

D. B. O. SAVILE
Associate Plant Pathologist

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FOREWORD

Several special accounts appear in this report. They are: "Notes on some plant parasitic nematodes" by A.D. Baker, "Survey of nursery material for plant diseases in 1948" by T. Johnson, B. Peterson, A.M. Brown, and G.J. Green, "Physiologic races of cereal rusts in Canada in 1948" by T. Johnson, B. Peturson, and G.J. Green, "Flax diseases in Saskatchewan in 1948" by T.C. Vanterpool, "Soybean diseases in southwestern Ontario in 1948" by A.A. Hildebrand. Special reports were also prepared on flax diseases particularly in Man. but also in the other Prairie provinces and on sunflower diseases in Man. by W.E. Sackston and on tobacco diseases by L.W. Koch.

No doubt, plant diseases were more prevalent than usual in many parts of Canada, but there appears also to have been increased interest in placing the information on record. Dr. J.T. Slykhuis added a large number of important observations on diseases of alfalfa and sweet clover and Dr. C.D. McKeen contributed critical notes on many diseases of vegetable crops. The section on diseases of trees and shrubs is more extensive than usual due to the interest of some forest pathologists. Principal contributors outside the Division were Mr. S.F. Clarkson; Mr. E. Lavallée and Dr. T. Simard; Mr. O. Caron and Mr. D. Leblond; Dr. J.E. Jacques; Dr. J.D. MacLachlan; Prof. T.C. Vanterpool; Dr. A.W. Henry; Mr. W. Lobay; Mr. W.R. Foster, and all the District Potato Inspectors. Mr. W.R. Childers, Division of Forage Crops, C.E.F., contributed a few very interesting items. Dr. R.O. Lachance has translated the summary, "New and Noteworthy Diseases" for the benefit of French readers. Mr. T.R. Davidson replaced Mr. J.D. Gilpatrick as compiler of the plant disease data for Alberta including the observations made by Prof. Henry and his associates.

We wish to thank all contributors to the Survey, whether or not they have been specifically mentioned and to remind them that the value of these reports rests primarily on accurate painstaking observation and careful but imaginative reporting by each contributor.

I.L. Conners
Associate Plant Pathologist

D.B.O. Savile
Associate Plant Pathologist

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Division of Botany and Plant Pathology
Central Experimental Farm
Ottawa, Canada.

New or Noteworthy Diseases

Only a trace of stem rust (Puccinia graminis) developed on the resistant wheat varieties Thatcher, Regent and Redman in Man. and eastern Sask. Although stem rust was slow in developing, susceptible wheats carried 80% or more infection when they could be found. Stem rust was also severe in some late-maturing fields of soft spring wheat in Alta., but only a light infection was recorded on winter wheat in southern Ont. Infection by oat stem rust was light to severe in Man. and eastern Sask., but elsewhere stem rust was light except for sporadic outbreaks in Eastern Canada.

Leaf rust (P. triticina) infection was heavy in wheat throughout Canada except in parts of Sask. and Alta., but at most points the rust reached its maximum intensity only late in the season. Three races were responsible for most of the leaf rust on the varieties Regent and Redman. Only Exchange (Warden x Hybrid English) showed a high leaf rust resistance in all the rust nurseries across Canada.

Only traces or a very light infection of crown rust (P. coronata) occurred in Man. and southern Sask., but heavy infections developed here and there in Ont. and eastward. Further search in an area in N.B., where a severe infection has developed annually for last 13 years, revealed the buckthorn in quantity.

As a result of a special survey of the principal wheat growing districts in B.C., dwarf bunt (?race of Tilletia caries) was found well established but not severe in a small area about Armstrong and Enderby in the North Okanagan. However there exists in the herbarium a specimen of T. caries, collected at Armstrong in 1931, that has subsequently been identified as dwarf bunt.

Bacterial black chaff (Xanthomonas translucens) was severe at Indian Head, Sask., on naturally infected Saunders wheat, which is known to be one of the most severely affected varieties when artificially inoculated.

Gibberella Zeae was observed for the second time in Man. when perithecia were collected in August on corn stubble of the previous crop.

Although speckled leaf blotch (Septoria Passerinii) is a minor disease of barley, some promising new varieties have been rather heavily infected in Man.

Winter crown rot (low temperature basidiomycete) of alfalfa was again prevalent and caused the usual amount of damage in Alta. It was also present in all districts in northern Sask.

There was an increase of bacterial wilt (Corynebacterium insidiosum) in Alta. particularly in young stands in the southern part of the province. Besides reports of its occurrence in B.C. and Sask., the disease was reported for the first time in Eastern Canada when it was found

in several fields in southern Ont. A few severe, widely scattered, infections of black stem (Ascochyta imperfecta) were also reported. Several diseases of sweet clover previously unreported from southern Ont. were recorded; apparently the most destructive was Phytophthora root rot (P. cactorum).

Flax rust (Melampsora Lini) was epidemic in southern Man. and southeastern Sask. and caused damage estimated at $9,000,000. Under the unusual weather conditions prevailing in 1948, Royal, which possesses considerable mature plant resistance, was severely damaged. In addition many of the rust lesions were invaded by other fungi which caused considerable stem rot. Pasmo (Septoria linicola) was of little consequence because of the rust epidemic, but heavy pasmo infections were present on rust-resistant varieties in the rust area and slight to severe infections occurred in northwestern Man. and eastern Sask. Although Alternaria linicola was isolated several years ago from seed samples from Western Canada it was found for the first time this year on field material on which it was causing a brown stem canker.

Diseases of soybean were of little importance in Canada in 1948. However, brown stem rot (Cephalosporium gregatum Allington & Chamberlain) was found to be widespread on several varieties in southwestern Ont. and under more favourable conditions it may become destructive.

The increasing importance of the sunflower crop has directed attention to diseases of this plant. Some of the inbred female parents were found to be so severely affected by rust (Puccinia Helianthi) in Man. that the yield was cut in half whereas the loss was negligible in commercial fields.

Of scientific interest was the finding of Physoderma graminis causing severe damage to Agropyron repens at Ottawa. The only previous north American record is that of Thirumalachar and Dickson who reported it in 1947 at Madison, Wis.

Bacterial ring rot (Corynebacterium sepedonicum) was the cause of over 60% of the rejections in fields of potatoes entered for certification in Que. and Man. It has been evident for some time that the level of rejections in the seed crop parallels the incidence of the disease in table stock. Its high incidence in Que. has been known for several years, but any doubt concerning its prevalence in Man. was removed by the examination of carload lots of potatoes received in B.C. Of 33 cars shipped to B.C., 23 were found affected with ring rot, some being badly diseased. In contrast only a trace of ring rot was present in 6 of 177 cars received from Alta. Indeed failure to control the disease in table stock in any province seriously jeopardizes the production of seed potatoes.

The low incidence of ring rot in Alta. is clearly shown by the provincial survey. In 1948 the disease was found in 6.7% of the table stock fields in a year when conditions were ideal for its detection. In contrast in Que., 19% of the seed potato fields were disqualified because

of ring rot in the field and an additional 5.7% because of ring rot in other fields on the same farm. The fight to keep ring rot out of B.C. and P.E.I. and to bring it under control in Alta. and Ont. has been remarkably successful, but these efforts are hindered by the prevalence of the disease elsewhere.

High soil moisture and unfavorable growing conditions in the spring greatly increased the incidence of black leg (Erwinia phytophthora) in B.C., Alta., Sask., and northeastern Que. This disease was also more prevalent than usual in the Maritime Provinces, especially in the susceptible variety Sebago.

An epidemic of late blight (Phytophthora infestans), the severest ever recorded in B.C., caused great damage. The disease was not only prevalent on the coast, but it also penetrated into many of the dry areas of the interior. Late blight was also widespread in Man. and eastern Sask. and caused considerable tuber rot in northern areas. The disease spread rapidly in Ont. and threatened to cause heavy losses but for the advent of dry weather. Late blight developed early in Que. and N.B., but conditions were favourable for keeping the crop protected with fungicides and for harvesting rot-free crop. Epidemic conditions developed in the two other eastern provinces. It was destructive in the coastal areas of N.S., but in P.E.I. except for some reduction in yield due to destruction of the vines much of the crop was adequately sprayed, vine killers were used extensively and as a result, tuber rot was slight. Some loss also occurred on tomatoes in B.C. and from Ont. eastward.

Leak (Pythium ultimum) has been recognized for many years as a transit disease in potatoes intended for early market. It would appear to be of fairly frequent occurrence on potatoes during the early storage period particularly if the weather is warm during digging. The pathogen is a high temperature wound parasite and potatoes naturally thin-skinned or immature are especially subject to damage.

Evidence is presented that in the purple or bunch top disease of potato, the name is derived from the current season's symptoms. A small proportion of the tubers become affected by the virus and when such tubers are planted they frequently fail to germinate during the growing season. The tubers that do germinate produce plants that show the secondary or haywire symptoms of the bunch top virus.

Blue mold (Peronospora tabacina) is well established in the two important tobacco growing areas in Ont. The disease was effectively controlled in the seed beds, but it caused widespread damage in the field particularly in the districts where flue-cured tobacco is intensively cultivated.

A few diseases on other vegetables may be mentioned. Although no destructive outbreaks of bean rust (Uromyces appendiculatus) were reported in 1948, its presence was recorded in no less than 5 provinces across Canada. An interesting finding was the occurrence of yellow mosaic

(Phaseolus virus 2) on beans in a garden in N.B. where the source was traced to gladioli growing in the same garden. Besides late blight of potatoes already mentioned the downy mildews of hops and onion were likewise widespread and severe in B.C. To the long list of important pea diseases was added root rot, caused by Aphanomyces euteiches Drechsler, which caused the loss of nearly 500 acres of late maturing canning peas in Essex Co., Ont. A case of marsh spot (manganese deficiency) was recognized in a sample of peas from Sask. Wilt (Fusarium bulbigenum var. niveum) has rarely been observed in watermelons in Canada, but it was severe in 3 fields in Ont. this year; its sudden appearance suggested the pathogen may be seed-borne.

Apple scab (Venturia inaequalis) was very severe throughout B.C., but it was checked by dry weather and less serious than usual in Ont. and Que. Spring weather favoured infection in N.B. and N.S. and losses were heavy. Pear scab (V. pirina) was also severe in B.C. Powdery mildew (Podosphaera leucotricha) was also more destructive than usual in B.C. Perennial canker (Neofabraea perennans) has increased in the Okanagan Valley with the increase of the wooly aphid. Both the fruit and canker phases have increased in the Creston Valley. Another disease favoured by the unusually wet season in B.C. was peach leaf curl (Taphrina deformans), which was severe. The first Canadian record of reversion (virus) was reported when a single tree of Late Duke cherry was found at Creston.

Red stele (Phytophthora Fragariae) proved to be well established in N.S. Its occurrence was suspected previously, but only this year were the symptoms definite as a result of the wet weather. Leaf blight (Dendrophoma obscurans), previously unreported in Canada, was found attacking strawberries at three places in Ont. An interesting new record was the occurrence of downy mildew (Peronospora Rubi) on wild Rubus spp. in B.C. probably as the result of the wet weather.

Dutch elm disease (Ceratostomella Ulmi) was found in 7 additional counties in Que. and on a single tree at Ottawa, Ont. The pathogen was also isolated from the bark from 13 trees in 6 counties in eastern Ont.; there was no evidence that these sickly trees had yet been attacked by the fungus. Scab (Fusicladium saliciperdum) was found on Salix sp. in Ont. for the first time. Canker (Dothichiza populea) nearly destroyed a planting of Lombardy poplar (Populus nigra var. italica) in western Que. Pole blight (cause unknown) of Pinus monticola was reported for the first time in Canada when it was found in B.C. The disease is serious in Idaho and Montana. Rust (Chrysomyxa ledicola) was very heavy throughout Man. on Picea glauca and caused considerable defoliation. Specimens of canker on Laburnum collected in Ont. proved to be due to Fusarium lateritium.

Interesting reports of diseases of ornamentals were: powdery mildew (?Erysiphe Cichoracearum) of begonia in Sask. and Ont.; bud rot (Fusarium Poae) on Dianthus plumarius in Ont.; stem rot (Coniothyrium Euphorbiae) on Euphorbia epithymoides in Ont.; gladiolus scab (Pseudomonas marginata) widely reported; mosaic (Phaseolus virus 2) evidently widespread on gladiolus and white break (virus) in Ont.; soft rot (Erwinia carotovora) severe in forced L'Innocence hyacinth in Ont.

Maladies nouvelles ou d'importance notable

Il n'y a eu que des traces de rouille de la tige (Puccinia graminis) sur les variétés de blé résistantes Thatcher, Regent et Redman au Manitoba et dans l'est de la Saskatchewan. Bien que cette rouille se soit développée relativement tard on a observé des infections de 80% et plus dans les quelques champs de variétés susceptibles qu'il fut possible de trouver. En Alberta la rouille de la tige fut également grave dans les semis tardifs de blé tendre, tandis que dans le sud de l'Ontario il n'y eut qu'une légère infection sur le blé d'automne. L'infection causée par la rouille de la tige de l'avoine a varié de légère à grave au Man. et dans l'est de la Sask., tandis qu'ailleurs, elle ne fut que légère sauf dans l'Est canadien où quelques épidémies locales furent observées.

La rouille des feuilles du blé (P. triticina) fut grave dans tout le Canada, sauf en quelques endroits de la Sask. et de l'Alta, mais en général l'infection fut plutôt tardive. Trois races se partagent la responsabilité d'avoir attaqué les variétés Regent et Redman. Une seule variété, l'Exchange (Warden x Hybrid English), a montré une résistance très marquée à cette maladie à toutes les stations d'observation du Canada.

Il n'y eut que des traces ou tout au plus une très légère infection de rouille des feuilles de l'avoine (P. coronata) au Man. et dans le sud de la Sask., mais des infections plutôt graves ont été observées ici et là en Ont. et dans les autres provinces de l'Est. Une enquête a révélé la présence en abondance du nerprun dans une région où, au cours des 13 dernières années, l'infection fut toujours grave.

Une enquête spéciale, faite dans les principaux districts à blé de la Colombie Britannique, a révélé que la carie naine (? race de Tilletia caries) est bien établi, sans être grave, dans une petite région confinée autour d'Armstrong et d'Enderby dans le nord de l'Okanagan. Toutefois, il y a dans l'herbier un spécimen de T. caries récolté à Armstrong en 1931 et qu'on a par la suite identifié comme carie naine. La maladie appelée glumes noires du blé (Xanthomonas translucens) fut grave à Indian Head, Sask., sur du blé Saunders; on sait que cette variété est une des plus susceptibles lorsqu'elle est inoculée artificiellement.

C'est la seconde fois qu'on observe Gibberella Zeae au Man.; des périthèces furent récoltés en août sur des chaumes de la récolte précédente.

Quelques variétés d'orge nouvelles et prometteuses ont été plutôt gravement atteintes au Man. par une maladie d'importance secondaire, la tache septorienne (Septoria Passerinii).

La pourriture hivernale de la luzerne (basidiomycète croissant à basse température) fut de nouveau générale et a causé autant de dommages que d'habitude en Alta. On l'a également observée dans tous les districts du nord de la Sask. Il y eut une augmentation de flétrissure bactérienne

(Corynebacterium insidiosum) en Alta, particulièrement dans les jeunes luzernières du sud de la province. On l'a observée en C.-B. et en Sask. et, pour la première fois, dans l'est du Canada, dans plusieurs champs du sud de l'Ont. Quelques infections graves mais dispersées d'ascochytose (Ascochyta imperfecta) ont été observées. Plusieurs maladies du trèfle d'odeur inconnues jusqu'ici dans le sud de l'Ont. ont été signalées; apparemment la plus destructive serait la pourriture phytophthoréenne des racines (Phytophthora Cactorum).

La rouille du lin (Melampsora Lini) a pris des proportions épidémiques dans le sud du Man. et le sud-est de la Sask. et causé des dommages évalués à $9,000,000. Sous les conditions climatiques qui ont prévalu en 1948 la variété Royal, qui possède une résistance remarquable à l'état adulte, fut considérablement endommagée. De plus, nombre de lésions de rouille furent envahies par d'autres champignons qui ont causé beaucoup de pourriture des tiges. Le pasmo (Septoria linicola) n'a eu que peu d'importance à cause de l'épidémie de rouille; toutefois dans les mêmes régions on a observé des infestations graves de pasmo sur les variétés résistantes à la rouille, tandis qu'on en a observé à tous les degrés dans le nord-ouest du Man. et dans l'est de la Sask. Alternaria linicola, qui fut isolé il y a déjà plusieurs années de graines provenant de l'Ouest canadien, a été observé pour la première fois cette année dans les champs; il cause un chancre brun sur les tiges. Les maladies des fèves soya n'ont eu que peu d'importance au Canada en 1948. Toutefois la pourriture brune des tiges (Cephalosporium gregatum Allington & Chamberlain), était assez répandue sur plusieurs variétés dans le sud-ouest de l'Ont.; dans des conditions plus favorables, cette maladie pourrait devenir destructive.

L'importance toujours croissante du tournesol a forcé les pathologistes à considérer les maladies de cette plante. Quelques-unes des lignées autofécondées qu'on utilise comme parents femelles dans les croisements furent si gravement infestés de rouille (Puccinia Helianthi), au Man. que les rendements furent diminués de moitié; dans les plantations commerciales toutefois, les pertes furent insignifiantes.

On a observé à Ottawa des dommages sérieux causés à l'Agropyron repens par Pyrenoderma graminis; cette observation est intéressante du fait que la présence de ce parasite en Amérique du Nord ne fut signalé qu'une fois auparavant alors que Thirumalachar et Dickson l'observèrent en 1947 à Madison, Wisconsin.

La pourriture bactérienne du cerne des pommes de terre (Corynebacterium sepedonicum) fut la cause du déclassement de 60% de champs refusés pour la certification dans Québec et au Man. Depuis quelques années il est évident que le taux de déclassement des patates certifiées à cause de cette maladie suit parallèlement son expansion ou sa régression dans les patates de consommation. On sait depuis plusieurs années que cette maladie est très répandue dans la province de Qué. et tout doute quant à sa généralisation au Man. a disparu à l'examen des wagons expédiés du Manitoba en C.-B. En effet, des 33 wagons expédiés en

C.-B., 23 contenaient des patates malades parfois en très forte proportion. Par contre, seulement des traces de pourriture furent décelées dans 6 des 177 wagons reçus de l'Alta. Il est donc évident que les insuccès dans la lutte contre la pourriture bactérienne du cerne dans les patates de consommation entravent la production de semence certifiée.

L'enquête provinciale poursuivie en Alta a révélé que la pourriture bactérienne du cerne y est peu répandue. En 1948 on a décélé la maladie dans 6.7% des champs de pommes de terre de table, alors qu'il existait des conditions idéales de dépistage. Dans la province de Qué., 19% des champs ont été refusés à cause de la pourriture bactérienne du cerne et 5.7% à cause de la présence de cette maladie dans d'autres champs sur la même ferme. Les mesures prises pour empêcher la pourriture du cerne de pénétrer en C.-B. et dans l'Ile du Prince Edouard et pour l'éliminer de l'Alta et de l'Ont. ont donné des résultats remarquables, mais ces efforts sont atténués par la présence de cette maladie à l'état épidémique ailleurs.

L'humidité élevée du sol et des conditions défavorables de croissance au printemps ont grandement favorisé la jambe noire en C.-B., en Alta, dans la Sask. et dans le nord-est de Qué. Cette maladie fut également plus répandue que d'habitude dans les Maritimes, particulièrement chez la variété susceptible Sebago.

Une épidémie record de mildiou (Phytophthora infestans) a causé des dommages considérables à la récolte de patates en C.-B. La maladie était répandue non seulement sur la côte mais aussi dans plusieurs régions semi-arides de l'intérieur. Le mildiou était également répandu au Man., dans l'est de la Sask. et causa beaucoup de pourriture des tubercules dans les régions du nord de ces provinces. La maladie s'est disséminée rapidement en Ont. et elle aurait causé des pertes considérables n'eût été une température sèche. Dans Qué. et au Nouveau-Brunswick, le mildiou s'est développé tôt mais les conditions climatiques ont permis une protection efficace avec les fongicides et une récolte de tubercules exempts de pourriture. Dans les deux autres provinces de l'Est elle sévit à l'état épidémique; elle fut destructive dans les régions côtières de la Nouvelle-Ecosse, mais dans l'I.-P.-E., on a enregistré une légère diminution des rendements à cause de la mort des fanes. Les arrosages efficaces d'une bonne partie des champs et l'usage généralisé des herbicides pour la destruction des fanes ont eu pour résultat de diminuer sensiblement la pourriture des tubercules. Les tomates ont également subi quelques dommages en C.-B. et dans l'Est à partir de l'Ont.

La pourriture pythienne (Pythium ultimum) est reconnue depuis de nombreuses années comme une maladie de transit des pommes de terre de primeur. Il appert qu'elle se rencontre fréquemment durant la première période d'entreposage, particulièrement lorsque la température est élevée au temps de la récolte. La pathogène est un parasite thermophile qui pénètre par les blessures, et les patates dont la peau est mince ou qui ne sont pas parfaitement mûres sont particulièrement exposées à ses attaques.

Il est démontré que le nom de la maladie purple top ou bunch top de la patate est tiré des symptômes de la saison courante. En effet, une faible proportion des tubercules est envahie par le virus, et lorsqu'on plante ces tubercules il arrive souvent qu'ils ne germent pas; ceux qui germent montrent les symptômes dits "haywire" du bunch top.

Le mildiou (Peronospora tabacina) du tabac est bien établi dans les deux importantes régions à tabac de l'Ont. Cette maladie fut tenue en échec dans les couches et les serres, mais elle cause des ravages dans les champs, particulièrement dans les régions à tabac jaune.

Mentionnons quelques maladies des légumes. La présence de la rouille des haricots (Uromyces appendiculatus) fut signalée dans cinq provinces du Canada en 1948; toutefois, aucune épidémie sérieuse ne fut rapportée. Une mention intéressante est celle de la mosaïque jaune des haricots (Phaseolus virus 2) dans un jardin au N.-B. où les glaïeuls du même jardin ont constitué la source d'infection. En plus du mildiou des pommes de terre, les mildious du houblon et de l'oignon furent répandus et graves en C.-B. A la liste déjà longue des maladies importantes des pois, il faut ajouter une pourriture des racines causée par Aphanomyces euteiches, responsable de la perte d'environ 500 acres de semis tardifs de pois à conserves dans le comté d'Essex en Ont. Un cas de tache paludéenne (carence de manganèse) a été identifié sur un échantillon de pois provenant de la Sask. La flétrissure du melon (Fusarium bulbigenum var. niveum) n'a été que rarement observée au Canada; cette maladie fut grave cette année dans trois champs en Ont. Son apparition soudaine permet de croire que le pathogène peut être hébergé par la semence.

La tavelure du pommier (Venturia inaequalis) fut très grave dans toute la C.-B., mais elle fut moins grave que d'habitude en Ontario et dans Québec en raison du temps plutôt sec. La température printannière a favorisé l'infection au N.-B. et en N.-E. et les pertes ont été considérables. En C.-B., la tavelure du poirier (V. pirina) fut également grave et le blanc (Podosphaera leucotricha) a causé plus de dommages que d'habitude. Dans la vallée d'Okanagon, le chancre gléosporien a augmenté proportionnellement à la population des pucerons lanigères; dans la vallée de Creston, on a observé une augmentation et des chancres et du stade fructifère. La cloque du pêcher (Taphrina deformens) est une autre maladie qui fut favorisée par l'humidité exceptionnelle en C.-B. La première observation au Canada de la maladie à virus "reversion" a été faite à Creston sur un cerisier de la variété Late Duke.

La stèle rouge du fraisier (Phytophthora Fragariae) paraît bien établie en N.-E. Jusqu'à date on soupçonnait sa présence mais ce n'est que cette année que les symptômes devinrent mieux définis, grâce à la saison pluvieuse. La brûlure des feuilles du fraisier (Dendrophoma obscurans) jusqu'ici inconnue au Canada, a été observée à trois endroits en Ont. Une observation nouvelle et très intéressante est la présence du mildiou (Peronospora Rubi) sur diverses espèces de Rubus sauvages en C.-B.

La maladie hollandaise de l'orme (Ceratostomella Ulmi) a été observée dans 7 comtés additionnels du Québec et sur un seul arbre à Ottawa, Ont. Le pathogène a également été isolé de 13 arbres provenant de 6 comtés de l'est de l'Ont., fait remarquable, aucun de ces arbres ne manifestait les symptômes de la maladie. La brûlure du saule (Fusicladium saliciperdum) fut observée pour la première fois en Ont. Le chancre (Dothichiza populea) a pratiquement détruit une plantation de peupliers de Lombardie (Populus nigra var. italica) dans l'ouest du Qué. La brûlure du tronc (cause inconnue) de Pinus monticola a été signalée pour la première fois au Canada en C.-B.; cette maladie est grave dans l'Idaho et dans le Montana. Au Man., la rouille (Chrysomyxa ledicola) attaqua Picea glauca au point de causer une défoliation marquée. L'examen de chancres sur Laburnum récoltés en Ont. a révélé que Fusarium lateritium l'agent responsable.

Voici quelques observations intéressantes sur les maladies des plantes ornementales: le blanc (?Erysiphe Cichoracearum) des bégonia en Sask. et en Ont.; la pourriture des boutons (Fusarium Rosa) sur Dianthus plumarius en Ont.; la pourriture de la tige (Coniothyrium Euphorbiae) sur Euphorbia epithymoides en Ont.; la gale des glaïeuls (Phytomonas marginata) observés dans plusieurs endroits; la mosaïque (Phaseolus virus 2) très répandue sur les glaïeuls de même que la bigarrure blanche (virus) en Ont.; la pourriture molle (Erwinia carotovora) sur les jacinthes de serre, variété L'Innocence, en Ont.

The Weather and Its Influence on Plant Diseases

The weather during the 1948 season was abnormal throughout B.C. On Vancouver Island the main features were a mild winter and abnormally high rainfall in May, July and August. Owing to the wet May weather, potato planting was delayed and blackleg was accelerated in early plantings. Considerable losses occurred in Certified seed, partly due to holding too long before planting. During the very wet months of July and August, many fungus diseases were unusually prevalent and caused serious losses. This was particularly true of late blight of potato and tomato. Tomato crops in many gardens were ruined, even on the Saanich Peninsula where late blight has rarely been found previously. Botrytis diseases were abnormally severe on tulips, gladioli, roses, pansies and other ornamentals, affecting both foliage and blossoms. Precipitation in September and October was slightly below normal, and diseases were somewhat checked, but heavy losses had already been incurred (W. Jones).

The exceptionally wet weather throughout B.C. in May, June, July and August favoured the development of many diseases. Rainfall for twelve scattered stations varied from 139 to 263% of average. The following diseases were much more severe than usual: fireblight of pears in the Okanagan and Kootenays; scab of apples and pears in the Kootenays, northern Okanagan and on the coast; coryneum blight of peaches and apricots in the

Kootenays and Okanagan; peach leaf curl in the Okanagan; brown rot of stone fruits; late blight of potato on the coast and in most of the interior; downy mildew of hops in the Kamloops area; downy mildew of onions in the coastal, northern Okanagan and Grand Forks areas; late blight of tomato in the coastal, northern Okanagan and Kootenay areas; late blight of celery; red stele of strawberry on southern Vancouver Island; and shot-hole of cherry on the coast and in the Kootenays. Serious spring floods killed many kinds of plants, but sensitivity to flooding varied greatly. Most small fruits, many broad-leaved maples (Acer macrophyllum) mountain ash (Sorbus pumila) and cherries were quickly killed. Cherries were much the most sensitive tree fruits, most of them dying soon after their roots were covered with water. Peach was next in sensitivity, followed by plum and pear, and finally apple, which was fairly resistant (W.R. Foster).

Rainfall at Summerland from April to August was nearly three times the average, resulting in general outbreaks of many fungus diseases in the Okanagan. Sphaerotheca pannosa was less serious than usual, perhaps because of the wet season, but Podosphaera leucotricha on apple was exceptionally hard to control in southern sections. The wet season also appeared to have other effects. Prunes in many orchards were shrivelled at the stem end, apples failed to size up well, some Bartlett pears were spongy, and peaches were low in sugar and did not ripen normally (H.R. McLarty). In the Kootenays effects of the high rainfall were comparable to those in the Okanagan. Tree fruit diseases were unusually severe, and floods in May prevented delivery of some spray materials. Many growers applied seven scab sprays instead of three or four. Late September and the whole of October were unusually dry, facilitating application of Coryneum sprays (M.F. Welsh).

In Alta. the spring was very cold and the snow did not melt until late April. Winter-killing in legumes was negligible, but up to 29% killing in fall wheat was reported from parts of southern Alta. and the Peace River district. There was a remarkable recovery of these crops in southern areas where rainfall was above normal until mid-July, but the rest of the season was very dry. As a result of this prolonged wet weather, severe chlorosis in spring wheat developed near Lethbridge. In central and northern Alta. drought conditions existed after spring floods, and general rains were not reported until mid-July. Leaf rust of wheat was reported from various points in central and southern Alta. in mid-July; it developed rapidly in the south where heavy rains had resulted in dense growth. By mid August infection was moderate to severe throughout this region. In central Alta. leaf rust developed somewhat during cool, cloudy weather in August. A slight general infection was reported by 1 Sept. Stem rust was reported in southern Alta. on 1 Aug., and was slight but general on susceptible varieties by mid August. Damage was severe on late-maturing stands of soft spring wheat in the Brooks district. In central Alta. traces of stem rust were found in a few widely separated fields. Very dry fall weather in the south rasulted in a poor secondary root development in winter wheat, and severe winter killing may result (M.W. Cormack, S.G. Fushtey).

The spring thaw in Sask. was late but very rapid, resulting in rapid run-off and flooding, followed by high temperatures for about 10 days with very fast germination and growth. Wheat seedlings appeared yellow as

a result of the fast growth, and banding of the leaves was caused by the high temperatures. The warm weather was unfavourable for development of bunt of wheat but favoured the covered smuts of oats and barley. Crown rot of alfalfa was checked quickly.

Dry weather during June and early July caused serious crop deterioration west of the third (106°W) meridian. Rusts and leaf spots were slow in developing. Showery, warm weather over the province in July revived the crops and aided in filling of the heads. The eastern half of the province was most favoured with rainfall and it was in this area that diseases were generally most prevalent. Two exceptions were scald of barley, which was common in the dry area around Scott, and common root rot of cereals, which was most severe in the dry western areas. All crops matured well in fine weather and were harvested in good condition (R.C. Russell).

At Saskatoon, Sask., sunshine was above average from May to Sept., rainfall was below average except in July, and temperature was above average except in Aug. Relatively low evaporation rates tended to offset the abundant sunshine. May was featured by an unseasonably warm spell from the 17th. to the 25th. with daily maxima of 75° to 84°F. This hot weather may have been responsible for unidentified leaf browning of roses, mountain ash, alfalfa and brome grass.

June temperatures were generally uniform, with a warm period during the first week (maximum in the eighties). The only hot spell of the summer occurred during the first week of July when maximum temperatures were above 90°F. for four days. Heavy rains on the 15th and 16th brought the total precipitation above average for the month. August temperatures were reasonably uniform (T.C. Vanterpool).

Winter and early spring in the Niagara Peninsula, Ont., were favourable for orchard fruits. Fair weather in late March afforded good opportunity to apply dormant sprays for peach leaf curl, which was not a factor except in orchards sprayed inadequately or too late.

Daily showers and frequent fogs during the bloom period for stone fruits, 3-17 May, resulted in heavy outbreaks of blossom blight and stem rot. On susceptible varieties of sweet cherries losses were up to 50%. Fair weather after bloom prevented rot of the green fruit. Weather during harvest was very favourable and there was no loss from rotting or splitting of mature fruit.

The early bloom period for apples was cloudy, cool and wet. Growth was very slow, the trees remaining in bloom over three weeks. A heavy primary scab infection resulted from a rain of 1.15 in. on 10 May followed by 0.57 in. on 11 May, which kept the trees almost continually wet for 28 hours. Secondary infections were favoured by prolonged rains on 7 and 22 June. On the latter date infection showed on young fruit. Drought in July, August and September checked later development and practically no late infection occurred.

A period of high temperature, 23-28 Aug., following the dry weather, caused wilting and scorching of the foliage of sour cherries and pears grown on heavy soils. The drought prevented appreciable brown rot of mid and late season peaches and other stone fruits, and did not permit cherry shot hole to develop until late September, but it also reduced fruit size.

A threatened outbreak of tomato late blight was checked by the dry, hot weather of late August. Heavy losses from blossom-end rot of early staked tomatoes was associated with very dry weather when the early fruits were maturing (G.C. Chamberlain).

At Ottawa, January and February were unusually cold. March temperature was normal. Snow cover was unusually light and had virtually disappeared from open fields by 21 Mar. April was warm, May and June somewhat cool, July normal, and August and September unusually warm. Rainfall was close to normal in April and May, but was light for the rest of the season. Sunshine was low in June, high in July, and close to average in the remaining months. Light snowfall and light rainfall after May caused a serious water deficiency late in the season. Cool, wet weather in early May caused much spread of tulip fire. No measurable rain fell from 23 May to 7 June or from 7 to 15 July. Otherwise rains were fairly frequent until late August. From 11 to 24 Aug. there were frequent showers, fogs and heavy dews. In this period Sclerospora graminicola developed abundantly on foxtail millet and wild foxtail, and Phytophthora infestans became established on potato and tomato. On 26 Aug. about 1/10 acre patch in one potato field showed the underside of nearly every plant white with late blight sporangia. However, development was checked by four days of extremely hot weather; and from 6-30 Sept. rainfall totalled 0.07 in. Consequently the threatened epidemic did not materialize. Temperature and precipitation in October were normal. November and early December were wet and very mild (D.B.O. Savile).

The growing season in eastern Que. was characterized by a cool spring, a summer with evenly distributed rain just sufficient to permit a good growth, and a dry fall. The conditions did not favour disease epidemics, and ordinary control measures easily checked most of the common diseases of cultivated plants. Little tuber rot was observed even in fields where potato foliage had been severely damaged by late blight. Although only traces of potato leak (Pythium ultimum) could be observed in a field at Ste. Anne de la Pocatière, it caused about 1% loss of the crop in storage. On the other hand, a higher percentage of bacterial ring rot could be observed in the fields than in cellars because conditions favoured rapid decay of infected tubers. Rust was again unimportant on cereals. Leaf rust of wheat, though abundant, occurred too late to do any damage. Similarly, heavy infection of alfalfa by Pseudopeziza Medicaginis was encountered only in places where harvesting had been abnormally delayed (A. Payette).

The longest cold spell in the history of N.B. was recorded from January to early March. In this period there were forty-nine days of sub-zero weather. Despite from 12 to 30 in. of snow cover sod land was frozen

to a depth of 37 in. Rain and warm weather rapidly melted the snow and by 20 March the fields were bare. Only one inch of rain fell during April and by the end of the month sandy soils were almost ready to work. In May precipitation was 5.46 in. Wet ground delayed seeding considerably, especially in the eastern section of the province where most of the land was not dry enough to seed until late June.

Despite the severe winter cold, grasses and legumes wintered well. Growth was slow during early May and much chlorosis was evident in grasses and clovers. These crops developed luxuriantly in June and a very heavy hay crop was eventually harvested. A feature of the season was the exceptionally vigorous growth of red clover. Apple trees wintered well in some sections but not in others. Considerable bud injury to McIntosh and Cortland was reported from some localities. The varieties Linda and Sandow showed considerable frost injury in the branches and trunks in some areas. Strawberries and perennial flowers wintered exceptionally well, but raspberries, some shrubs and many hedges suffered severely.

A heavy ascospore discharge of the apple scab fungus was first recorded 25 May and for the next six days discharge was intense.

Precipitation amounted to 2.54 in. in June. In July it was 4.47 in. and was well distributed. However, there were 39 more hours of sunshine than for the 35-year average for the month. During a damp, dull period extending from 12 to 14 Aug. late blight of potatoes became generally established, but abundant sunshine and restricted rainfall during the rest of August and September checked its spread. Water shortage developed in many districts and was not relieved until early October. November was mild and 6.93 in. of rain were recorded. On the whole, the month of December was mild. Ploughing ceased on 12 Dec. Sub-zero temperatures were experienced only on two days of this month. At the end of the year, frost had penetrated 11 in. into the soil (J.L. Howatt).

The two critical months of May and June in N.S. were wet. It was one of the wettest springs in many years as soil water was high and a rainfall of 10.39 in. during the two months aggravated the soil conditions. Planting was seriously delayed. Orchard spraying was exceedingly difficult. Apple scab started early and became well established. Botrytis blights were prevalent on many crops. Magnesium deficiency was reported on several crops. The first general outbreak of red stele in strawberries occurred in several parts of the province. These were some of the influences of the weather in the early season. The summer was more favourable but late blight developed in several districts on potatoes and tomatoes, causing reductions in marketable crops. Autumn weather favoured the maturing of most crops but frosts occurred in some districts to cause injury to late apples and kill the foliage on many apple trees. Orchard defoliation was very erratic. Well fertilized orchards appeared to have most of the frozen foliage. A similar condition in some previous years has reduced the carry-over of the scab fungus in the orchards concerned (J.F. Hockey).

Weather conditions had a marked effect upon the development of crop diseases in P.E.I. The spring was backward and seeding late; grain came up slowly and there were many instances of potato seed pieces decaying in cold soil. Tree fruit bloom was delayed at least a fortnight because of backward weather.

Apple scab spore discharge was very late but the disease was a threat with the onset of warm, wet weather. Rainy weather during June and July made spraying difficult and many orchards suffered accordingly.

Strawberry mildew, usually troublesome in dry, hot weather, was not serious, presumably owing to the comparatively wet season. Turnip brown heart was less troublesome than usual, it being evident that the boron applications were fully effective with high soil moisture. The same was doubtless true of potato magnesium deficiency.

July weather conditions favoured potato late blight development, yet precipitation for July, August and September was slightly under the 26 year average of 10.53 in. During September heavy dews and warm days ensured rapid development of blight, which finally got out of control in many fields. Fortunately, plants thus killed no longer produced spores, and fine frost-free weather made it possible to delay harvesting until the spores were dead. Consequently little tuber rot developed (R.R. Hurst).

Notes on Some Plant-Parasitic Nematodes

A.D. Baker,
Division of Entomology, Ottawa, Ont.

The finding of the potato-rot nematode, Ditylenchus destructor Thorne, 1945, attacking potatoes in Prince Edward Island a few years ago (P.D.S. 25:66) attracted an appreciable amount of attention, particularly from those interested in potato culture in other parts of the world. Fears were evident that this nematode might be an important threat to potato growing. Accordingly, in order that the excellent reputation enjoyed by Prince Edward Island potatoes should be well protected, vigorous steps were taken at once to prevent any spread of this pest even though it was not at all certain that a potato enemy of major economic importance was involved. While there has been no relaxing of the protective measures there has been no evidence, as yet, that the potato-rot nematode presents a threat of great importance to successful potato culture. Potato plantings in sod land have resulted in a few fairly heavy infestations and the planting of infested potatoes may also cause important injury, but this level of infestation has not been increased or even maintained by subsequent plantings of non-infested potatoes. With the planting of land to potatoes in areas in Prince Edward Island where potatoes had not been planted since the identification of this parasite, some few new infested fields are being located. Potato culture is still prohibited in all fields reported infested. However, most of the land now classified as infested is land where trace infestations only are present. The matter of infested land has about

reached the point where some difficulty is being experienced in finding fields sufficiently infested for experimental purposes. Thus, in general, the current situation in regard to this nematode in Prince Edward Island does not yet appear to support very grave apprehensions as to its possible role as a major injurious pest of the potato that might operate with devastating results in potato-growing areas.

The sugar-beet nematode, Heterodera schachtii (Schmidt, 1871), continues as an important problem in the sugar-beet growing areas about Blackwell, Ont. While recent surveys have not revealed any spread in this locality beyond the areas previously known to be infested, the present short crop rotations have not been sufficiently effective in reducing the total annual production of these nematodes to warrant easing the existing regulations that govern the harvesting of the sugar beet crop from this area. From the standpoint of this problem the present rather specialized type of farming could well be replaced by the introduction of additional non-host crops so that the growers could profitably lengthen their crop rotations. The present practice of not allowing one beet crop to immediately succeed another has usually been sufficient to prevent severe crop injury, from this source, but not sufficient to prevent a large crop of these nematodes being produced every year. The provincial regulations now in force governing the harvesting of beets in this area have likely been an important factor in restricting the spread of this nematode, but it should be possible to greatly reduce the present production level of these nematodes by improved farm practices.

Further information has been accumulated on the host range of the Blackwell population of the sugar beet nematode. Records now show this pest attacking sugar beets, garden beets, mangels, turnips, radish, rutabaga, brussels sprouts, cabbage, cauliflower, rape, broccoli, kale, wormseed mustard, wild mustard, curled dock, pennycress or stinkweed, and lambs quarters.

The oat nematode, Heterodera avenae Lind, Rostrup & Ravn, 1913, is an important plant pest over a considerable area in the central southern regions of the Province of Ontario, ranging from Waterloo in the west to Peterborough in the east. However, this is not a continuous area of infestation but consists rather of a number of infested areas lying within these present limits. Many of these points of infestation are well removed from one another and may be quite isolated. Important crop loss has been caused by this nematode, from time to time. This crop loss may vary considerably in different years and seems to be influenced, to some extent, by seasonal conditions. Observations on this parasite provide an interesting example of the danger of using crop injury as an indication of the seasonal abundance of the pest involved. Under some conditions the two events may tend to parallel one another but sometimes the facts will demonstrate that something quite different may occur. In some years the plants may become established early and rapidly and, given uninterrupted good weather for growth, manage to keep ahead of the demands of the parasites. Eventually a fairly good crop of grain may be harvested and, judging solely by the appearance of the crop, it might be assumed that the

nematode population in that year, and in that particular field, had fallen to a low level. Examinations of the soil and plant roots may reveal that this is not the case and that the parasite, having had an abundance of food available at all times, has increased in numbers to a very high level. Thus it is possible to have, at harvest time, a condition where injury may be classified as light and the parasite rated as very abundant. On the other hand, under different conditions, the situation may be reversed. With late or slow establishment of the plants and later unfavorable conditions for plant growth, dry spells of weather, etc., severe crop loss may occur, even though the initial nematode population may not have markedly exceeded that of the case already described. With many of the plants killed and the growth of the remainder greatly stunted the food supply of the nematodes will have been sharply reduced. Thus by the end of the season the nematode population may have been reduced even below the original spring level. In this case injury would be termed severe but the population level of the parasite had dropped. There are, of course, other important combinations of conditions that may occur to give different results, and a very high initial population is liable to result in severe injury almost regardless of the seasonal conditions.

Oats, barley and wheat are the plants which have been most commonly attacked by the oat nematode and injury is often most pronounced in the order given. Large populations may be built up on wheat but sometimes without injury being very conspicuous. Where oats and barley are planted together in an infested field the oats will usually show the most injury.

The situation in regard to the oat nematode in Ontario can not be said to have improved to any noticeable extent and rotation of crops should be emphasized along with precautions aimed at restricting the further spread of this nematode.

Some experimental plots harvested at Blackwell, Ont., on October 27, 1948, disclosed rather heavy infestations of rutabaga and of turnip by the root-knot nematode, Heterodera marioni (Cornu, 1879). These are new host plant records for Ontario.

The root-knot nematode is a comparatively common parasite of plants and, in other parts of the world has been recorded as attacking a very large number of different plants. However, it is not at all certain that any one natural population of this nematode could be successfully transferred to all of the plants recorded as hosts of the species. The variety of theories used to explain these differences in populations will not be discussed here, but the desirability of securing as much information as possible in regard to the host range of local populations of this nematode is stressed. To avoid confusing matters further, greenhouse infestations should be referred to as such and an accurate record of the host range of the field populations emphasized.

Information similar to the above is desired in the case of the meadow nematode, Pratylenchus pratensis (deMan,1880), where it is evident that a complex is involved. The same applies to other species such as Ditylenchus dipsaci (Kuhn, 1857), Aphelenchoides parietinus (Bastian, 1865), and Aphelenchus avenae Bastian, 1865.

Phenological Data - 1948

The data were compiled this year by B. Peturson at Winnipeg, R.C. Russell at Saskatoon, and M.W. Cormack and S.G. Fushtey at Edmonton, and appear in the accompanying table.

The spring season opened somewhat later than normal at Winnipeg, decidedly later at Saskatoon and later still at Edmonton. However, warm weather after 15 May caused rapid development of the vegetation at all three points, and flowering dates were normal by about 25 May at Winnipeg, 5 June at Saskatoon, and 25 June at Edmonton. From then on flowers opened at about the normal dates throughout the season.

At all three points the first wheat was sown considerably later than usual. However, by harvest time it had more than made up for lost time except at Winnipeg (R.C. Russell).

Anthesis dates at Ottawa, with number of days departure from average, for 8 plants from the main list were as follows:

Populus tremuloides	18/4	2L	Anemone canadensis	2/6	2E
Acer Negundo	27/4	N	Bromus inermis	25/6	6L
Prunus pennsylvanica	15/5	2L	Phleum pratense	28/6	3L
Smilacina stellata	17/5	2E	Solidago canadensis	5/8	6L

Anthesis dates for marker plants at Ottawa, with number of days departure from average, were as follows:

Acer saccharinum	5/4	6E	Carya cordiformis	13/6	1L
Ulmus americana	22/4	3E	Tilia americana	10/7	4L
Acer saccharum	6/5	2E	Polygonum cuspidatum	28/8	4E
Pinus sylvestris	30/5	2L	Hamamelis virginiana	26/9	2E

At Ottawa the spring season opened, with the flowering of Acer saccharinum, six days ahead of average. The season then lagged somewhat and by 1 May it was approximately average. It continued close to average throughout the summer (W.H. Minshall).

SUMMARY OF PHENOLOGICAL DATA TAKEN AT WINNIPEG, SASKATOON, and EDMONTON, IN 1948.

		Winnipeg		Saskatoon		Edmonton	
Pulsatilla Ludoviciana		--	--	30/4	13L	--	--
Populus tremuloides		28/4	3L	9/5	15L	12/5	18L
Phlox Hoodii		--	--	14/5	15L	--	--
Salix petiolaris		--	--	16/5	12L	--	--
Acer Negundo		13/5	6L	15/5	8L	20/5	17L
Betula papyrifera		--	--	17/5	7L	24/5	15L
Thermopsis rhombifolia		--	--	20/5	10L	--	--
Amelanchier alnifolia		20/5	3L	21/5	7L	26/5	11L
Prunus americana		17/5	4L	--	--	--	--
Viola rugulosa (V. canadensis auct.)		--	--	23/5	1L	28/5	7L
Prunus pennsylvanica		--	--	23/5	3L	29/5	11L
Smilacina stellata		--	--	29/5	5L	7/6	12L
Hierochloë odorata		--	--	21/5	4L	--	--
Crataegus sp. (Hawthorn)		26/5	1E	30/5	2L	3/6	4L
Prunus sp. (Chokecherry)		27/5	1E	30/5	2L	2/6	6L
Viburnum Lentago		2/6	2E	--	--	--	--
Cornus sp. (Dogwood)		--	--	1/6	2L	4/6	3L
Elaeagnus commutata		--	--	4/6	N	7/6	2L
Lonicera glaucescens		--	--	6/6	2E	12/6	3L
Achillea lanulosa		--	--	12/6	2L	26/6	N
Diholcos bisulcatus		--	--	10/6	1E	--	--
Anemone canadensis		2/6	5E	8/6	2E	30/6	4L
Galium boreale		--	--	10/6	3E	14/6	2E
Rosa alcea		--	--	15/6	2E	--	--
Bromus inermis		17/6	5E	17/6	7E	30/6	3L
Gaillardia aristata		--	--	18/6	5E	--	--
Campanula petiolata		--	--	24/6	1L	--	--
Chrysopsis hirsutissima		--	--	20/6	9E	--	--
Spiraea alba		--	--	29/6	3E	--	--
Symphoricarpos occidentalis		--	--	28/6	6E	4/7	N
Psoralidium argophyllum		--	--	16/7	6L	--	--
Phleum pratense		--	--	--	--	5/7	2E
Lactuca pulchella		8/7	4L	1/7	8E	10/7	4E
Chamaenerion spicatum		--	--	--	--	8/7	1E
Agastache anethiodora		--	--	--	--	8/7	3E
Solidago canadensis		--	--	--	--	20/7	2L
Grindelia perennis		--	--	25/7	2L	--	--
Oligoneuron canescens		--	--	28/7	3L	--	--
Aster sp. (white)		--	--	27/7	1E	--	--
Aster laevis (purple)		--	--	31/7	1L	28/7	3E
Thatcher Wheat:	Sown	14/5	18L	4/5	9L	12/5	14L
	Emerged	?	?	17/5	7L	23/5	13L
	Headed	4/7	5L	27/6	3L	5/7	4L
	Harvested	10/8	5L	3/8	2E	10/8	4E

I. DISEASES OF CEREAL CROPS

WHEAT

ALTERNARIA BLOTCH (A. tenuis) was common in Man. in 1948 but caused slight damage. Two severe outbreaks occurred in very late-sown fields of Regent (W.A.F. Hagborg).

ERGOT (Claviceps purpurea). Traces were recorded in some varieties of winter wheat at Lacombe, in a plot of Marquis at Olds, and in 6 out of 331 fields of spring wheat in Alta. (T.R.D.); in 2 plots of Regent x Thatcher R.L. 2035.4 at Winnipeg, Man. (W.A.F. Hagborg); and in a field in P.E.I. (R.R. Hurst).

POWDERY MILDEW (Erysiphe graminis) infection was 35-tr. 24-sl. 4-mod. /331 spring wheat fields in Alta. and tr.-sl. in the plots at Lacombe, tr.-mod. at Olds and mod. at Edmonton; infection was mod.-sev. in the irrigated plots at Lethbridge and a trace in 4 out of 41 fields of winter wheat in southern Alta. (T.R.D.). Infection slight in a block of Rideau at the C.E.F., Ottawa, Ont. (V.R. Wallen); moderate and less than usual in winter wheat about Guelph (J.D. MacLachlan). A trace in a field in Prince Co., P.E.I. (R.R. Hurst). Compare these local observations with those on the rust nursery material (see Table 2).

HEAD BLIGHT (Fusarium spp.). Continued most and relatively cool weather during the summer appeared to favour the development of head blight in Man. By the end of July, it was found in moist fields of wheat and barley examined and in 15 of the 25 varieties of the co-operative test of wheat varieties at Winnipeg. Occasionally as many as 5% of the spikes were affected. Of the 6 collections of wheat head blight that were cultured, Fusarium Poae was isolated from one collection, F. Scirpi var. acuminatum from 3, F. culmorum from 2, and F. graminearum and Helminthosporium sativum from one.

Gibberella Zeae, the perfect stage of Fusarium graminearum, was found in profusion on corn stubble of the 1947 crop on the University farm by J.E. Machacek on Aug. 8, 1948. (This collection of perithecia was the second recorded for Man., the first having been reported by Dr. G.R. Bisby in 1923). Formation of perithecia evidently took place between mid-June and early August for perithecia were not found on the same stubble on June 12. Empty perithecia, as well as mature and in some collections immature perithecia, were found on the corn stubble at the same location on Sept. 12. No perithecia were found on corn stubble of the 1948 crop when it was examined in mid-November (W.L. Gordon, J.E. Machacek, W.A.F. Hagborg).

Six other collections of head blight on wheat and one on barley from outside Man. were cultured. The species isolated were as follows: Agassiz, B.C., F. avenaceum; Fort William, Ont., F. culmorum; Appleton, wheat 2 collections F. graminearum and barley F. Poae, Helminthosporium sativum; Normandin, Que., F. graminearum (W.L. Gordon).

Traces of head blight occurred in the plots at Ste. Anne de la Pocatiere, Que. (A. Payette).

COMMON ROOT ROT (Helminthosporium sativum and Fusarium spp.). Infection was 79-tr. 100-sl. 18-mod. 4-sev./331 fields of spring wheat in Alta., being slightly more intense in southern than in central Alta.; trace in the plots at Lacombe; 18-tr. 9-sl. 10-mod. 3-sev./41 fields of winter wheat (T.R.D.).

In 1948 the mean disease rating for 245 fields inspected in Sask. was 10.34, compared with 9.80 in 1947 and 10.68 in 1946. The variability from field to field within the province was high (standard deviation 5.48) whereas within a crop district it was, for the most part, lower. The root-rot ratings for crop districts 1 to 9 were respectively 8.1, 6.9, 10.7, 17.8, 7.2, 10.7, 11.2, 10.7 and 9.0. The main difference from last year was the low rating in crop district 2 and the unusually high rating in crop district 4. In fact there appears to have been an increase of the disease in crop district 4 during the succession of dry years from 1943 on, the disease ratings from 1943 to 1948 being 8.5, 11.0, 13.4, 16.7, 12.5 and 17.8. This increase may indicate a build-up of inoculum (B.J. Sallans).

TAKE ALL (Ophiobolus graminis). Infection was 8-tr. 7-sl. 4-mod. 1-sev./41 fields of winter wheat and 23-tr. 13-sl. 2-mod. 1-sev./331 fields of spring wheat in Alta. (T.R.D.). Single plants or small patches were affected in 3 fields in east central Sask.; in one field infection spread from the grassy headland (H.W.M.). Infection was slight and sporadic in winter wheat about Guelph, Ont. (J.D. MacLachlan).

BASAL GLUME ROT (Pseudomonas atrofaciens). A trace was found in one field of spring wheat in Alta. (T.R.D.).

STEM RUST (Puccinia graminis). A trace occurred in one field of winter wheat in 41 examined in Alta. and on most varieties in the plots at Lacombe. A severe infection developed in late-maturing fields of soft wheat at Brooks. Infection was only a trace to slight on spring wheat throughout southern Alta. and a trace at scattered points in central Alta. (T.R.D.). Infection was 10-tr, 2-sl. 3-mod., confined to fields in eastern Sask. from Arcola to Carrot River; it was found at Saskatoon on 10 Aug. on Sea Island and Red Bobs (H.W.M.). For the occurrence of stem rust in Man. as well as Alta. and Sask. consult "Cereal Rust Development in the Prairie Provinces in 1948", on p. 18.

Stem rust infection was slight in winter wheat about Guelph, Ont. (J.D. MacLachlan) and ranged from 20 to 30% in three blocks of Garnet and one of Rideau at the C.E.F., Ottawa (V.R. Wallen). Infection was a trace in a few varieties at Ste. Anne de la Pocatiere, Que. (A. Payette); a trace to slight in all fields examined in N.B. (J.L. Howatt) and a trace in fields in P.E.I. (R.R. Hurst).

LEAF RUST (Puccinia triticina). A slight infection was noted at Sorrento, B.C. (G.E. Woolliams). Leaf rust was general and often quite heavy throughout the foothills area of north-central Alta. by mid-August. In most fields of winter wheat even slight infections were rare in southern Alta., but infection was moderate to severe in spring wheat. In other parts of central Alta. infection was a trace to slight. "I do not recall a year when leaf rust was more general and heavy in Alta." (G.B. Sanford). Leaf rust infection was 19-tr. 19-sl. 15-mod. 9-sev./247 fields in Sask.; severe infections occurred in the north-east, north-central sections at Weldon, Meath Park, Kelliher and Yorkton. Leaf rust was first recorded at Saskatoon on 27 July (H.W. Mead). The incidence of leaf rust in Man. is recorded in a summary for the Prairie Provinces on p. 18.

Leaf rust infection was in general moderate on winter wheat about Guelph, Ont.; it appeared to be less severe than in 1947 (J.D. MacLachlan). Infection was 40% in a block of Rideau and ranged from 5 to 25% in 3 blocks of Garnet at the C.E.F., Ottawa (V.R. Wallen). In the plots at Ste. Anne de la Pocatiere, Que., infection developed late and ranged from 40-50% on Huron and Coronation to 15-20% on Cascade and Redman (A. Payette). Leaf rust was found in all fields examined in N.B. and caused moderate damage in a few (J.L. Howatt).

BROWNING ROOT ROT (Pythium spp.). No severe outbreaks were observed or reported in Sask. May and, especially, June were much too dry for the disease to develop. When the rains did come in early July the soil temperature was probably too high (T.C. Vanterpool).

BUNT (Tilletia caries and T. foetida). The inspection records (summarized in Table 1) of the Board of Grain Commissioners show that bunt of wheat was less prevalent in 1948 than in the past several years. In Hard Red Spring and Amber Durum wheats there was a marked decrease in the percentage of cars graded smutty, but in Alberta Red Winter the figure remains unchanged (W.J. Cherewick, W. Popp).

Table 1. Wheat Bunt in Western Canada

Class of Wheat	Aug. 1, 1947 to July 31, 1948			Aug. 1 to Oct. 31, 1948		
	Cars Inspected	Cars Graded Smutty	Percentage Graded Smutty	Cars Inspected	Cars Graded Smutty	Percentage Graded Smutty
Hard Red Spring	131,838	418	0.32	45,374	47	0.10
Amber Durum	5,862	90	1.54	4,294	12	0.28
White Spring	433	1	0.23	224	0	0.00
Alberta Red Winter	981	28	2.85	718	28	3.90
Garnet	2,330	0	0.00	402	0	0.00
Mixed Wheat	136	0	0.00	78	1	1.28
All Classes	141,580	537	0.38	51,090	88	0.17

A survey for dwarf bunt of winter wheat in B.C. was made for the first time in 1948 at the request of the Associate Committee on Plant Diseases of the National Research Council of Canada and the Dominion Department of Agriculture. Fields of winter wheat were examined in the Kootenays, Okanagan, Kamloops and the coast, but not in the Cariboo, the only other area in B.C. where winter wheat is grown. Dwarf bunt was found to be well established but not severe at Armstrong and Enderby in the Northern Okanagan. It was also found on one farm on Vancouver Island, but it was not seen in the Kootenay and Kamloops areas. Affected heads were collected from each field and sent to W. Popp, who confirmed the presence of dwarf bunt.

Dwarf bunt infection on the affected farms in the North Okanagan varied from a trace to about 5%. The varieties affected were Hussar, Ridit, Orfed, Jones' Fife, and Yogo, of which Hussar and Ridit are the most commonly grown. The replacing of Jones' Fife with the introduction of Ridit and Hussar in 1931 was very effective in reducing bunt losses until 1945. The

incidence of bunt increased in 1945, 1946, and 1947, but was considerably less in 1948. Dwarf bunt may be responsible for the increased incidence in these years (W.R. Foster). Twenty-two collections of bunt were received at Winnipeg from B.C., Alta. and Sask. The collections were identified as follows: Armstrong, B.C., (10 collections), Enderby (2), all dwarf bunt; Gordon Head, near Victoria (3), one dwarf bunt and two mixed T. caries and T. foetida; Shuswap (1) T. foetida; Lethbridge, Alta., (1) mixed T. foetida and T. caries; Magrath (3), Swift Current, Sask., (1) and Southey (1) all T. foetida (W. Popp).

Bunt infection was 1-tr. 1-sl./41 fields of winter wheat examined in Alta. (L.E. Tyner). About 25% of the heads were bunted in one field, near Whitla, of spring wheat out of 331 fields examined in Alta. (M.W. Cormack). A trace of bunt (mostly T. foetida) was found in 7 out of 251 fields examined in Sask. It was less prevalent in 1948 than for several years. Probably late seeding and the rapid warming of the soil after seeding were responsible for much of the decrease. It is possible that the publicity given to the increase of bunt in recent years resulted in more attention being paid to proper seed treatment (R.C. Russell). No bunt was found in a field survey in Man. (W.J. Cherewick, W. Popp). A trace of bunt (T. foetida) was present in a plot of Huron at Ste. Anne de Pocatiere, Que. (A. Payette).

SPECKLED LEAF BLOTCH (Septoria Avenae var. triticea). Infection was 60-tr. 83-sl. 19-mod. 3-sev./331 fields of spring wheat in Alta., tr.-sl. in the variety plots at Olds and Lacombe and sl.-mod. at Lethbridge (T.R.D.). Infection was 3-mod. 3-sev./247 fields in Sask. The affected fields were in east-central Sask. between Quill Lakes and York; the damage was considerable in late fields (H.W.M.). For additional observations see Table 2.

GLUME BLOTCH (Septoria nodorum). Infection was 11-tr. 9-sl. 1-mod./331 fields of spring wheat in Alta. (T.R.D.). A trace infection was recorded in one field in Queens Co., P.E.I. (R.R. Hurst).

LOOSE SMUT (Ustilago Tritici). Infection was 1-tr./331 fields of spring wheat in Alta. (T.R.D.); 4-tr./251 fields in Sask. (H.W.M.). Infection was a trace in 2 fields and 1.6% in another in the 17 fields of common wheat examined in Man., and a trace to 1.7% av. 0.6%, in the 6 out of 7 fields of durum wheat inspected (W.J. Cherewick, W. Popp). Infection was moderate to severe in susceptible winter wheat varieties about Guelph, Ont.; no loose smut was observed in a block of Cornell 595 at Ont. Agr. College (J.D. MacLachlan). A few affected heads were found in a field in Queens Co., P.E.I. (R.R. Hurst).

BACTERIAL BLACK CHAFF (Xanthomonas translucens) was again severe in Saunders wheat (naturally infected) at Indian Head, Sask. For several years Saunders has been one of the varieties most severely attacked in field test plots inoculated with X. translucens at Winnipeg, Man. The mean annual disease ratings for bacterial black chaff in per cent on four selected varieties for the past three years are given below; each figure is the mean of four replicates:-

Variety	Leaf Area Destroyed 1946	1947	1948	Head Discoloration 1946	1947	1948
Saunders	75	48	66	35	53	28
Thatcher	53	25	53	13	14	9
Apex	46	10	53	26	43	18
Regent	33	10	18	9	16	2

(W.A.F. Hagborg).

CHLOROSIS (physiological). Severe damage was observed in 8 fields of spring wheat and was reported from several others in an area south of Lethbridge and Taber, Alta. This condition apparently developed during a prolonged period of cool, wet, spring weather. It was most severe in the early seedings, but was not constantly associated with a particular variety, soil type or cultural practice (M.W. Cormack).

CHLOROTIC BANDING (high surface-soil temperatures) was widespread in central and north-central Sask., but the damage was probably slight although some retardation of seedling development was reported. In open-air experiments at Saskatoon boxes 12" x 12" x 10" were filled with moist soil to within 1½" of the top, wheat seed was sown and the remaining 1½" filled with dry soil. In four of the eight series that were run, germination was completed during hot clear weather. It was found that chlorotic banding first appeared when surface-soil temperatures registered 42°-45°C, white spot injury increased as the temperature rose to 52°C, while collapse and death of the seedlings occurred at about 52°-54°C. The same three types of symptoms are also commonly found on seedlings which have been subjected to surface-soil temperatures at or near the freezing point. It is planned to incorporate the results of this study in a short paper to Scientific Agriculture (T.C. Vanterpool).

MELANISM (physiological). Head discoloration was reported to be prevalent and severe in a number of fields of Rescue wheat in the Aneroid district, Sask. Specimens of diseased plants were received for examination and in them the discoloration appeared to be very similar to the physiological bronzing that is a normal character in certain wheat varieties. In the specimens, lateral floret development had been arrested in many of the spikelets before kernel development began. In the florets with dwarfed glumes, anthers were present containing pollen grains, but no seed had developed. Anthesis had not occurred in either sterile or fertile florets, the anthers in the fertile florets, being present on the brush of the kernel. Glume and lemma discoloration, chiefly of the exposed surfaces, was common to all florets. The symptoms of disease were not characteristic of Alternaria blotch, bacterial black chaff, or pseudo black chaff and were considered to have resulted primarily from the exceptionally high temperatures (max. 101°F.) that were reached on July 5 and 6 in the Aneroid-Cadillac-Gravelbourg-Chaplin area (W.A.F. Hagborg). Head discoloration was conspicuous about Aug. 1 on Rescue in south and south-east Sask. At Assiniboia and Kindersley root rot was also present (T.C. Vanterpool).

OATS

ERGOT (Claviceps purpurea). Trace infection reported in one field (T.R.D.). Ergots were found by the Seed Laboratory, Saskatoon, in 3 seed samples of Sask. origin (P.M. Simmonds, I.L. Conners).

POWDERY MILDEW (Erysiphe graminis). Infection was general on late sowings in areas in the Fraser River Valley where the ground had been flooded and early growth noticeably retarded (W. Jones).

COMMON ROOT ROT (Fusarium spp.). Infection was 1-sl./113 fields in Alta. (T.R.D.) and 3-sl. 16-mod./19 fields in Sask. (H.W.M.).

LEAF BLOTCH (Helminthosporium Avenae). Infection was 25-tr. 4-sl./113 fields in Alta. (T.R.D.); and slight about Guelph, Ont. (J.D. MacLachlan). Traces, at least, were recorded on all varieties included in the Quebec Seed Board plots located at widely scattered places in Que. The heaviest infection observed was at Notre Dame du Lac and ranged from light to severe (T. Simard, D. Leblond).

HELMINTHOSPORIUM BLIGHT (H. victoriae), as was expected, was more widespread and severe in Man. in 1948 than in 1947 when it was first noticed. The causal fungus had apparently become widely disseminated by wind, and all the fields of Garry oats observed had some of this disease in them although only treated seed had been sown. Blighting was particularly severe where Garry had been sown in or near fields showing infection last year. The amount of infection on the seed of this year's crop is, however, surprisingly low, which may be attributed to the fact that dry weather during late summer and fall prevented the formation of abundant inoculum.

To aid plant breeders in their effort to produce resistant oat varieties, a simple method of soil inoculation was devised. The fungus was grown on ground oat hulls and the inoculum, after grinding, was sown with the seed. The reactions of varieties in the greenhouse and field were found to be very similar (J.E. Machacek).

Helminthosporium blight was moderate to severe in the susceptible varieties, Beacon, Vicland and Garry, about Guelph, Ont. (J.D. MacLachlan). A trace was present in a block of Beacon at the C.E.F., Ottawa (V.R. Wallen). It was noted on Beacon and/or Garry in Q.S.B. plots at several places in Que. (T. Simard, D. Leblond).

HALO BLIGHT (Pseudomonas coronafaciens). Infection was 47-tr. 21-sl. 2-mod./113 fields in Alta. and tr.-sl. in the variety plots at Olds and Lacombe (T.R.D.); and 7-sl. 3-mod./57 fields in west-central to east-central Sask. (H.W.M.). A severe infection occurred at Winnipeg, Man. on numerous varieties, both old and new. A severe infection developed on some lines of foundation stock of the variety Exeter, previously considered resistant (W.A.F. Hagborg). A slight infection was observed in a field in Queens Co., P.E.I. (R.R. Hurst).

CROWN RUST (Puccinia coronata). A slight to moderate infection developed in eastern Sask. between Broadview and Tisdale (H.W.M.). Its prevalence in Man. and further eastward is indicated in Table 2.

Infection was slight to moderate about Guelph, Ont. (J.D. MacLachlan). Traces were noted on a block of 3003 whereas a 5% infection was present on Beaver and Beacon at C.E.F., Ottawa (V.R. Wallen). In the Q.S.B. plots at least traces were noted on all varieties, except Mohawk and 3003 (T. Simard, D. Leblond).

In some 30 fields examined in N.B., a trace was found in most early maturing fields, but moderate to severe infections were encountered in some late maturing fields near buckthorns (J.L. Howatt). For several years the Springhill area in York Co. has been under observation on account of the severe infection of crown rust that develops there each year on oats. During the period search has been made for the common buckthorn with limited success. However, observations made this year were successful in locating large hedges and clumps of the alternate host. Plans have now been completed for the removal and destruction of the bushes. When the varieties Erban, Ajax and Vanguard were grown $\frac{1}{4}$ mi. from the nearest buckthorn crown rust infection was 85% on Erban and 95% on the other two (S.F. Clarkson). Crown rust became very abundant on late oats in P.E.I. (R.R. Hurst).

STEM RUST (Puccinia graminis). Infection was 6-tr. 5-sl. 1-mod./113 fields in Alta. and tr.-sl. in the plots at Lethbridge in late August (T.R.D.); and 10-tr. 6-sl. 3-mod. 2-sev. in fields in eastern Sask. (H.W.M.). For its occurrence in Man. and eastward see p. 11.

Infection was sl.-mod. about Guelph, Ont. In Q.S.B. plots at Lennoxville, Que., infection was tr.-mod. on several varieties; stem rust was virtually absent elsewhere (T. Simard, D. Leblond). Stem rust was quite abundant in late fields in P.E.I. (R.R. Hurst).

BROWN STRIPE (Scolecotrichum graminis). Infection slight on a block of Beacon at O.A.C., Guelph, Ont. (J.D. MacLachlan).

SPECKLED LEAF BLOTCH (Septoria Avenae). Infection was 5-tr. 3-sl./113 fields in Alta. and slight in the plots at Lethbridge (T.R.D.). The disease was light to moderate in the Q.S.B. plots at several places in Que. (T. Simard, D. Leblond). Of the 50 varieties under test at Ste. Anne de la Pocatiere, the heavier infections recorded were: 25% on Erban, 20% on Abegweit and 10-15% on Banner and several lines of 3003 (A. Payette). The observations in Que. are confirmed by the examination of rust nursery material (Table 2).

SMUTS (Loose Smut, Ustilago Avenae, and Covered Smut, U. Kolleri). Covered smut was found in several oat fields about Armstrong, B.C. (G.E. Woolliams). Smut infection was 6-tr. 2-sl./113 fields in Alta. (T.R.D.). Infection was loose smut 3-tr. 1 with 5%, covered smut 24-tr. 14 with 2-25% in 38 fields in Sask.; the latter appeared to be more prevalent than in 1947 (H.W.M.). Out of 163 fields examined in Man., 145 were affected; infection ranged from tr. to 15%, average 1.1% (W.J. Cherewick, W. Popp). Smut infection was sl.-mod. about Guelph, Ont. (J.D. MacLachlan). Loose smut was found in 4 (tr.-1%) and covered smut in 5 (tr.-2%) out of 17 fields examined in York and Sunbury Counties, N.B. (J.L. Howatt). Traces of both smuts found in Prince Co., P.E.I. (D. Robinson).

GREY SPECK (manganese deficiency) was observed in the portion of a block of Beacon that had not been sprayed at O.A.C., Guelph, Ont. (J.D. MacLachlan).

BLAST (non-parasitic) was reported as follows: damage 60-tr. 46-sl. 4-mod. 1-sev./113 fields in Alta. (T.R.D.); damage slight, widespread in Sask., but not severe in any area (H.W.M.); damage tr.-mod. in most varieties in Q.S.B. plots in Que. (T. Simard, D. Leblond). As in 1947 (P.D.S. 27:10) a careful estimate of blast was made in the plots at Ste. Anne de la Pocatiere. The figures for the named varieties included both years were: Beaver 3.6, Mabel 3.2, Roxton 11.1, Ajax 3.8, Banner 14.1, Garry 3.1, and Erban 4.9. In general this year's figures are in good agreement with those of last year (A. Payette). Traces of blast were seen in 15 fields in Queens Co., P.E.I. (R.R. Hurst).

BARLEY

ERGOT (Claviceps purpurea). Infection 10-tr./99 fields in Alta. and in some varieties at Lacombe and Olds (T.R.D.); trace in one field at Percival out of 38 examined in Sask.; also trace at Saskatoon (H.W.M.); infection slight, less than 1947, about Guelph, Ont. (J.D. MacLachlan); trace in a field in Queens Co., P.E.I. (R.R. Hurst).

POWDERY MILDEW (Erysiphe graminis). Infection was moderate in one field near Nipawin, Sask. (H.W.M.); in general moderate about Guelph, Ont., but severe on blocks of O.A.C. 21 and Montcalm (J.D. MacLachlan); moderate on Mensury and O.A.C. 21 and lesser amounts on other varieties in the Q.S.B. plots at Notre Dame du Lac, Que., elsewhere absent to light (T. Simard, D. Leblond); trace in a field in Queens Co., P.E.I. (R.R. Hurst).

HEAD BLIGHT (Fusarium spp. and Helminthosporium sativum). Traces were noted on most varieties in the Q.S.B. plots in Que. (T. Simard, D. Leblond).

STRIPE (Helminthosporium gramineum). Infection was 11-tr. 3-sl. 2-mod./99 fields in Alta. (T.R.D.); and a trace in one field in Queens Co., P.E.I. (R.R. Hurst).

SPOT BLOTCH (Helminthosporium sativum). Infection was 6-tr. 7-sl./99 fields in Alta. and tr.-mod. in variety plots at Lethbridge (T.R.D.). All the leaves of Valentine barley from Wisconsin were affected by spot blotch at the Experimental Farm, Brandon, Man.; infection on other varieties in the plots was not pronounced. The causal organism was isolated (W.E. Sackston). Moderate to heavy infections were recorded on the rust nursery material from several places (Table 2).

COMMON ROOT ROT (Helminthosporium sativum and Fusarium spp.). Infection was 3-tr. 2-sl./99 fields in Alta. (T.R.D.). Of the 35 fields sampled in Sask. 23 were classed as moderately and 12 as severely diseased. In one field at Vonda 100% of the plants were severely lesioned. Disease ratings on barley have been about 40% greater than comparable ratings on wheat in the past 2 years (H.W.M.). Damage was slight to moderate in some plots at the Station, Fredericton, N.B. (J.L. Howatt).

NET BLOTCH (Helminthosporium teres). Infection was 4-tr. 4-sl. 3-mod./99 fields in Alta. (T.R.D.); 3-sl. 4-mod./38 fields located between Broadview and Carrot River in the east part of Sask. (H.W.M.).

STEM RUST (Puccinia graminis). Infection was 4-tr. 3-sl./99 fields in Alta. and trace in variety plots at Lethbridge (T.R.D.). Infection was usually a trace in the few fields in which rust was found in Sask., but it was moderate in the odd field in east central Sask. and slight in a field near Prince Albert (H.W.M.). Infection was moderate about Guelph, Ont. (J.D. MacLachlan). Stem rust was light to moderate on barley in the Q.S.B. plots at Lennoxville, Que.; elsewhere it was rarely more than trace (T. Simard, D. Leblond). Some additional observations are contained in Table 2.

LEAF RUST (Puccinia Hordei) was recorded at 11 stations mostly in eastern Canada and was severe at three (Table 2). Infection was slight to moderate about Guelph, Ont. (J.D. MacLachlan).

SCALD (Rhynchosporium Secalis). Infection was 32-tr. 25-sl. 12-mod./99 fields in Alta., tr.-mod. in the plots at Lethbridge and Olds, and tr.-sev. at Lacombe (T.R.D.). A light infection was present in 2 fields near Scott, Sask., where it has been observed for several years in spite of very dry conditions (H.W.M.).

SPECKLED LEAF BLOTCH (Septoria Passerinii). Infection was 13-tr. 9-sl./99 fields in Alta. and tr. in some varieties at Lacombe (T.R.D.). Its distribution elsewhere in Canada is discussed at some length on p. 11.

SMUT (Covered Smut, Ustilago Hordei, True Loose Smut, U. nuda, and Black Loose Smut, U. nigra). Loose smut was found occasionally in fields in the B.C. Interior (G.E. Woolliams). In the Laboratory survey smut infection was: covered smut: 2-tr. 2-sl. 1-mod. 1-sev.; and loose smut 25-tr. 12-sl. 3-mod./99 fields in Alta. (T.R.D.). Either covered smut or true loose smut or both were found during an independent survey in central Alta. in 54% of the 217 fields examined, of which 63 were of smooth-awned varieties, 152 of rough-awned and 2 hooded. The number of fields of each type infected was:-

Type	Covered	Loose	Mixed	Free	Total
Smooth-awned	2	41	16	4	63
Rough-awned	24	23	12	93	152

Covered smut infection varied from a trace to 25% and affected about one field in four of both barley types. Loose smuth was about as prevalent as covered smut in the rough types, but it affected over 90% of smooth-awned barley fields; infection ranged from a trace to 15%. The kind of smut present was checked by spore germination, but no black loose smut was found (A.W. Henry).

Smut infection was: covered smut, 11 fields with trace and 7 with 2-15%, and loose smut, 7 with trace and 6 with 2-4% out of 45 examined in Sask.; average infection covered smut 1.2%, loose smut tr. and slightly less prevalent than in 1947 (H.W.M.). In all, 297 heads of loose smut taken from the plots sown with seed from all parts of Sask. were checked by spore germination; 253 proved to be U. nuda and 44 U. nigra (R.C. Russell). A heavy infection of loose smut was observed at Shell Lake. A sample of seed received from Melfort showed hard smut balls of covered smut scattered through the grain sample. These smut balls were extremely hard and brittle, not unlike ergot bodies in appearance (T.C. Vanterpool). In

Man. smut infection ranged from tr.-48% average 5.2% in the 183 fields examined. Loose smut (U. nuda) was much more prevalent in 1948 than during the past several years (W.J. Cherewick, W. Popp). Loose smut infection was light to moderate about Guelph, Ont. (J.D. MacLachlan). Traces of covered and loose smut were observed in Queens Co., P.E.I. (R.R. Hurst).

BACTERIAL BLIGHT (Xanthomonas translucens). Infection was severe on several varieties of barley in the plots at Winnipeg, Man. The mechanical transfer of inoculum during weeding and loose smut inoculation probably accounted for much of the infection (W.A.F. Hagborg). A 10% infection was observed in Montcalm in the plots at Ste, Anne de la Pocatiere, Que., whereas only traces were seen in the other varieties (A. Payette).

A head blight, characterized by a darkening or browning of the kernels and sometimes portions of the awns, was seen in 7% of the fields visited in Alta. In several fields the kernels were severely blighted and some failed to fill. Smooth-awned varieties appeared especially susceptible, but severe damage occurred in at least one field of rough-awned barley. Bacteria resembling X. translucens were isolated from the diseased kernels (A.W. Henry).

RYE

ERGOT (Claviceps purpurea). Infection was 6-tr. 10-sl. 3-mod./25 fields in Alta. and sl.-mod. in variety plots at Lacombe (T.R.D.). Out of 13 fields examined 6 were affected in Sask., in 2 of which the infection was severe (60-70% of the heads) in the Kandahar area (H.W.M.). A trace of ergot was found in winter rye at Charlottetown, P.E.I. (D. Robinson).

COMMON ROOT ROT (Helminthosporium sativum and Fusarium spp.) infection was 1-tr. 2-sl. 1-mod./25 fields in Alta. and a trace of TAKE ALL (Ophiobolus graminis) in two (T.R.D.). Of the 13 fields examined in Sask., 11 were classed as moderately and 2 as severely diseased (H.W.M.).

STEM RUST (Puccinia graminis). A light infection was noted in 3 fields in Alta. (T.R.D.) and in one field at Ryerson, Sask. (H.W.M.).

LEAF RUST (Puccinia secalina). Infection was 6-sl. 2-mod. 6-sev./25 fields in Alta. (T.R.D.) and present in 3 fields in east-central Sask. (H.W.M.).

SPECKLED LEAF BLOTCH (Septoria Secalis). A trace was observed in 2 fields and a slight infection in a third in Alta. (T.R.D.).

SURVEY OF NURSERY MATERIAL FOR PLANT DISEASES IN 1948

T. Johnson, B. Peturson, A.M. Brown, and G.J. Green

In Table 2 are summarized the data gathered from rust nursery plots grown at 31 places in Canada. Separate tables were prepared for the cereal rusts and for powdery mildew of wheat and barley giving the disease intensity on each of the varieties in the plots, but the complete report, mimeographed separately, must be consulted for these tables.

Eleven varieties of wheat, six of oats, and three of barley were grown. They were as follows: wheat - McMurachy, Hope x Timstein, Carleton, Little Club, Marquis, Spelmar, Thatcher, Vernal, Norka, Redman, and Exchange; oats - Bond, Trispernia, Ajax, Vanguard, Garry, and Clinton; and barley - Goldfoil, Gold, and Vantage.

Stem rust of wheat was present at all stations except those in central and northern Alta. and in B.C., but was severe only in Man. and at certain points in Ont. Infection by leaf rust of wheat was generally severe except in parts of Sask. and Alta., but at most points the disease did not reach its maximum intensity until late in the season. Redman was heavily infected in eastern Sask., Man., and several points in Eastern Canada, but it appeared resistant in B.C. and in other localities in Eastern Canada. Hope x Timstein, tested for the first time this year, was highly resistant in the Prairie Provinces, but at many places in Eastern Canada it carried a moderately heavy infection on about 50% of the plants and a mere trace of rust on the remainder. Exchange (Warden x Hybrid English) showed a high leaf rust resistance at all stations.

Moderate to severe infection of oat stem rust developed in Man., but elsewhere infection was light except for sporadic outbreaks, several of which are known to have occurred in Eastern Canada. Only traces or very light crown rust infection occurred in Man. and eastern Sask., but heavy infection developed here and there in Ont. and eastward.

Although leaf rust of barley was recorded at 11 out of 31 stations, it was severe only at Agassiz, Mindemoya, and Kentville.

Attention may be called to the distribution of speckled leaf blotch (Septoria Passerinii), a minor disease of barley. Although it has a limited distribution in Canada, it shows a marked tendency to appear year after year in certain localities. In the five years since 1944 it occurred at Brandon and Morden in all five years, at Winnipeg in four of the five years and at Melfort, Kapuskasing, and Normandin in three of the five years. For the same period, its appearance was recorded once at each of the stations, Edmonton, Indian Head, St. Catharines, and Lennoxville.

Besides the diseases recorded in Table 2 may be mentioned powdery mildew of oats which occurred only at Kemptville, Ont., in trace quantities and speckled leaf blotch of wheat (Septoria Tritici) found only at Lacombe and Edmonton, Alta.

Table 2. Incidence of certain pathogenic fungi on wheat, oats, and barley grown at 31 localities in Canada in 1948

Locality	Wheat						Oats			Barley					
	P. gr. Tritici	P. triticina	Erysiphe graminis	Septoria nodorum	S.Avenae f.sp. triticea	Fusarium spp. (Scab)	P. gr. Avenae	P. coronata Avenae	Septoria Avenae	P. graminis	P. Hordei	Erysiphe graminis	Septoria Passerinii	H. sativum	Rhynchosporium Secalis
Saanichton, B.C.	0	3	0	0	0	0	3	0	0	0	1	0	0	-	0
Agassiz, B.C.	0	4	1	0	0	2	0	0	2	0	4	2	0	-	0
Beaverlodge, Alta.	0	1	1	1	0	0	0	0	0	0	0	0	0	1	2
Edmonton, Alta.	0	1	4	1	1	0	0	0	0	0	0	0	0	-	1
Lacombe, Alta.	0	4	0	0	0	0	0	0	0	0	0	0	0	2	3
Lethbridge, Alta.	1	4	2	0	0	0	0	0	0	1	0	0	0	1	1
Scott, Sask.	1	2	0	0	0	0	1	0	0	1	0	0	0	1	0
Melfort, Sask.	1	2	0	0	1	0	2	0	0	1	0	0	0	1	3
Indian Head, Sask.	3	4	0	0	2	0	2	0	0	1	0	0	1	1	0
Brandon, Man.	4	4	0	0	3	0	3	1	0	2	0	0	3	2	0
Winnipeg, Man.	4	4	0	0	3	0	4	1	0	2	1	0	3	3	0
Morden, Man.	4	4	0	0	3	0	4	1	0	1	0	0	4	4	0
Fort William, Ont.	4	3	0	2	2	1	3	0	3	3	0	0	0	2	0
Kapuskasing, Ont.	3	4	0	2	0	0	2	0	4	1	0	0	3	2	0
Mindemoya, Ont.	4	4	1	0	1	0	4	1	2	3	4	1	0	2	0
Guelph, Ont.	4	4	3	-	-	-	2	0	-	3	0	3	-	3	0
St. Catharines, Ont.	2	4	1	0	0	0	0	0	0	2	1	1	0	1	0
Appleton, Ont.	2	4	0	0	3	1	2	4	0	1	0	1	0	1	0
Ottawa, Ont.	4	4	4	0	3	0	2	2	0	3	2	2	0	3	0
Merrickville, Ont.	4	4	1	0	1	0	1	4	0	2	1	1	0	2	0
Kemptville, Ont.	3	4	3	0	2	2	1	4	0	2	2	3	0	1	0
Macdonald College, Que.	3	4	1	0	2	0	2	2	1	2	3	3	0	3	0
L'Assomption, Que.	2	4	0	0	1	0	3	4	0	1	0	4	0	4	0
Lennoxville, Que.	2	4	2	0	2	0	1	0	2	2	0	0	1	1	0
Normandin, Que.	3	4	1	0	3	2	1	1	4	0	0	0	4	1	0
Ste.Anne de la Pocatiere,Que.	2	4	1	0	1	0	2	2	3	0	0	0	0	1	0
Fredericton, N.B.	1	4	0	1	1	-	0	4	3	2	0	0	0	3	0
Kentville, N.S.	2	4	0	1	0	0	2	-	0	0	4	0	0	2	0
Pictou, N.S.	2	3	1	0	0	0	1	3	2	0	2	0	0	3	0
Lower South River, N.S.	2	3	1	0	0	0	2	4	0	0	2	0	0	2	0
Charlottetown, P.E.I.	1	4	1	0	1	0	2	2	0	0	0	0	0	3	0

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

PHYSIOLOGIC RACES OF CEREAL RUSTS IN CANADA IN 1948

T. Johnson, B. Peturson and G.J. Green

In the following report are recorded the distributions in Canada, in 1948, of physiologic races of the following cereal rusts: Puccinia graminis var. Tritici, Puccinia graminis var. Avenae, Puccinia triticina, and Puccinia coronata var. Avenae. A record is also given of the results of infection studies carried out on cereals and grasses with aeciospores collected on barberry and buckthorn in Eastern Canada.

Cereal Rust Development in the Prairie Provinces in 1948

In Man., initial development of all the cereal rusts began rather late. The first infections of leaf rust of wheat were not seen until the second week of July and stem rust on wheat and oats was not found until the third week. The middle part of July was dry and further rust development was slow until the end of the month when good rains occurred and leaf rust, in particular, spread rapidly. At maturity, after the middle of August, Thatcher generally carried about 80% leaf rust infection and Redman only a little less; but, owing to the late date at which rust development took place, damage was not very great. Only a trace of stem rust was found on Thatcher, Regent and Redman but where susceptible wheats could be found they frequently carried 80% or more infection. On barley, stem rust was generally prevalent but only occasionally severe. On oats, stem rust infection was general and rather light except for late-sown oats which became heavily rusted in some localities. Crown rust occurred for the most part only in trace amounts. Leaf rust of barley was absent from most fields but trace infection was found here and there.

In Sask., light to moderate stem rust infection occurred on susceptible wheats in the eastern parts and trace to light infection was found on barley. Leaf rust infection on wheat was moderate to severe in most of the eastern part of the province but dwindled to light and trace infections in the central and western parts. Oat stem rust infection varied from slight to severe in the central eastern parts but only trace amounts were found elsewhere. Trace crown rust infections were found in the eastern parts.

In Alta., wheat stem rust was first found at Lethbridge on 4 Aug. Slight general infection developed in the southern part of the province about 20 Aug. and severe infection occurred in late-maturing stands of soft wheat in the Brooks area at the end of the month. In areas farther north, trace and light infections were found at the end of August. In southern Alta., moderate to severe infection of leaf rust of wheat occurred about 20 Aug. Trace infections of stem rust on oats and barley were found in the southern part of the province at the end of August.

Light stem rust and leaf rust infection of rye was noted in a few places in all three provinces.

Distributions of Physiologic Races of the Cereal Rusts

Nine races of Puccinia graminis var. Tritici were obtained from 132 isolates. The races, with the number of isolates of each in brackets, were in order of decreasing prevalence: race 56 (56), race 38 (31), race 29 (20), race 17 (17), race 39 (4), and races 15, 19, 36, and 80 (1). As compared with 1947 there was a notable increase in the prevalence of race 38, which together

with the similar race 39 comprised about 26% of all isolates in 1948 as against 7% in 1947. A marked increase also took place in the prevalence of the two closely related races 17 and 29, which in 1948 comprised 29% of all isolates as compared with 4% in 1947. These changes in racial distribution are probably without significance for the rust resistant common wheats now grown in Canada; but it is possible that an increased prevalence of race 38 may affect the reaction of barley varieties, in view of the fact that infection tests have indicated that this race is somewhat more virulent than race 56 towards barley.

Sixteen races of P. triticina were identified from 207 isolates. The races, in order of decreasing prevalence, were: race 126a (44), race 5a (42), race 15a (37), race 58 (23), races 1 and 11 (13), race 3 (8), race 9 (7), race 44 (5), races 15 and 126 (4) race 128a (3) and races 31, 33, 35, and 93 (1). (Races designated by the letter "a", as 126a, are those that show particular virulence towards Hope and H44 derivatives). Thus, about 85% of the isolates were accounted for by races 126a, 5a, 15a, 58, 1, and 11 and 60% of all the isolates were "a" races, capable of attacking Hope and H44 derivatives. That these three races are responsible for most of the leaf rust present on Regent and Redman is indicated by the fact that they collectively accounted for 49 of the 53 isolates from these wheat varieties. Geographically, these races were concentrated chiefly in the Prairie Provinces but two of them, races 15a and 126a, were not uncommon in Eastern Canada. Each of these three races has shown a slight increase in prevalence since last year but race 128a, which accounted for much of the rust on Regent and Renown from 1944 to 1946, but which diminished greatly in prevalence in 1947, has now almost disappeared.

Certain of the other races show a marked tendency to be concentrated in given areas. Race 58 was the predominant race in Ont. and Que. where it comprised 50% of the isolates. In the southern parts of Sask. and Alta. there was a concentration of races 1, 9, 11, and 44. The presence of these races is probably connected with the cultivation in this area and adjacent American territory of winter wheats and of varieties of spring wheat not commonly grown elsewhere. It may be noted here that race 11 is rather highly pathogenic to the new leaf-rust resistant wheat Hope x Timstein.

The distribution of races of P. graminis var. Avenae in 1948 was very similar to that of 1947 (race 1 (10), race 2 (36), race 5 (8), race 7 (2), race 8 (25), race 10 (10), and race 11 (8) in 99 isolates). The race group 1, 2, 5 made up 54.6% of all isolates as compared with 50.5% in 1947; and the race group 8, 10, 11, which is virulent towards many of the newer oat varieties, comprised 43.4 in comparison with 49.5% in 1947. A study of rust collections made on oat varieties equally susceptible to both race groups indicates that races 1, 2, and 5, the common races of former years, make up about 70% of the oat stem rust in the country. The only other race collected in 1948 was race 7, which was found once in N.S. and once in Ont.

Fourteen races of P. coronata var. Avenae were obtained from 91 isolates. The races were race 1 (3 isolates), race 2 (12), race 3 (38), race 4 (1), race 5 (6), race 6 (5), race 24 (6), race 34 (7), race 38 (2) races 45 and 1946-1 (4) and races 1947-1, 1948-1, 1948-2 (1). Their distribution agrees with that of preceding years in that races 2 and 3 are still the predominant races. The apparent diminution in prevalence of races 1 and 4 is perhaps due to the fact that few collections could be secured from Man. and Sask. where these races have been most common in

past years. The 1948 results differ from those of previous years in the greater proportion of isolates capable of attacking the variety Bond, which may possibly have resulted from the increased acreage in the United States devoted to the growing of Bond and its derivatives. Two races, 1948-1 and 1948-2, were found that apparently differ from any described previously. Neither of these races is highly pathogenic to varieties possessing the Victoria type of resistance but one of them is virulent towards Bond.

Infection Studies with Aecia on Berberis and Rhamnus in 1948

Isolations from Aecia on Berberis

A study of the varieties of stem rust (Puccinia graminis) occurring in collections of aecia from barberry in 1948 agrees with similar studies made in previous years in showing that varieties Secalis and Agrostidis are the ones most prevalent. In the 23 collections of aecia studied, of which 21 came from Eastern Canada, var. Agrostidis occurred 17 times, var. Secalis (rye stem rust) 16 times, var. Avenae (oat stem rust) and Poae 3 times each, and var. Tritici once. The three collections of var. Avenae gave rise to four physiologic races: 1, 7, 10, and 12. The occurrence of races 7 and 12, which are very rarely found on oats in Canada, is worth noting as is also the fact that the single collection of var. Tritici gave rise to race 87, which is rarely collected on wheat.

Isolations from Aecia on Rhamnus cathartica and R. Frangula

Aecial collections were obtained on R. Frangula at Fredericton, N.B., and on R. cathartica in various localities in Ont., N.B., and P.E.I. in 1948.

One crown-rust variety, Puccinia coronata Corda var. Agrostis Erikss. was isolated from the aecial material obtained on R. Frangula. Three crown-rust varieties, P. coronata Corda var. Avenae Erikss., P. coronata Corda var. ?Bromi (Muehl.) and P. coronata Corda var. Festucae Erikss. were isolated from the aecial collections obtained on R. cathartica. Of the three crown-rust varieties occurring on R. cathartica the variety Avenae was the most prevalent. This variety was isolated from 11 of the 12 collections studied. The variety Bromi was isolated from 7 and the variety Festucae from one of these 12 collections.

Seven isolates of race 3, four of race 2, and three of race 38 were obtained from the cultures of the crown-rust variety Avenae obtained from the 11 cultures established of that variety. These results agree with those of 1947 in that race 3 was again by far the most prevalent race.

Several varieties of grasses and cereals were tested for their reaction to the variety Bromi. The tests demonstrated that this rust variety has a very wide host range. Several species of Bromus and Agropyron as well as varieties of barley and rye showed different degrees of susceptibility to the variety. The ability of this variety to infect such a large number of common grass and cereal hosts accounts for its frequent and widespread occurrence on R. cathartica in Eastern Canada.

II. DISEASES OF FORAGE AND FIBRE CROPS

ALFALFA

BLACK STEM (Ascochyta imperfecta). Leaf and stem infection was trace to slight in 11/106 fields examined in central Alta. It was more prevalent in southern Alta., infection being estimated as 11-tr. 16-sl. 3-mod./60 fields. Infection ranged tr-sl. in the variety plots at Lethbridge (M.W. Cormack). Infection varied greatly from area to area in Sask., being very severe in wooded areas east of Tisdale and light in areas west of White Fox, where clearing is extensive (H.W. Mead). A severe infection of black stem rendered worthless for seed a crop of alfalfa at Swan Lake, Man. The severity of the attack was probably due to the fact that in 1947 the alfalfa straw was allowed to remain spread over the field after the crop was threshed (W.A.F. Hagborg).

A heavy infection was present in the row plots of Grimm, where the growth was heavy and lush at the Agricultural School, Kemptville, Ont., but it was less prevalent in the pasture and hay mixture plots. Infection was also moderate to severe on Grimm alfalfa at the C.E.F., Ottawa, and caused considerable yellowing and defoliation; pycnidia containing mature spores were present on 30 July (R.J. Baylis). Black stem was heavy in a field of alfalfa at Hespeler; almost the whole field was dead early in July; winter injury may also have been a factor (J.D. MacLachlan). Although traces of black stem were present on most varieties at the Station, Ste. Anne de la Pocatière, Que., the Indian varieties were more heavily infected, some plants being virtually destroyed (A. Payette).

WINTER CROWN ROT (low-temperature basidiomycete). Damage from winter crown rot in Alta. was estimated as follows:

District	Fields Examined	Fields Damaged				
		Tr.	Sl.	Mod.	Sev.	Total
		%	%	%	%	%
Northern Alta.	49	4	41	47	6	98
West-Central Alta.	38	11	37	47	-	95
Clover Bar	68	10	60	30	-	100
Southern Alta.	60	17	68	10	-	95
All Districts	215	11	54	31	1	97

Winter crown rot was very prevalent and caused about the usual amount of damage in the different districts. As in previous years, the damage was most severe in the northern and central areas. In southern Alta. partial rotting of the crowns resulted in weakening of the plants in most fields examined (M.W. Cormack).

Winter crown rot on single plants or in small to large patches was present in all districts of northern Sask. that grow alfalfa. On account of the scattered nature of the infection the damage was not severe. In areas not previously examined for winter crown rot, damage was severe at Scott at the end of plots next to the north side of a hedge; at Big River large patches extending several feet from the grass borders were entirely killed (H.W. Mead).

BACTERIAL BLIGHT (Corynebacterium insidiosum). A severe infection was found in one field near Grand Forks, B.C.; the alfalfa was dying out (G.E. Woolliams). The damage from bacterial wilt in alfalfa fields examined in Alta. was estimated as follows:

District	Fields Examined	Fields Damaged Tr.	Sl.	Mod.	Sev.	Total
		%	%	%	%	%
Northern Alta.	49	-	2	2	-	4
West-Central Alta.	38	8	5	3	-	16
Clover Bar	68	13	22	8	-	43
Southern Alta.	60	13	39	33	12	97
All Districts	215	9	19	13	3	44

Bacterial wilt was found in additional fields in west-central Alta., but it did not show any increase in the Clover Bar district, east of Edmonton. In southern Alta. moisture conditions were particularly favourable for the development of the disease during the early part of the season and there was a noticeable increase in infection in stands only 2 and 3 years old. In a variety plot planted at Lethbridge in 1945, the damage ranged from extremely severe in Grimm to a trace in Ranger and other wilt resistant varieties (M.W. Cormack). Only the irrigated area at North Battleford, Sask., (P.D.S. 27:23) was resurveyed in 1948; although the field is infested throughout, less damage was evident this year because conditions were favourable for the growth of alfalfa. An extensive survey covering 30 fields in north-east Sask. in areas not previously visited failed to reveal the presence of wilt (H.W. Mead).

Bacterial wilt was observed in several fields in Essex and Kent Counties, Ont., and it is probably the cause of a "running out" of stands of which farmers have complained, the stands becoming unprofitable about three years from seeding (J.T. Slykhuis).

ROOT ROT (Cylindrocarpon Ehrenbergi) caused slight damage to a field near Lethbridge, Alta. (M.W. Cormack). C. Ehrenbergi was isolated from 70% of the plants damaged by winter crown rot in the north-east areas of Sask. Although the crown rot organism was apparently the primary cause, further decay of the root was due to C. Ehrenbergi (H.W. Mead).

DOWNY MILDEW (Peronospora aestivalis) was prevalent on D.U. Puits (French variety); La Pampa, Buenos Aires, Rio Nigra (Argentine strains); and Ranger in the trial rows at Saanichton, B.C., whereas the disease was not observed on Grimm, Rhizoma and Bahia Blanca (Argentine strain) (W. Jones). Downy mildew was found quite frequently in most sections of the B.C. Interior (G.E. Woolliams). Infection was slight in 2 fields in central Alta. and ranged tr.-mod. in the alfalfa nurseries at Lethbridge (M.W. Cormack).

YELLOW LEAF BLOTCH (Pseudopeziza Jonesii). Severely infected fields were found in the Torch River area, and near White Fox, Sask. Defoliation was severe by 20 July - and the sporoneme stage was abundant. On 20 Aug., immature perithecia and ascospores were present on the dark, curled leaves still attached to the plant (H.W. Mead). A moderate infection was observed in a field of Canauto in Carleton Co., Ont. (V.R. Wallen).

COMMON LEAF SPOT (Pseudopeziza Medicaginis) was reported as follows: infection severe on Grimm, moderate on La Pampa and other Argentine strains and Rhizoma, slight on D.U. Puits, a French variety, at Saanichton, B.C. (W. Jones); prevalent on Rhizoma, U.B.C. plots, Point Grey (H.N.W. Toms); infection 33-sl. 22-mod. 3-sev./60 fields examined in southern Alta., where it was unusually prevalent late in the season; unreported from central or northern Alta. (M.W. Cormack); infection general by July in Sask., but damage slight as checked by dry weather (H.W. Mead); quite general in Essex and Kent Counties, Ont., especially in late summer and caused considerable defoliation in some fields (J.T. Slykhuis); infection moderate at the Station, Ste. Anne de la Pocatière, Que., but great variation in the amount of infection from plant to plant (A. Payette); mod.-sev. infection with sl.-mod. defoliation in rod rows at Fredericton, N.B. (J.L. Howatt); general infection noted in a field in Queens Co., P.E.I. (R.R. Hurst).

STEMPHYLIUM LEAF SPOT (S. botryosum) was general in a field at Ladysmith, B.C., causing yellowing of leaves; no other leaf spot was present (W. Jones). Traces were observed on nearly every variety at Ste. Anne de la Pocatière, Que. (A. Payette).

WITCHES' BROOM (virus) was quite prevalent around Lytton and Lillooet, and the odd plant was affected in a field at Shuswap, B.C., (G.E. Woolliams). A few plants were found affected in 2 stands in central Alta. (J.E.J. Thomson, J.B. Lebeau). Trace found in an old field east of Tisdale, Sask. (H.W. Mead).

YELLOWS (undetermined virus). A trace was found in a field at the Station, Fredericton, N.B. The affected plants were stunted and the numbers of leaves and stems were reduced. The leaves showed a yellowing of the margins and interveinal areas and were reduced in size. The stems exhibited a yellow or red coloration. In some instances only one or two stems were affected. The diseased stems usually wilted and died prematurely. The virus was transmitted by grafting to healthy alfalfa plants (D.J. MacLeod).

YELLOWS (boron deficiency) caused slight to severe damage at Shuswap, Chase, Sorrento and Salmon Arm, B.C. (G.E. Woolliams).

YELLOWS (cause undetermined) caused damage as follows: 5-tr. 8-sl. in 38 fields examined in west-central Alta. (J.E.J. Thomson, J.B. Lebeau).

SWEET CLOVER

STEM CANKER (Ascochyta caulicola). Infection was 2-tr. 8-sl. 2-mod./13 fields examined in southern Alta. (M.W. Cormack).

BLACK STEM (Ascochyta Meliloti). Infection was 1-sl. 1-sev./13 fields in southern Alta. It was also severe in roadside stands near Scandia (M.W. Cormack). Black stem infection was light to moderate on first year stands of both white and yellow clover in Essex Co., Ont., but it was less prevalent than last year (J.T. Slykhuis).

WINTER CROWN ROT (low-temperature basidiomycete). Damage was 5-sl. 4-mod. 1-sev./17 fields of red clover examined in west-central Alta. Several of the affected stands were sown in fields in which alfalfa had previously been damaged (M.W. Cormack). The disease caused slight damage in one field of clover near Melfort, Sask. (H.W. Mead).

STAGONOSPORA LEAF SPOT (Leptosphaeria pratensis (S. Meliloti). Infection was slight in 2 of 13 fields examined in southern Alta. (M.W. Cormack). A moderate infection was observed in one field of yellow sweet clover in Essex Co., Ont. (J.T. Slykhuis).

PHYTOPHTHORA ROOT ROT (P. Cactorum) caused extensive damage in April and May to fields of white and yellow sweet clover in Essex and Kent Counties, Ont. Damage varied from a few scattered plants to patches with nearly every plant killed or severely injured. In some fields 75-90% of the plants were killed. The disease occurred chiefly on the heavier soils (J.T. Slykhuis).

PSEUDOPEZIZA LEAF SPOT (P. Medicaginis). Infection was slight in a field near Scandia, Alta. (M.W. Cormack). This leaf spot was quite common in 1948 on both white and yellow sweet clover in Essex and Kent Counties, Ont., and in some fields caused considerable defoliation of the lower leaves (J.T. Slykhuis). Although the Pseudopeziza on Melilotus has been referred to P. Meliloti Sydow (P.D.S. 21:19, 22:21, and 23:20) examination of material submitted by Dr. Slykhuis revealed that it was not distinct morphologically from P. Medicaginis. For this reason we prefer to use the latter name for the sweet clover pathogen even if it is confirmed that it is distinct biologically from the Pseudopeziza on Medicago (cf. P.D.S. 14:21-22) (D.B.O. Savile).

SCLEROTINIA ROOT ROT (S. Trifoliorum). A few white sweet clover plants were infected and killed in areas where red and alsike clover were attacked in Kent Co., Ont. (J.T. Slykhuis).

YELLOW MOTTLE (probably virus). In most fields in Essex Co., were present plants of white and yellow sweet clover that were affected with yellow mottle; their growth was often stunted (J.T. Slykhuis).

COMMON CLOVER

SOOTY BLOTCH (Cymadothea Trifolii). A moderate to heavy infection developed in the late fall on a plot of alsike clover sown last spring in Essex Co., Ont. (J.T. Slykhuis, D.B.O. Savile). Infection was heavy on new seedings of alsike and white clover, slight on Ladino white clover and a trace on red clover in the plots, C.E.F., Ottawa (R.J. Baylis). A moderate infection was recorded in a block of Leon red clover at O.A.C., Guelph (J.D. MacLachlan).

POWDERY MILDEW (Erysiphe Polygoni). Infection was sl. in 2 fields of red clover in central Alta. and sl.-mod. in the plots at Lethbridge (T.R.D.). Light infections of powdery mildew were noted in June; later in the summer and early fall the disease was general in Essex and Kent Counties, Ont., and some fields were quite heavily infected. The very dry summer was condusive to its development (J.T. Slykhuis). A light to moderate infection was noted about Guelph (J.D. MacLachlan). Powdery mildew was general after the first cutting and the infection was severe on red clover in the Ottawa Valley, but there was also some infection on alsike and white clover. The disease was much more prevalent than in 1947 (R.J. Baylis).

ANTHRACNOSE (Kabatiella caulivora). Infection was 4-tr. 3-sl. 1-mod./17 fields of Altaswede red clover examined in west-central Alta. (J.E.J. Thomson, J.B. Lebeau). The disease was quite general in several fields of red clover in Essex Co., Ont., in May (J.T. Slykhuis). A slight infection was found on red clover in June in the plots, C.E.F., Ottawa. Further spread was apparently checked by dry weather (R.J. Baylis).

COMMON LEAF SPOT (Pseudopeziza Trifolii). A trace was observed on Ladino white clover at the Station, Ste. Anne de la Pocatière, Que. (A. Payette).

SCLEROTINIA ROOT ROT (S. Trifoliorum) caused severe damage in patches in a field of red and alsike clover in Kent Co., Ont. (J.T. Slykhuis). This root rot destroyed 20% of the plants of red clover, alsike clover and alfalfa in one area of the plots, C.E.F., Ottawa, in May and the average damage was about 5%. Elsewhere in the district the disease caused little damage (R.J. Baylis).

STEMPHYLIUM LEAF SPOT (S. sarciniaeforme). A moderate infection was observed in a field of red clover in Essex Co., Ont. (J.T. Slykhuis). In a specimen sent for confirmation, roughly half the lesions were those of this leaf spot and the other half were those caused by Cercospora zebrina (D.B.O.S.).

RUST (Uromyces spp.). An exceptionally heavy infection of U. Trifolii caused severe loss in hay value of a field of alsike clover in Essex Co., Ont. A moderate infection (U. fallens) was fairly general on red clover in late summer and early autumn (J.T. Slykhuis). Rust infection was heavy on red and alsike clover and caused considerable defoliation in the plots, C.E.F., Ottawa (R.J. Baylis). Rust infection was moderate to heavy on a block of Alon alsike clover at O.A.C., Guelph; stem lesions were abundant (J.D. MacLachlan). Traces of rust were present in a field of red clover near Charlottetown, P.E.I. (R.R. Hurst).

MOSAIC (virus). Symptoms of mosaic were observed on occasional plants of red clover in many fields in Essex Co., Ont., but in one field a considerable portion of the plants were affected (J.T. Slykhuis). A trace of mosaic (Trifolium virus 1) was found in 5 fields of red clover in York Co. and one in Queens Co., N.B. (D.J. MacLeod).

WITCHES' BROOM (virus). A clover plant showing symptoms resembling witches' broom of alfalfa was found in the Cariboo, B.C., by Dr. J.B. Munro. On alfalfa the disease is fairly common in the interior (W.R. Foster). This disease has previously been reported on clover in B.C. (P.D.S. 12:27) and Alta. (P.D.S. 27:27).

YELLOWS (undetermined virus) affected a trace to 1% of the red clover plants in fields in Carleton, York, Sunbury, Queens and Westmorland Counties, N.B., and caused considerable damage. The affected plants were stunted and the number of stems and leaves greatly reduced. The stems had a faint reddish coloration and an enlargement of the nodes. The leaves showed a marked yellowing of the marginal and interveinal areas. In some plants only one or two stems were affected. The diseased plants usually presented a staring, upright appearance. The crowns and roots usually became necrotic and as a result the plants wilted and died prematurely. The virus was transmitted by grafting to healthy red clover plants. Attempts to transmit the virus by means of the leaf hopper, Macrosteles divisus, were unsuccessful (D.J. MacLeod).

BUCKWHEAT

YELLOWS (Callistephus virus 1) was general and severe on tartarian buckwheat in Carleton, York, Sunbury, Queens and Westmorland Counties, N.B. (D.J. MacLeod).

CORN

SMUT (Ustilago Maydis). In a planting at the University farm, Winnipeg, Man., 50% of the plants bore smut galls (B. Peturson). Smut infection was moderate about Guelph, Ont. (J.D. MacLachlan).

FLAX

Prof. T.C. Vanterpool, University of Saskatchewan, Saskatoon, Sask., has summarized his observations in "Flax Diseases in Saskatchewan in 1948."

Among the flax diseases the severe epidemic of rust in south-eastern Sask. was of great local importance. Another destructive disease was stem rot or canker caused by several fungi singly or in combination. In many instances the cankers centred on black rust lesions. A severe epidemic of stem break and browning occurred in an area east of the Quill Lakes, where in some fields over 50% of the stems broke over--the heaviest damage ever recorded. In western Sask. flax diseases were negligible and low yields were due to drought and other causes. Seed from the 1948 crop is unusually free from internal infection except that from east of the Quill Lakes. In most areas flax ripened under dry, cool conditions.

RUST (Melampsora Lini). Not since 1942 has flax been rusted over wide areas of Sask. In that year, the rust-susceptible Bison was replaced by the more resistant Royal. In the intervening years, rust was absent or generally light on Royal, but in five of the six years, as the P.D.S. reports point out, a moderate infection developed in the occasional field or in low places where the stand was thick. Rains in July and low rates of evaporation during the summer provided conditions favourable for severe rust infection of Royal in the southeastern part of Sask., a triangular area with Rocanville (north) Carnduff (south) and Weyburn (west) at the apices. Infection dropped rapidly west of the 'rust area', the rainfall being lower during July, but northward along the Manitoba boundary rust damage varied from moderate to slight. Because of late sowing and dry surface soil cereals and flax emerged irregularly and stands were uneven.

Both early and late stands suffered severely from rust. The early stands were usually thick and rust pustules were very heavy on the main stem. During the latter half of August the rust lesions became infected by species of Fusarium, Alternaria, Septoria and Polyspora to produce a stem rot or canker. Affected plants tended to lodge and the stems turned a dirty grey to brown or black. In late, thin stands the rust developed chiefly on the fine branches and pedicels; stem canker was infrequent.

It was estimated in the extreme south east that flax yields were reduced by 50 to 75%, primarily by rust and secondarily by stem rot. From data largely supplied by Mr. H.M. Holm, Agricultural Representative for the South-Eastern Crop District (No. 1) it is estimated that Royal averaged 5 bu. per acre and Victory 12 bu. per acre under heavy rust conditions; in a non-rust year these varieties yield practically the same. As 35% of the flax acreage for Sask., or 200,000 acres, was in District No. 1, loss from flax rust in 1948 is conservatively estimated at over $5,000,000. On account of the susceptibility of Royal the Sask. Cereal Variety Committee has recommended that Dakota be grown in this District in the place of Royal. (Dakota is resistant to the races of flax rust so far isolated in Canada, but several fields of Dakota in western North Dakota were reported to have rusted in 1948 because of new races of rust. Such strains are not likely to prove troublesome in Canada in the next year or two. I.L.C.).

STEM BREAK and BROWNING (Polyspora Lini). Lesioning of the cotyledons was heavy in all fields examined between Elfros and Wadena, east of the Quill Lakes, but it was not found elsewhere in northern Sask. on the seedling survey. In mid-August a severe infection was reported from Elfros. When the field was visited on 6 Sept. over 50% of the plants were broken over, and stem and boll lesioning was conspicuous. The disease was generally severe in the area where lesioning of the cotyledons had been present on the seedlings, but rapidly became less destructive to the west and north. In southeastern Sask. a moderate infection was found at Kipling but only scattered traces were recorded elsewhere; again it was absent on the open prairie. That the late seed infestation in the Elfros-Mozart district in 1947 was a potential menace to the 1948 crop was forecast (P.D.S. 27:28). Farmers in the infested area have been advised to obtain fresh flax seed from further west where the disease was absent. The disease is favoured by the cooler and more uniformly moist conditions in eastern and northeastern Sask. Polyspora Lini was abundant on dead stems of Linum Lewisii along the Wadena-Elfros highway and may have contributed to the infection of cultivated flax.

PASMO (Septoria linicola). In 1946 and 1947 slight to moderate infections were found late in the season in Crop District No. 1 with an occasional trace reported further north. Contrary to expectations, no pasmo spores were found in specimens of rusted flax until the last week of August. Fifty samples collected during a field survey made 6-10 Sept. through the principal flax growing areas revealed, on microscopic examination, that pasmo was less severe and S. linicola was sporulating less freely than in the previous 2 years. Only slight to moderate infections were found on Viking, a variety susceptible to pasmo. However, pasmo is spreading northwards through the eastern park belt, spores being found on samples collected at Humboldt.

BROWN STEM CANKER (Alternaria linicola). At long last heavy infections of A. linicola have been found on flax in the field. At the end of August affected samples were collected by Dr. H.W. Mead at Love and Pas Trail in north-eastern Sask. These specimens showed light to dark brown cankers surrounding the stems and particularly abundant on the upper half of the plants. The cankers were ½-2" long and frequently coalesced. Above the cankers the top third of some plants were dry and had turned pale brown. The large spores typical of A. linicola were found occasionally in canker scrapings. When portions of affected stems were surface disinfected and plated over 65% yielded Alternaria, more than half of which were A. linicola: the other 35% were mainly cultures of Fusarium spp.

From observations made during the September survey and subsequent examination of the samples collected it was evident that cankers might develop independently or centre about rust lesions. Isolations from cankers of the latter type yielded, depending on the district, Fusarium spp., Alternaria linicola, Septoria linicola and Polyspora Lini. Moreover, the brown stem canker caused by A. linicola, sometimes with S. linicola or P. Lini associated, was also frequently found. In fact A. linicola predominated in isolates of brown stem canker, which was common throughout the eastern park belt from Love to Carnduff. In this area it was also much more frequently associated with rust telia than were Fusarium spp.

SEEDLING BLIGHT (Rhizoctonia Solani, etc.) was not conspicuous in fields in north-central Sask.; it was, however, generally distributed through the flax plots at the University and continued to cause death of seedlings until well into mid-summer. Moreover R. Solani comprised 25% of the isolates from 100 plants from each of 3 fields showing severe late root rot. Reduction in yield averaged 35%. Late root rot was most severe in two flax fields on barley stubble. R. Solani should no longer be regarded as only a damping-off parasite of flax; under favourable conditions it may continue to attack the plants until maturity.

DIE-BACK or TOP BROWNING (heat and drought). On the open prairie flax ripened uniformily and the whole stem gradually turned brown with very little of the die-back symptoms. Although soil moisture was low, summer temperatures were generally uniform. It appears that the sudden onset of high temperatures when the flax is ripening, as has occurred in previous years, may be one of the chief causes of die-back symptoms.

MISCELLANEOUS. A distinctive white spotting and stunting of young flax plants was observed in an area where a straw-pile had been burned. As the season advanced the plants recovered, the late growth being normal. Flax was sown in pots of the soil in the greenhouse; the seedlings developed normally.

Flax plants with crooked, severely distorted roots were found in soil bordering cracks at Saskatoon. Plants showing similar symptoms were received from Swift Current, Leader and Fenton.

2,4-D Dust Injury (P.D.S. 25:31) on flax roots was clearly recognized in a sample from near Regina. Conspicuous bends, buckles and S-shaped twists on the stems about 1/3 to ½ of their length from the ground was another type of injury generally distributed in 2 fields; the plants were otherwise well developed.

?Phosphorus Deficiency. Flax plants in areas through a field at Floral, near Saskatoon, exhibited a striking blue-green sheen when blown by the wind. The soil was of light texture and uneven in colour and showed evidence of former drifting. Phosphorus deficiency is suggested in these areas where subsoil is exposed.

Heat Canker was insignificant in flax which emerged late and escaped a hot spell the first week of June.

Selenophoma Branch Spot (S. linicola). Not a single specimen was collected this year.

Water Blister (unbalanced water relations) was present on flax stems in the Irrigation Nursery, Saskatoon.

Special reports covering two surveys in Man. and one preharvest survey embracing parts of all three prairie provinces were prepared by W.E. Sackston. They have been combined into a single report.

The largest flax acreage on Manitoba's history yielded a record crop in 1948. Early spring rains delayed seeding and dry weather early in June slowed up emergence. However, precipitation was well above normal and dry frost-free weather extended from mid-August into October, enabling most of the late flax to mature a good crop.

Three flax disease surveys were made in Man. in 1948. These were the seedling survey, 21-25 June, the mid-season survey, 12-29 July including southeastern Sask., and the fall survey 30 Aug.-11 Sept. covering the three prairie provinces.

SEEDLING BLIGHT (Rhizoctonia Solani, Fusarium spp., etc.). Conditions appeared ideal for severe seedling blight in Man. in 1948, but the expected outbreak did not develop. Severe losses were confined to isolated cases. Two 50 acre fields, of Royal and Dakota respectively, had to be plowed down because 80-100% of the plants were killed by R. Solani. Several reports of severe damage were received, but where poor or irregular stands were found they were due in most cases to poor emergence. Thin stands seen on the early survey were often greatly improved by mid-July although the plants were in all stages from seedling to bloom. R. Solani, Fusarium spp. and Alternaria spp. (mostly A. tenuis), were the principal fungi isolated from dead or diseased seedlings. Nematodes were present in many of the cultures.

LEAF SPOTS. A trace of leaf spot was found in 20 fields out of the 200 examined in the first two surveys; in 8 fields infection ranged 5-75%. Mostly non-sporulating strains of Alternaria were isolated. Several colonies of Fusarium, one of Helminthosporium sativum and one of Polyspora Lini were recovered from field samples. Colletotrichum Lini was isolated from plants grown from Ottawa seed in the variety plots, Winnipeg. Infection was extremely severe on Pusa and several other Indian varieties, causing stem canker, boll blight and seed discoloration as well as leaf spot. C. Lini was abundant in all tissues of Pusa flax received from the C.E.F., Ottawa, Ont., and from the Station, Morden, Man., when platings were made.

WILT and ROOT ROT (Fusarium oxysporum f. Lini, Rhizoctonia Solani). Traces of wilt and root rot were found in 21 fields examined in Man. in July, and 2% infection in two. R. Solani was isolated from over half the specimens plated; F. oxysporum f. Lini was isolated in pure culture from only one collection; Fusarium spp., including F. oxysporum, were present in about half the samples. Other organisms isolated were: Helminthosporium sativum one collection, Alternaria spp. from most specimens, and miscellaneous fungi, with nematodes in several plates. All collections were from southern Man.

Pure cultures of F. oxysporum f. Lini were isolated from wilted flax plants received from growers and others in Man. along with other Fusarium spp. in several lots. R. Solani was isolated in pure culture from dead plants in a patch where root rot was severe at the University.

Very little wilt or root rot was evident during the preharvest survey. Infection was tr. in 9 fields and 5% in one out of 90 examined in Man.; tr. in 2 and 2-5% in 2 out of 45 examined in Sask.; tr. in 7 and 10% in one out of 30 in Alta. R. Solani and Fusarium spp. were isolated from samples collected in all provinces. These two fungi and Alternaria sp. were isolated from one trace sample in Sask. and F. oxysporum f. Lini from another. F. oxysporum f. Lini was isolated from wilted plants collected at the Station, Lethbridge, Alta.

RUST (Melampsora Lini)[1] and STEM ROT (Fusarium spp. and Alternaria spp.). For the first time since 1942 rust was the most important disease of mature flax. The outstanding feature of the rust epidemic of 1948 was the severe damage it caused to Royal. It has been demonstrated by B. Peturson, of the Winnipeg Laboratory and by others that Royal flax in the seedling stage is susceptible to most forms of flax rust common on the prairies. In the mature stage Royal develops appreciable resistance and suffers little from rust attack. Because of delayed spring seeding and emergence in the rust area of Man. and south-eastern Sask. and the moist warm weather in July and early August the flax remained succulent and susceptible when weather favoured rapid development of rust. Rust infection alone was heavy enough to cause serious damage, but the situation was aggravated by secondary invaders such as Fusarium and Alternaria, which entered the rust telia and spread out from them causing a brown discoloration or stem rot that extended for varying distances along the stems, girdling many of them and killing the tissues above the lesions.

Rust was found on volunteer plants of Royal in bloom near Clear-water on June 22. In July traces were found in 9 fields and light to moderate infections on 2-25% of the plants in 8 fields and on 50-100% of the plants in 12 fields. Nearly all the rusted fields were in southwest Man. and southeastern Sask. It was already more widespread and severe than in 1947.

The estimates of rust severity reported in the preharvest survey are based on telial infections on the stems. It is possible therefore that fields where only light telial infections were seen had suffered heavy uredinial infections on the leaves. Fifteen of 90 fields examined in Man. had no rust, but 13 of these were rust-resistant varieties such as Dakota, Rocket, etc. The two rust-free fields of Royal were in the northwest, near Gilbert Plains. Five of 45 fields examined in Sask. were free of rust; of these, three were rust-resistant varieties and two were in the dry southwest corner of the province. The only rust-free field of 30 examined in Alta. was dead ripe and had apparently escaped the disease.

Rust without stem rot was found in 23 fields in Man. The infections were trace to light in all but two fields, in which 50% of the stem area was rusted. Rust and stem rot affected traces to 10% of the stem area in 22 fields, 15-50% in 14 fields, and 55-100% in 16 fields. All the fields with more than 35% rust and stem rot infections were in the southwest part of the province. Losses were as high as 75% in some fields, and averaged 25-35% for the area. Where stem rot infections were relatively light, most of the discoloration seemed to be on the basal part of the stems, with clean rust telia occurring on the upper stem tissues in some cases. Numerous reports were received from flax growers, and others to the effect that rust was heavy on Royal early in August in southwest Man., and that rust and stem rot reduced yields very severely.

Traces of rust without stem rot were seen in 12 fields in Sask., light telial infection with severe uredinial infection on green leaves was seen in 5 fields, and in one extremely late field rust was killing

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[1] F.J. Greaney in "Seedtime & Harvest" No. 209, Oct. 14, 1948, estimated that in 1948 the average loss in yield from flax rust in Man. was 10%. "On a crop the value of which in August was estimated at $40,000,000 this represents a cash loss to Manitoba of $4,000,000."

most of the plants. Rust and stem rot lesions covered traces to 15% of the stem area of plants in 20 fields from the Quill Lakes east and south. Traces of stem rot were seen on rusted plants in the irrigation nursery at the University, Saskatoon. In a mixed stand of Royal and Rocket near Alameda, 100% of the Royal was diseased and prematurely dead, while the Rocket was rust-free and just turning color. The survey did not cover the southeast corner of the province, from Alameda east, but numerous reports indicated that rust and stem rot infection in that area was extremely heavy and causing serious damage.

Rust infection ranged from trace to 15% of the stem area in 28 fields in Alta. Heavy telial infections, covering 50% or more of the stems, were seen in two fields. In one of these there was rusted combined flax straw from the preceding crop scattered through the field. Rust was killing plants in scattered patches. There were traces of stem rot associated with the rust; no stem rot was seen on rusted flax elsewhere in Alta. The other heavy infection occurred on Redwing in plots at the Lacombe Station.

Little rust was seen on Linum Lewisii in Man. in 1948, but heavy infection was seen on this species near Prud'homme, Sask.

PASMO (Septoria linicola) was not as conspicuous in 1948 as in 1947. Heavy infections were found in fields near Haywood, Man., on 15 Aug. By the time of the late survey, however, rust and stem rot were so severe on most of the rust-susceptible flax in southwest Man. and southeast Sask. that pasmo infections were difficult to determine.

Definite pasmo lesions were recognized on much of the severely rusted Royal but the pasmo was listed as "trace" wherever rust and stem rot accounted for much of the injury. Traces to 10% of the stem area were affected by pasmo in 48 fields in Manitoba, 15-50% in 14, and 60-90% in 13. Heavy pasmo infections were observed on rust-resistant varieties in the worst rust area, and also on Royal and Redwing in northwest Man., from Neepawa through Dauphin to Roblin. Reports of pasmo infection were received from Agricultural Representatives at Swan River in the north, and from Vita to Piney in the southeast, where no surveys were made.

Traces to 10% of pasmo were seen in 18 fields in Sask., and 25-50% in three. With the exception of University plots at Saskatoon and fields near Weyburn, Humboldt, and Misninger, all the pasmo infections were found in the "rust area". No pasmo was found in Alta.

STEMBREAK and BROWNING (Polyspora Lini). Two fields near Elfros, Sask., with stembreak affecting up to 35% of the plants were visited through the courtesy of Prof. T.C. Vanterpool. The break was not confined to the cotyledonary node but occurred at various levels up to two-thirds of the height of the stems. Traces to 2% of stembreak were found in four fields between Elfros and Yorkton, but P. Lini was not isolated from lesions on the stems. From 10-15% of the stems were broken over at various heights in a field near Hirsch; isolations yielded only miscellaneous fungi.

Traces to 10% stem browning were seen in 7 fields from the Quill Lakes to the Man. border, 25-50% in 4 fields, and 75% in 2. P. Lini was isolated only from the two fields near Elfros where stembreak was severe, and from one other field several miles east of Elfros. All the other brown stems plated yielded only Fusarium spp., Alternaria spp., and miscellaneous fungi similar to those isolated from stem rot associated with rust.

Traces of stem browning were seen in 8 fields in Alta., and from 1-10% in 3 fields. P. Lini was isolated from flax collected in fields near Edmonton and Vegreville, and from plots at Olds and Lacombe.

HEAT CANKER (physiologic) was not conspicuous in 1948 in Man. Traces were present in 20 fields; the heaviest damage seen affected only 5% of the plants, in 7 fields. One sample was received from a grower.

BOLL BLIGHT (cause unknown) was more severe in Man. in 1948 than in 1947. There was trace to 20% blighting in 28 fields, 25-35% in 36, and 40-65% in 13 fields. Severe blighting and stripping of the bolls was associated with heavy rust and stem rot infections in 11 of the 13 fields and with heavy pasmo infection in the other two. In Sask. there was 5-20% blighting in 12 fields, 25-35% in 24, and 45-50% in 2 fields, one of which showed severe drought injury. Boll blight was not severe in Alta. Traces to 20% occurred in 25 fields, and 25-35% in three fields. Rust was severe on the pedicels of plants in 2 of the 3 severely blighted fields.

MISCELLANEOUS. Chlorosis was conspicuous in many fields in the southern part of the Red River Valley, Man., in June. Scattered chlorotic fields were seen in July. In some cases chlorosis was severe over much of one field, but none could be found in an adjacent field of flax of the same age. Heat and Drought Injury caused some damage to seedlings in June. Severe injury of all plants was seen in July on large acreages of flax in very light sandy soil between Douglas and Shilo, Man. Traces of Stem Break were seen in July in 5 fields in Man. and one in Sask. Fusarium spp., Alternaria spp., miscellaneous fungi and nematodes were isolated from the tissues, but no Polyspora Lini. Breaking-over of the stems at the cotyledonary node was seen in one field of flax on peaty soil, and reported from another field, both in the interlake area of Man. The trouble was most noticeable in thin stands and at the edges of bare patches in the field. The breaks looked mechanical, and no known pathogens were isolated. Cutworms were reported in one of the fields, but according to an entomologist who examined the material, they were not responsible for the injury. Traces of 2,4-D Injury were observed in a few fields. No severe injury was seen except at headlands, although many of the fields examined had been treated. Top Discoloration involving the upper quarter to half of the flax plants was seen in 3 fields in Man., 7 in Sask., and 12 in Alta. Severe drought injury was seen in one field in Man. and two in Sask.

Other Observations

WILT (Fusarium oxysporum f. Lini) was severe in a variety test plot at Ste. Anne de la Pocatière. The percentage of plants affected were: fibre varieties - Norfolk Queen 8.7**, Cascade 17.4**, Gossamer 54.6**, Cirrus 67.5*, Dominion 68.5*, J.W.S. 75.7, and Liral Prince 91.7; oil varieties - Dakota 6.2**, Red Wing 11.3*, Rocket 13.6* and Royal 26.7. In comparison with the most susceptible variety in each series the figures followed by ** were highly significant and by * significant. Wilt was observed in a few fields in the area, but infection was light. Samples were received from Soulanges Co., where 20% of the plants were reported affected (R.O. Lachance).

RUST (Melampsora Lini). Infection was 8-tr. 18-sl. 1-mod. 1-sev./32 fields examined in Alta., tr.-sl. in the variety plots at Olds and tr.-mod. at Lacombe, (T.R.D.). A 15% infection was observed on Red Wing at Innisfail; the growth was rank (G.B. Sanford). Rust was moderate to severe in a field of Liral Monarch at Ste. Anne de la Pocatière, Que.; a nearby field of Cirrus was free from rust (R.O. Lachance).

BROWNING (Polyspora Lini) was severe in patches in fields at New Norway, Alta. (G.B. Sanford, W.E. Sackston). Affected flax was received from Blackie where a moderate infection occurred (A.W. Henry).

BROOMCORN MILLET

SMUT (Sphacelotheca destruens (Schlecht.) Stevenson & Johnson, = Sph. Panici-miliacei (Pers.) Bubak). A light infection was present in a field at Tessier, Sask. (H.W.M.).

FOXTAIL MILLET

DOWNY MILDEW (Sclerospora graminicola) affected 15-20% of Early Foxtail Millet in the plots, Division of Forage Plants, C.E.F., Ottawa, Ont. Infected plants tillered excessively and bore sterile inflorescences. Yield was probably reduced 15-20% (W.R. Childers). It was also heavy on Setaria lutescens near Ottawa. The sporangial stage was plentiful (D.B.O. Savile).

MANGEL

LEAF SPOT (Cercospora beticola). A slight infection occurred about Guelph, Ont., on mangels and sugar beets (J.D. MacLachlan).

ROOT KNOT (Heterodera marioni). About 1% of the roots were found affected at harvest in the variety plots of the University, Point Grey, B.C. The spherical root knots yielded the nematode in abundance. (H.N.W. Toms, A.D. Baker).

BLACK LEG (Phoma Betae). The leaf spot phase was present on plants being grown for seed at Grand Forks, B.C. (G.E. Woolliams). The disease affected about 10% of plants in a field at Clyde River, P.E.I., causing a damping-off. (D. Robinson).

LEAF SPOT (Ramularia beticola) was generally distributed on the lower leaves of crops in the lower Fraser Valley, B.C.; damage slight (H.N.W. Toms).

CROWN ROT (boron deficiency). Two affected roots were brought to the laboratory, Charlottetown, P.E.I. (R.R. Hurst).

MUSTARD

WHITE RUST (Cystopus candidus). Infection was severe on occasional plants in several fields of cultivated mustard about Lethbridge, Alta., but most plants were not affected (M.W. Cormack).

SOYBEAN

The principal observations on diseases of soybean are contained in a report "Soybean Diseases in Southwestern Ontario in 1948" by A.A. Hildebrand.

As in previous years, surveys of soybeans in the southwestern counties of Ont. were carried out at intervals throughout the season. Most of the diseases that have previously been reported in the district were found again this year but none of them caused serious loss. However, BROWN STEM ROT (Cephalosporium gregatum Allington & Chamberlain) is causing some concern. In 1947, the disease was found only in a single planting of soybeans and on one variety only. In 1948, the disease was found to be of widespread occurrence on a number of varieties. In the laboratory plots at Harrow where, for the second year, soybeans followed soybeans, by mid-September up to 20% of the plants in some rows were more or less seriously affected. However, yield from these rows was just as high as from others with fewer infected plants and it is suggested that development of the disease did not take place until after the seeds in the pods were well filled out. Allington and Chamberlain (Phytopath. 38: 793-802, 1948) have shown that air temperatures are of critical importance in the development of brown stem rot. They report that air temperatures below 21°C. (70°F.) are essential for the rapid spread of the organism up the stem of the plant. At Harrow this season the maximum daily temperature during July and August exceeded 70°F., except for one period of about 48 hours. Consequently, though considerable inoculum may have been present, the disease had little chance to develop until the cooler weather of September. With the disease becoming widely distributed, it might well be destructive in a year with a cool August.

Other diseases noted in the course of the surveys include: MOSAIC (Soja virus 1); BUD BLIGHT (virus of tobacco ring-spot group); DOWNY MILDEW (Peronospora manshurica); BROWN SPOT (Septoria Glycines); BACTERIAL BLIGHT (Pseudomonas glycinea); POD and STEM BLIGHT (Diaporthe Phaseolorum var. Sojae); FUSARIUM BLIGHT (F. oxysporum f. tracheiphilum); a foot-rot from which Rhizoctonia was consistently isolated; and SUN SCALD (non-parasitic).

Other Observations

DOWNY MILDEW (Peronospora manshurica). Infection was severe on Capital; moderate on Richland, Goldsoy, and O.A.C. 211; and light on Mandarin, Kabott, Flambeau, Harman, Pagoda and Earlyana in the plots, O.A.C., Guelph, Ont. (J.D. MacLachlan). It was found at Ottawa for the first time, when a trace was observed on Capital (W.R. Childers, I.L. Conners).

BACTERIAL BLIGHT (Pseudomonas glycines). Infection was severe on Pagoda; moderate on Kabott and Goldsoy; and light on Earlyana, O.A.C. 211, Flambeau and Harman in the plots, O.A.C., Guelph, Ont. (J.D. MacLachlan). A light infection at Ottawa was confined to a few introduced varieties known to be susceptible. Spread was greatly restricted by subsequent dry weather in August (R.J. Baylis). Infection was light on Early Black Eye at Ste. Anne de la Pocatière, Que. (R.O. Lachance).

MOSAIC (virus). Slight infection observed on all varieties in the plots, O.A.C., Guelph, Ont. (J.D. MacLachlan).

SUGAR BEET

LEAF SPOT (Phoma Betae) was very prevalent on the stalks of the seed crop at Ladner, B.C. (R.E. Fitzpatrick).

LEAF SPOT (Ramularia beticola) caused appreciable defoliation in some fields of the seed crop at Ladner, B.C., just prior to harvest. As a result seed heads ripened unevenly (R.E. Fitzpatrick).

RUST (Uromyces Betae) caused a scattered infection in the variety plots, University, Point Grey, B.C. (H.N.W. Toms).

ROOT ROT. During the current season, more particularly towards mid-summer, sugar beets in a number of fields in southwestern Ont. exhibited symptoms that in the past have been ascribed to attack by Rhizoctonia Solani. When affected tissue from diseased beets was transferred to various solid nutrient media, including P.D.A., pure cultures of R. Solani were obtained with such consistency as to suggest that fungus as the causal organism of the disease. When, however, isolations were attempted by the water-culture method, Aphanomyces cochlicides developed just as consistently as had R. Solani when the solid media had been employed. The significance of this association of organisms is not yet understood but is about to be investigated. (A.A. Hildebrand).

SUNFLOWER

Observations on sunflower diseases in Man. are contained in a special report by W.E. Sackston.

A disease survey through the main sunflower area of Man. was made in mid-August with E.D. Putt, Cooperative Vegetable Oils, Ltd., Altona; W.A. Russell, Dominion Experimental Station, Morden; and H. Westdal, Dominion Entomological Laboratory, Brandon.

RUST (Puccinia Helianthi) was present in every field examined; it was the most prevalent sunflower disease in 1948, causing appreciable damage in some crossing blocks, but little in commercial fields. Rust infection was trace to light in 13 fields, moderate in 7, and heavy in 4. In crossing blocks the inbred female parent, S 37-388, was attacked much more heavily than the Sunrise parent, and in some fields of the hybrid variety Advance

plants of the inbred were severely damaged by rust whereas those of Advance showed only light infection. The variety Mennonite appeared to be more susceptible than either Sunrise or Advance. Late-season reports from Mr. Putt and Mr. Russell indicated that rust appeared to be causing yield reductions as high as 50% in some crossing blocks, but only 1-2% in commercial fields.

WILT (Sclerotinia sclerotiorum) was found in more than half the fields examined; in all but one field, however, there was only a trace to 1% of the disease. In one field near Carman, over 50% of the plants in 3 acres of a 30 acre field were killed by S. sclerotiorum. The sunflowers followed four successive good crops of field peas. Mr. Putt reported a field in the Altona area in which 60-70% of the stems in patches were killed by wilt, with an average infection of 25% for the field. Wilt was worst in fields, or portions of fields, where growth was heavy.

LEAF SPOT (Septoria Helianthi) was not seen at the time of the survey, but Dr. J.E. Machacek found traces of the disease in a foundation plot of Sunrise.

LEAF MOTTLE (cause unknown). An unidentified leaf mottle caused a trace to 1% infection in 5 fields. The mottle apparently starts on the lower leaves as an interveinal chlorosis, followed by necrosis. The affected tissue is sharply limited by the veins. As the disease spreads upward along the plant, the necrotic tissues tend to break out of the lower, earlier-diseased leaves, leaving them ragged and torn. Infected plants occurred singly, surrounded by healthy plants, and also in groups extending up to 20 feet along the row and across two or three rows. Affected plants seemed to be slightly shorter than healthy ones.

STUNT (cause unknown). An unidentified stunting, similar to that caused by systemic downy mildew infection, was present in trace amounts in 6 fields and up to 5% in patches in one. Affected plants were 6-18" high, with most about 12". The roots appear to be browner and more twisted than those of healthy plants; they pull out of the soil easily, and do not hold soil. No particular discoloration of the stem base was noted. Discoloration at the point of attachment of leaf petioles seemed to be more pronounced than at the base of dead leaves on non-stunted plants. Stem borers were present in all the stunted plants in the worst field; they were also present in healthy plants, but the infestation was much less. The number of leaves on stunted plants was approximately the same as on healthy ones, but the internodes were extremely short. The diameter of the mid-stem was greater than that of the basal or upper parts, making the stem appear spindle shaped. The heads on all affected plants were rigid and erect, while those on healthy plants were nodding. Chlorosis of the upper leaf surfaces was conspicuous, spreading laterally a short distance from the midrib and larger branch veins. The chlorosis was irregular in pattern, and did not appear on the lower leaf surface. Veins on the affected leaves were somewhat distorted, and the leaves tended to be rugose. No pathogen could be found associated with the diseased plants.

DOWNY MILDEW (Plasmopara Halstedii) was found on scattered plants in test plots near Rosenfeld. Affected plants were similar in appearance to those suffering from "stunt", save that downy mildew was present on the lower leaf surfaces, corresponding to the chlorosis visible on the upper surfaces. Not all the stunted plants in mildew patches were mildewed; it may be that much of the stunting seen was induced by systemic mildew infection but that the organism did not fruit for some reason.

POWDERY MILDEW (Erysiphe Cichoracearum). Trace infection was seen in sunflower plots at the University, Winnipeg, and "considerable infection" was reported on some of the later selections at Morden by Mr. Russell.

MISCELLANEOUS. Traces of a bacterial stem rot were found in two fields. Mr. Putt reported that the disease was severe in one field heavily infected by Sclerotinia wilt, and that like the wilt it was most common where the growth was heavy.

CULTIVATED GRASSES

AGROPYRON - Wheat Grass

Brittle Dwarf (Brachycolus tritici Gill) was severe on both fall and spring sown perennial wheat (Agropyron elongatum x T. aestivum var. Chinese) in the plots, University, Saskatoon, Sask. Many plants of both sowings were killed before heading. The aphid in all probability overwintered on the fall-sown plants. From some experimental work completed in 1948 it was concluded that (1) there is no indication that a virus is associated with the disease, but rather (2) the so-called brittle dwarf disease of wheat, barley, crested wheat grass and other grasses is caused by the western wheat aphid (T.C. Vanterpool).

Ergot (Claviceps purpurea). Heavy infection on perennial wheat (see above) in the University plots, Saskatoon, Sask. (T.C. Vanterpool). Infection was slight on A. repens near Willingdon, Alta., and trace to slight on A. Smithii in central Alta. (S.G. Fushtey). Trace on A. repens in Queens Co., P.E.I. (R.R. Hurst).

Take All (Ophiobolus graminis) moderately infected Agropyron-Triticum hybrids in the plots at Lacombe, Alta.; destroying many of the plants (T.R.D.).

Physoderma Blight (Physoderma graminis (Büsgen) A. Fischer ex von Minden) caused severe damage to wild A. repens bordering the plots, Division of Forage Plants, C.E.F., Ottawa, Ont. It was recognized from its similarity to the outbreak seen at Madison, Wis., and described by M.J. Thirumalachar and J.G. Dickson (Phytopathology 37:885-888. 1947) (W.R. Childers). The Ottawa material contained resting sporangia (23.5) 25-39 x (15.5) 19-32 microns, wall yellow brown to dark red brown, 1.5-2.2 microns. It agreed closely with Cladochytrium graminis Büsgen in Rabh.-Pazschke, F. Extra-Europ. 4117 on Dactylis glomerata. It is clearly distinct from Physoderma Agrostidis Lagerh. in Vestergren, Micromycetes rariores selecti 510 on Agrostis alba. In the Ottawa material the sporangia are abundant in the leaves and rhizomes and some were also seen in the cortex of the few remaining roots. This is the second report of the fungus for North America. Von Minden (Kryptogamenfl. d. Mark Brandenburg 5:404. 1911) cites A. Fischer as the author of the transfer of the species to

Physoderma, but in the cited work (Rabh. Krypt.-fl. 1(4):139. 1892) Fischer merely places Cladochytrium graminis in the subgenus Physoderma (D.B.O. Savile).

Basal Glume Rot (Pseudomonas atrofaciens). Slight infection on Agropyron-Triticum hybrids in the plots at Lacombe, Alta. (T.R.D.).

Stem Rust (Puccinia graminis) was a trace to heavy on A. repens in Queens Co., P.E.I. (R.R. Hurst).

Leaf Rust (Puccinia Clematidis). Trace to heavy infection on A. repens in Queens Co., P.E.I. (R.R. Hurst).

BROMUS - Brome Grass

Ergot (Claviceps purpurea). Slight infection on B. inermis at Lacombe and Delburne and moderate at Tofield, Alta. (S.G. Fushtey).

Leaf Blotch (Helminthosporium Bromi). Infection was slight in plots of B. inermis at Lethbridge and in several roadside stands in southern Alta. (M.W. Cormack).

Leaf Spot (Selenophoma bromigena). Infection moderate on B. inermis at Edmonton (J.D. Gilpatrick); moderate and general in roadside stands near Cowley, Alta. (M.W. Cormack). Infection variable on strains and varieties of B. inermis in the breeding nursery at Saskatoon, Sask. (H.W. Mead).

CYNOSURUS CRISTATUS - Crested Dogtail

Brown Stripe (Scolecotrichum graminis) was general on a lawn at North Saanich, B.C. (W. Jones).

DACTYLIS GLOMERATA - Orchard Grass

Bacterial Blight (Corynebacterium rathayi) has now spread throughout the main orchard at Ste. Anne de la Pocatière, Que.; infection moderate (A. Payette).

Ergot (Claviceps purpurea). Heavy infection along a fence row at Walkerton, Ont. (J.D. MacLachlan).

Powdery Mildew (Erysiphe graminis) was general on one strain at the Station, Saanichton, B.C. (W. Jones).

Purple Leaf Spot (Mastigosporium rubricosum). Infection general in fields in North Saanich, B.C.; considerable damage to a few strains at the Farm, Agassiz (W. Jones).

Stem Rust (Puccinia graminis). On a few plants along roadside, North Saanich, B.C. (W. Jones). Trace on the variety Oron at O.A.C., Guelph, Ont. (J.D. MacLachlan).

Brown Stripe (Scolecotrichum graminis). General on one strain at the Station, Saanichton, B.C. (W. Jones). Slight infection on the variety Oron at O.A.C., Guelph, Ont. (J.D. MacLachlan). Slight infection at C.E.F., Ottawa (W.R. Childers).

FESTUCA - Fescue

Bacterial Leaf Spot (Corynebacterium agropyri). Infection slight in a field of F. rubra at Turin, Alta. (M.W. Cormack).

Leaf Blotch (Helminthosporium dictyoides). Trace on F. elatior var. Mefon at Brampton, Ont. (J.D. MacLachlan).

Stem Rust (Puccinia graminis). Trace at Brampton, Ont. (J.D. MacLachlan).

PHLEUM PRATENSE - Timothy

Stem Rust (Puccinia graminis var. Phlei-pratensis). Observed on stands at Flatbush and Rossington, Alta. (A.W. Henry). Some volunteer timothy plants between rows of planted timothy var. Medon in a block at Brampton, Ont., but none observed in the rows of foundation plants (J.D. MacLachlan). Infection trace to heavy in Queens Co., P.E.I. (R.R. Hurst).

Brown Leaf Spot (Scolecotrichum graminis). Collected at Rossington, Alta. (A.W. Henry). Slight infection on Medon timothy at Brampton, Ont. (J.D. MacLachlan). Slight infection at C.E.F., Ottawa (W.R. Childers).

POA - Blue Grass

Ergot (Claviceps purpurea). Slight infection in some plantings of blue grass at Edmonton, Alta. (S.G. Fahey).

Powdery Mildew (Erysiphe graminis). Slight infection at Edmonton (J.D. Gilpatrick).

Stem Rust (Puccinia graminis). A trace on P. canadensis var. Canon at O.A.C., Guelph, Ont. (J.D. MacLachlan).

Leaf Rust (Puccinia Poae-sudeticae). Slight infection in some plantings of blue grass at Edmonton, Alta. (J.D. Gilpatrick).

Brown Stripe (Scolecotrichum graminis). Moderate infection mostly on the basal leaves of P. compressa var. Canon at O.A.C., Guelph, Ont. (J.D. MacLachlan). Infection was heavy in one ¼ acre block of P. compressa at C.E.F., Ottawa, completely browning the leaves (W.R. Childers).

LAWNS and TURF

Brown Patch (Pythium spp. and Helminthosporium sativum). Many new lawns were started in July and August at Saskatoon, Sask. Brown patches were conspicuous in many of these lawns. Pythium ultimum, P. arrhenomanes and H. sativum were isolated. Rhizoctonia Solani was not obtained (T.C. Vanterpool).

Brown Patch (Rhizoctonia) caused moderate damage to a lawn at Charlottetown, P.E.I. (D. Robinson).

Snow Mould (Typhula spp.) caused only slight damage to the greens and fairways of local golf courses about Ottawa, Ont., in March. Snow cover was unbroken throughout the winter and disappeared very quickly (within one week); both factors may have been responsible for the little damage from snow mould. Only Typhula spp. were isolated from diseased patches (R.J. Baylis).

III. DISEASES OF VEGETABLE AND FIELD CROPS

ASPARAGUS

RUST (Puccinia Asparagi). A trace was present on Mary Washington plants at the Station, Summerland, B.C. (G.E. Woolliams).

BEAN

GREY MOULD (Botrytis cinerea) caused considerable damage to leaves, flowers and pods of all bush varieties in the plots, University, Point Grey, B.C.; the summer was wet (H.N.W. Toms). Heavy infection occurred on wax beans in a garden at Charlottetown, P.E.I. (R.R. Hurst).

ANTHRACNOSE (Colletotrichum Lindemuthianum). Infection light on a few plants at Langley, B.C. (W. Jones); severe on the pods in the only affected lot examined at Summerland (G.E. Woolliams); severe in some garden plots at Edmonton, Alta. (J.D. Gilpatrick); affected specimens received from Ebenezer, Sask.--damage probably slight; anthracnose not found in Man. except in plots grown from infected seed (W.A.F. Hagborg). Damage was so severe in one field of Black Pencil Pod rejected for registration in Kent Co., Ont., that it was probably difficult to dispose of the crop in ordinary commercial channels; seed was secured from B.C. (A.A. Hildebrand). More prevalent than usual on snap beans about Guelph (J.D. MacLachlan). Slight damage in Lincoln Co., but disease less common than usual, occurring mostly where growth was luxuriant (J.K. Richardson). Anthracnose affected 25% of the plants of Brittle Wax in the plots at the Station, St. Martin, Laval Co., Que. Growers reported other cases with 5-10% loss in Montreal district (E. Lavallee). Severely diseased pods were received from Hudson Heights and Calumet (H.N. Racicot). Growers under contract to a local N.S. cannery reported severe loss from anthracnose in 1948. Specimens were received from several areas in Kings and Annapolis counties. In all cases the seed used was brought into N.S. and distributed by the cannery. The extremely wet season was favourable for the development and spread of the disease (D. Creelman). Varying amounts of anthracnose were noted on wax beans in Queens Co., P.E.I. (R.R. Hurst).

HALO BLIGHT (Pseudomonas phaseolicola) caused considerable damage to a seed crop of Stringless Green Pod at Metchosin, Vancouver Island, B.C. (W. Jones). Infection was heavy on Landreth's strain of Stringless Green Pod in both the test plots and the variety plots at University, Point Grey. (H.N.W. Toms). Halo blight affected less than 1% of the plants in a field of Tendergreen being grown for seed at Shuswap; it was found throughout the B.C. Interior on crops grown from diseased seed, but not on crops from healthy seed (G.E. Woolliams). The disease was absent to severe in variety plots of garden beans at Edmonton, Lacombe and Lethbridge, Alta., and trace to slight in 6 fields of field varieties at Lethbridge and Taber (M.W. Cormack, T.R. Davidson). Slight damage on several varieties at the Station, Scott, Sask. (H.W.M.). Halo blight was found in home gardens in Man. in various amounts, the more severeal infected yielding almost nothing. Field plantings grown under contract were almost free from infection and several fields were apparently disease free. The value of disease-free seed is becoming recognized by the contract companies (W.A.F. Hagborg). A moderate infection was found in Kings Co., N.S. (K.A. Harrison).

SCLEROTINIA WILT and ROT (S. sclerotiorum). Wilt was severe in part of a field of Michelite in Kent Co., Ont. (A.A. Hildebrand). Several deliveries to a cannery at Kentville, N.S. were affected by Sclerotinia rot. Where the beans could not be processed immediately, some lots were a complete loss. The season was wet (D. Creelman).

RUST (Uromyces appendiculatus) was reported in commercial fields in the Mission-Abbotsford area, Fraser Valley, B.C. (H.N.W. Toms). Plants were heavily infected by rust in a 30 ft. patch in a 2-acre field of Brittle Wax at Sherrington, Que. This is the first time that I have observed rust in the Montreal district (E. Lavallee). A light infection was observed in a field in Queens Co., N.B. (S.F. Clarkson). An affected specimen from a local garden was referred to the laboratory, Kentville, N.S. (D. Creelman). Traces were observed on wax beans in Queens Co., P.E.I. (R.R. Hurst).

COMMON BLIGHT (Xanthomonas phaseoli). Reported from a few city gardens, Saskatoon, Sask.; not a year for bacterial blight (T.C. Vanterpool). The disease affected 2% of the plants in an acre field of Corvette and 5% of the plants in a small plot of Stringless Green Pod in Carleton Co., Ont.; plots of 3 other varieties were disease free (V.R. Wallen). Out of 7 fields grown for seed and inspected at Sherrington and Ste. Philomene, Que., 5 were infected; average infection was about 5% (E. Lavallee). A moderate infection developed on Michelite and other varieties at the Station, Ste. Anne de la Pocatiere; damage was slight (A. Payette). A few affected plants were brought to the Laboratory, Charlottetown, P.E.I. (R.R. Hurst).

BACTERIAL BLIGHT (Common and Halo Blight). In most fields in N.B., infection was confined to the leaves, but in a field at Green Road, Carleton Co., both pod infection and joint rot were quite common over the entire field and severe in patches (S.F. Clarkson).

CURLY TOP (Beta virus 1). Slight infection in most plantings in the southern sections of the Okanagan Valley, B.C. (G.E. Woolliams).

MOSAIC (virus). Found occasionally in field beans in the B.C. Interior (G.E. Woolliams); slight infection in 2 fields at Taber, Alta., and in the Red Mexican variety at Lethbridge (M.W. Cormack). Present in most plantings in Lincoln Co., Ont., but losses appear negligible (J.K. Richardson). Moderate infection of Stringless Green Pod in a plot in Carleton Co., 3 other varieties not affected (V.R. Wallen). A trace of mosaic (Phaseolus virus 1) found in Giant Stringless Green Pod and White Marrowfat in a garden at Fredericton, N.B. (D.J. MacLeod). A trace of mosaic in a garden in Queens Co., P.E.I. (R.R. Hurst).

YELLOW MOSAIC (Phaseolus virus 2). About 2% of the plants of Kentucky Wonder in a garden at Fredericton, N.B., showed a well defined yellow mosaic. The source of the virus was traced to a mixed lot of gladiolus planted about 4 feet from the beans. When the virus obtained from the infected beans and the gladioli was transmitted by sap inoculation to healthy Phaseolus vulgaris and Vicia Faba the typical symptoms of Phaseolus virus 2 were produced. The gladioli showed a marked mottling of the leaves (D.J. MacLeod).

CHLOROSIS (high temperature of surface soil). Greening was retarded by several days in bean seedlings in city gardens, Saskatoon, Sask. High temperatures at the surface of the soil when the seedlings were emerging was believed to have upset the mechanism of chlorophyll development (T.C. Vanterpool).

BEET

LEAF SPOT (Cercospora beticola). A moderate infection was found on all beets examined, but rather heavy in one garden in Queens Co., P.E.I. (W.A. Hodgson, R.R. Hurst).

LEAF SPOT (Phoma Betae) was fairly prevalent on the lower leaves of a seed crop of Crosby Egyptian at Cobble Hill, B.C. (W. Jones).

LEAF SPOT (Ramularia beticola). Infection light on the lower leaves of all varieties in the test plots, University, Point Grey, B.C. (H.N.W. Toms). Infection general on beet stecklings grown for seed at North Saanich; fungus sporulating profusely on Oct. 22 (W. Jones).

SCAB (Streptomyces scabies (Thaxter) Waksman & Henrici). All beets grown in the plots at the Station, St. Martin, Que., were affected; the damage was considerable (E. Lavallee). A trace recorded on Detroit Dark Red in a garden at Kentville, N.S. (D. Creelman); and in a garden in Queens Co., P.E.I. (R.R. Hurst).

RUST (Uromyces Betae) was abundant and general on stecklings grown for seed at North Saanich, B.C. (W. Jones). Scattered infection in the plots, University, Point Grey (H.N.W. Toms).

BROWN HEART (boron deficiency). An occasional affected beet seen in Queens Co., P.E.I. (R.R. Hurst).

BROCCOLI

RING SPOT (Mycosphaerella brassicicola) was general on foliage of overwintered plants at the Station, Saanichton, B.C. (W. Jones).

CABBAGE

GREY LEAF SPOT (Alternaria Brassicae) moderately infected 15% of the plants in a 1/10 acre plot in Northumberland Co., Ont. One plant also affected by soft rot (Erwinia carotovora) (V.R. Wallen).

DOWNY MILDEW (Peronospora Brassicae). General infection on overwintered plants at the Station, Saanichton, B.C.; sporulating freely (W. Jones). Infection moderate on seedlings in $\frac{1}{4}$ acre field on Lulu Island (I.C. MacSwan); also on seedlings at Steveston and on mature plants in the plots, University, Point Grey, B.C. (H.N.W. Toms).

BLACK LEG (Phoma lingam). All plants affected in a small area of a field in Carleton Co., Ont. "Situation is getting quite alarming" according to C.E. Ste. Marie, Experimental Station, L'Assomption, Que., on a nearby farm, where is grown a large acreage of cauliflower, brussels sprouts, early and late cabbage (L.T. Richardson). A very light infection noted in a garden in Queens Co., P.E.I. (W.A. Hodgson).

CLUB ROOT (Plasmodiophora Brassicae). Scattered infection in the vegetable plots, University, Point Grey, B.C. (H.N.W. Toms). Infection was general and severe on cabbage and cauliflower in the western part of the Fraser Valley especially on delta lands. Crops set out from June on are more severely affected than those set out earlier (I.C. MacSwan). Cabbage fields in the Jesus and Montreal Islands are seldom found free of club root. Losses are very high in many fields. Also heavy on cauliflower (E. Lavallee). Light infection in a garden in Queens Co., P.E.I. (W.A. Hodgson).

WIRE STEM (Rhizoctonia Solani). Severely infected cabbage plants sent 21 June from Yellowknife, N.W.T. According to A. Hutchinson "Cauliflower plants were a complete loss, the flats appearing as if they had been blasted with a blow torch" (H.N. Racicot). Prevalent in hot beds of cabbage and cauliflower in Jesus Island, Laval Co., Que., and losses heavy. Fermate and Arasan are promising as soil disinfectants (1.5 grams per square foot well mixed with soil) (E. Lavallee).

BLACK ROT (Xanthomonas campestris) was severe in patches in a 3-acre field at St. Vital, Man. (W.A.F. Hagborg). About 25% of the plants died in an acre planting of late cabbage in Welland Co., Ont., others were dwarfed and in late October most plants showed some symptoms (J.K. Richardson). Black rot affected half of the plants in a field at Cote de Liesse, Que.; damage was 15% (E. Lavallee).

CARAWAY

YELLOWS (Callistephus virus 1) affected 4 plants in a garden at Fredericton, N.B. (D.J. MacLeod).

CARROT

CROWN GALL (Agrobacterium tumefaciens). A sparse infection in the vegetable plots, University, Point Grey, B.C. (H.N.W. Toms).

LEAF BLIGHT (Alternaria Dauci). A slight infection in the variety plots at Agassiz, B.C., and in the vegetable plots, University, Point Grey (H.N.W. Toms).

BLACK ROT (Alternaria radicina) caused extensive root decay in crops eing grown for seed at Grand Forks, B.C.; also some infection on a root crop t Summerland (G.E. Woolliams).

LEAF BLIGHT (Cercospora Carotae) was observed occasionally about Guelph, . (J.D. MacLachlan).

SOFT ROT (Erwinia carotovora) was extensive on roots of plants grown for seed at Grand Forks, B.C. (G.E. Woolliams).

SCLEROTINIA ROT (S. sclerotiorum) caused extensive losses among some overwintered root crops in the B.C. Interior (G.E. Woolliams). Trace infection found in plantings at Edmonton, Alta.; severe damage occurred in a storage cellar at Calgary in late November (M.W. Cormack).

BACTERIAL BLIGHT (Xanthomonas carotae). Infection was slight on crops being grown for seed at Grand Forks and Cawston, B.C. (G.E. Woolliams), and on the leaves of a root crop at Winnipeg, Man. (W.A.F. Hagborg).

YELLOWS (Callistephus virus 1) was found on some roots being grown as stecklings at Grand Forks, B.C. (G.E. Woolliams); slight infection in a field at Barnwell, Alta., and traces in plantings at Vermilion and Edmonton (T.R.D.); although the disease is still widespread in the Montreal district, Que., fields treated with oil for weeds were freer of the disease (E. Lavallee). Yellows was general on carrots in Carleton, York, Sunbury, Queens, and Westmorland Counties, N.B.; infection ranged from a trace to 20% (D.J. MacLeod, S.F. Clarkson). Traces to 30% of plants affected in many plantings in Queens Co., P.E.I. (R.R. Hurst).

DWARF (undetermined virus) described in P.D.S. 27:45-46, 1947, was found in fields in York, Carleton, Sunbury, Queens and Westmorland Counties, N.B.; infection was a trace to 17% (D.J. MacLeod).

CAULIFLOWER

BLACK STEM (Alternaria brassicicola (Schw.) Wiltshire = A. oleracea Milbr.) affected about 10% of the seedlings being grown in flats in a greenhouse at Elk Lake, B.C. (W. Jones).

BLIGHT (Alternaria ?tenuis) severely infected most of the heads of cauliflower in a planting at Ste. Anne de la Pocatiere, Que. No infection was observed on the leaves, but the blackening of the heads was striking (A. Payette).

RING SPOT (Mycosphaerella brassicicola). Slight infection on a few leaves of young plants in a cold frame at the Station, Saanichton, B.C. (W. Jones).

DOWNY MILDEW (Peronospora Brassicae). Numerous seedlings affected in cold frames at Elk Lake and the Station, Saanichton, B.C.; also rather severe on young plants in cold frames (W. Jones).

CLUB ROOT (Plasmodiophora Brassicae). A single specimen seen in a private garden at White Rock, B.C. (H.N.W. Toms). A small planting on low ground in Welland Co., Ont., showed severe clubbing; infection took place in the seedling flats (J.K. Richardson). See also under cabbage.

WIRE STEM (Rhizoctonia Solani). Two growers at Leamington, Ont., lost 20% of their plants after the first transplanting. The disease continued to destroy plants, but at a reduced rate, until they were set in the field. Most growers lost some plants from wire stem (C.D. McKeen).

BLACK ROT (Xanthomonas campestris) caused slight damage in commercial fields about Winnipeg, Man. (W.A.F. Hagborg). The disease again occurred in Lincoln Co., Ont., to a slight extent in 1948 after a severe outbreak in 1947 (J.K. Richardson).

WHIPTAIL (physiological). Three plantings were severely affected in Queens Co., N.B. (S.F. Clarkson).

CELERY

EARLY BLIGHT (Cercospora Apii) severely infected 3 plantings of ½ to 2 acres in extent in the Leamington area, Ont. Spraying was begun after much damage had been caused already to the foliage and stems (C.D. McKeen). Damage was less severe than in most years in Lincoln Co., except that several outbreaks occurred in crops under irrigation (J.K. Richardson). Two fields were heavily infected at St. Martin, Que.; loss was at least 30% (E. Lavallee).

SOFT ROT (Erwinia carotovora) severely affected 65% of the heads in a stored crop in Queens Co., P.E.I. (R.R. Hurst).

LATE BLIGHT (Septoria Apii-graveolentis). A heavy infection was observed on leaves and stalks in one 10 acre field at Cloverdale, B.C. (I.C. MacSwan); a sparse infection occurred in the vegetable plots at the University, Point Grey (H.N.W. Toms); the disease was quite general in the Armstrong district (G.E. Woolliams). The disease was found in a few plantings in the Leamington area, Ont., but frequent sprayings kept it under control; damage was slight (C.D. McKeen). One grower with a large acreage under irrigation had difficulty in keeping late blight under control in Lincoln Co. (J.K. Richardson). Found in about 10 fields in the Montreal district, Que.; 30-80% of the plants were affected and the loss was heavy in a few cases (E. Lavallee).

STEM CRACKING (boron deficiency). The entire crop was lost from heart rot and stem cracking on a farm in Russell Co., Ont. The plants were set out on soil with underlying limestone (H.N. Racicot).

CUCUMBER

LEAF SPOT (Alternaria sp.) infection was severe in a garden at Rosedale, B.C. (W. Jones). The Alternaria sp. is distinct from A. cucumerina on melon; it approaches A. tenuis but some spores are larger than those typical of the species. This leaf spot was severe on cucumbers about Maugerville, N.B., in 1946. According to the collector, S.F. Clarkson, the disease can be very destructive, actually killing the plant (I.L. Conners, D.B.O. Savile).

EGG-PLANT

WILT (Verticillium ?Dahliae) was found in several plantings in Essex Co., Ont., and affected up to 20% of the plants; moderate damage resulted (C.D. McKeen).

HOPS

DOWNY MILDEW (Pseudoperonospora Humuli) was prevalent in one commercial yard at Kamloops, B.C. Hitherto the district has been free of the disease but heavy rainfall favoured its development. At Sardis mildew was found attacking the cones of the Fuggles variety, which has proved in other seasons highly resistant. The disease caused considerable damage to the susceptible varieties Clusters and Golding in Fraser Valley yards (W. Jones).

LETTUCE

GREY MOULD (Botrytis cinerea) was widespread on the outer leaves of plants nearing maturity in the plots, University, Point Grey, B.C. (H.N.W. Toms).

DOWNY MILDEW (Bremia Lactucae). A moderate infection was present in a 10-acre field at Cloverdale, B.C.; both grey mould and downy mildew occurred on the lower leaves near the surface of the ground (I.C. MacSwan). Infection was heavy on 2" seedlings in a garden at Victoria during an unusually wet and cool summer (H.T. Gussow, D.B.O. Savile). Light infection on lower leaves of lettuce seed crop at Grand Forks (G.E. Woolliams).

RUST (Puccinia patruelis). A trace occurred on lettuce in a garden at Kapuskasing, Ont. (M.R. Wiancko, D.B.O. Savile).

DROP (Sclerotinia sclerotiorum) killed 16% of the plants in a garden at Cowichan, B.C. (W. Jones).

YELLOWS (Callistephus virus 1) affected 2% of the plants in a field in Sunbury Co., N.B. (D.J. MacLeod).

FERTILIZER INJURY (excess fertilizer) reduced the yield of lettuce being grown in a greenhouse near Ottawa, Ont. The fertilizer, 4-8-10, had been applied and worked into the soil. Plants were spindly and lighter green than normal with some leaves slightly twisted. The stems were much thickened and the fibrous roots were gnarled, thick and short (H.N. Racicot).

LEAF SPOT (unknown bacterium) was present on the lower leaves of all plants in a small seed planting at Grand Forks, B.C. (G.E. Woolliams).

TIP BURN (physiological) caused moderate damage to 2 fall crops of greenhouse lettuce at Leamington, Ont. (C.D. McKeen).

MELON

LEAF SPOT (Alternaria cucumerina). A light infection was observed in 2 fields at Leamington, Ont. (C.D. McKeen).

SCAB (Cladosporium cucumerinum) infection was variable and caused up to 30% loss in some fields in Essex Co., Ont. Most plants were affected in one 8-acre field at Leamington, Ont. The lesions were numerous and coalescing on the petioles and the ends of the vines in another 8-acre field at Kingsville; much of the terminal growth was dead before many fruits set (C.D. McKeen). A 90% infection in Carleton Co., caused the loss of half the crop (L.T. Richardson).

POWDERY MILDEW (Erysiphe Cichoracearum). As in 1947, the disease was again epidemic in the muskmelon areas in southern Essex Co., Ont.; extensive defoliation occurred in several fields shortly after harvesting began; losses varied from a trace to 50% (C.D. McKeen).

FUSARIUM WILT (F. bulbigenum var. niveum) was present in many melon fields in southern Essex Co., Ont. It was particularly severe in 7 fields where its existence was unknown previously. Losses were estimated to vary from 14 to 75% and averaged 42%. The variety Iroquois proved to be completely resistant when grown in heavily infected soil (C.D. McKeen).

MOSAIC (virus). All plantings were affected by mosaic in southern Essex Co., Ont. and in some 75% of the plants were infected with loss in yield up to 40% of the crop. Aphid population was high early in the season (C.D. McKeen).

ONION

BLIGHT (Botrytis Allii). Infection of seed heads and the scapes just below the heads caused much of the seed to be light, shrivelled and low in germination about Grand Forks and Vernon, B.C. (G.E. Woolliams).

NECK ROT (Botrytis Allii). Infected specimens were received from Vermilion, Alta. (A.W. Henry). In one 8-acre field of Spanish onions in Essex Co., Ont. 40% of the transplants were attacked and killed. The fungus penetrated the neck of the young plants about ½ inch below the soil line. Wet weather and low temperatures in late May probably favoured the organism; plant growth was slow (C.D. McKeen).

WILT (Fusarium sp.) affected 1% of the plants in a garden at Victoria, B.C. (W. Jones).

BULB ROT (Fusarium sp.). Infection was moderate in a planting at Ste. Anne de la Pocatiere, Que.; loss was about 25% (R.O. Lachance).

DOWNY MILDEW (Peronospora destructor) appeared in epidemic form on all varieties grown commercially in the Okanagan Valley and the Grand Forks district, B.C., where it caused severe injury to both the seed and bulb crops. Cool damp weather with frequent rain was probably ideal for the development and spread of the disease (G.E. Woolliams). The disease

was also severe on both a seed and a bulb crop at the Station, Saanichton (W. Jones). Not only was the season very wet, but adequate protection measures are lacking (W.R. Foster). Affected specimens were received from King, Bowanville, Gads Hill Station, Arden, Napanee, Toronto and Islington, Ont. (J.D. MacLachlan).

BLACK LEAF SPOT (Pleospora herbarum (Stemphylium botryosum) was common on scapes of seed plants affected by downy mildew at the Station, Saanichton, B.C. (W. Jones).

PINK ROT (Pyrenochaeta terrestris (Hansen) Gorenz, Walker & Larson = Phoma terrestris Hanson). Affected specimens were found in several fields in the Lamington marsh, Ont. (C.D. McKeen). In a recent paper by A.M. Gorenz, J.C. Walker and R.H. Larson (Phytopathology 28:831-840. 1948, the pathogen is transferred to Pyrenochaeta (p.838).

SMUT (Urocystis Cepulae) is commonly found on one farm at St. Laurent, Que. (E. Lavallee).

YELLOW DWARF (virus). A trace was found in one seed crop of Ebenezer at Grand Forks, B.C. (G.E. Woolliams).

PARSLEY

LEAF SPOT (Septoria Petroselini). A light infection was observed on the lower leaves of a seed crop of Champion Moss Curled near Vancouver, B.C. (H.N.W. Toms).

PARSNIP

LEAF SPOT (Ramularia Pastinacae). Infection was a trace in a small garden planting at Kentville, N.S. (D. Creelman).

YELLOWS (Callistephus virus 1). A few plants were moderately affected in a field at Taber, Alta. (M.W. Cormack).

PEA

ROOT ROT (Aphanomyces euteiches Drechsler). On 9 July, a survey of some 500 acres of late maturing canning peas was made in Essex Co., Ont. About 95% of the acreage was so severely damaged by root rot that the crops were not harvested. It appeared that late seeding and high soil moisture followed by relatively high temperatures prior to blossoming favoured root rot development (C.D. McKeen, A.A. Hildebrand). This disease was fully described by F.R. Jones and Chas. Drechsler (J. Agr. Res. 30:293-325. 1925). At that time they considered this disease caused by A. euteiches the most important of the several root rot diseases described in the United States. It causes a rapid rotting of the cortex of the main root and epicotyl. This pathogen has not previously been recognized in Canada (I.L. Conners).

LEAF and POD SPOT (Ascochyta Pisi). Infection was moderate mostly on the leaves of seed crops of Stratagem and Giant Stride at the Station, Saanichton, B.C.; (W. Jones). Infection was light on the leaves in the well drained plots, University, Point Grey, and general in a sheltered private garden at Chilliwack (H.N.W. Toms). Infection was slight on some of the variety increase plots in the Armstrong district; the lower leaves were infected on scattered plants in a field of Lincoln at Taffin (G.E. Woolliams).

Most of the fields inspected in Alta. were crops grown for seed. They were sown with seed tested at the Edmonton laboratory and found to be practically free of disease. Two inspections were made in the Lethbridge and Brooks districts, one when the plants were in early flower to early pod stage and another at the full pod to ripe stage. Rainfall had been considerably above normal up to mid-July, but the rest of the season was exceptionally dry, with no further spread of disease.

Peas in the Beaverlodge district were exceptionally clean. In the Lacombe and Edmonton areas infection was slight with no severe damage reported. The results of the inspection are summarized in Table 3.

Table 3. Pea Diseases in Alberta in 1948

District	Fields		Fields Infected by							
	Examined	Diseased	Pseudomonas Pisi		Ascochyta Pisi		S. Pisi	Peronospora Pisi	Erysiphe Polygoni	
			(1)	(2)	(1)	(2)	(1)	(1)	(1)	(2)
Lethbridge	10	10	9	1	8	0	0	7	3	0
Brooks	26	26	25	0	13	0	0	2	14	0
Lacombe	4	4	4	0	3	1	1	0	0	0
Edmonton	4	4	3	0	4	0	1	0	2	1
Beaverlodge	5	3	0	0	2	0	0	0	0	0
All Alberta	49	47	31	1	30	1	2	9	19	1

(1) Infection trace to slight. (2) Infection moderate to severe.

In the general survey in Alta. leaf and pod spot infection was a trace at Beaverlodge, Dawson Creek and Edmonton, moderate at Lacombe and moderate to severe at Lethbridge (S.G. Fushtey). A moderate infection by A. Pisi and A. pinodes was present in most fields in the Nipawin-Aylsham area, Sask.; one isolated field on new breaking was free from Ascochyta (H.W.M.). In a survey of 17 fields of field peas and 19 of garden peas in Man. 35 were infected by Ascochyta. Isolations were made from samples from 28 fields as follows: One collection each of field and garden peas yielded A. Pisi; 14 of field peas and 12 of garden peas yielded A. pinodes (W.A.F. Hagborg, E. Robertson). Leaf and pod infections were reported to be general on canning peas at Otterville, Ont.; specimens sent for examination (G.C. Chamberlain). All the late fields of canning peas were heavily infected in Essex Co. (C.D. McKeen). A trace only was observed in Queens Co., P.E.I. (R.R. Hurst).

POWDERY MILDEW (Erysiphe Polygoni). A slight infection was recorded on the foliage and pods of a seed crop at Saanichton, B.C.; the disease is uncommon in the coastal areas (W. Jones). Infection was slight to moderate in fields at Lethbridge and slight to severe at Edmonton, Alta. (S.G. Fushtey). Infection ranged from 20-80% and the damage from moderate to heavy in about 30 fields visited in South Gaspé Co., Que.; most fields were more or less severely infected (E. Lavallee). Infection was trace to heavy in Queens Co., P.E.I. (R.R. Hurst).

ROOT ROT (Fusarium spp.). Damage was slight in one garden at Saskatoon, Sask., and severe in gardens and experimental plots at Scott (H.W.M.). Isolations made from the base of plants of 2 varieties yielded F. oxysporum and those from a plant of Dashaway yielded F. Solani. As Mycosphaerella blight was prevalent in the same fields in Man., infection by Fusarium may have been secondary. No wilting was observed (W.A.F. Hagborg, W.L. Gordon).

Many specimens affected by Fusarium root rot were received from various parts of Ont. (J.D. MacLachlan). Infection was a trace to slight in a field of Arthur at Ste. Anne de la Pocatiere, Que. (R.O. Lachance).

WILT (Fusarium sp.). Damage was considerable in several gardens at Chemainus, B.C. (W. Jones).

MYCOSPHAERELLA BLIGHT (M. pinodes (Ascochyta pinodes) caused moderate to severe damage in the chief pea growing areas of Man. By mid-July infection was widespread although slight, but by 5 Aug. the disease was present on every plant in most fields and was causing premature ripening and blighting. Yield appeared to be markedly reduced. Of 36 fields examined under the Health Approval scheme, one or more of the designated diseases were present in every field. The results of isolations from affected material are reported above under Leaf & Pod Spot (W.A.F. Hagborg, E. Robertson).

DOWNY MILDEW (Peronospora Pisi). A few plants of Stratagem were severely affected at Sidney, B.C. (W. Jones). Infection trace to slight in 9 out of 36 fields examined in Alta. (see Table 3) (S.G. Fushtey). Found in a field of Lincoln peas at Birds Hill, Man. (W.A.F. Hagborg, E. Robertson).

LEAF SPOT (Pleospora herbarum (Stemphylium botryosum). Slight infection on Gradus at Cobble Hill, B.C.; sometimes associated with downy mildew infection (W. Jones).

BACTERIAL BLIGHT (Pseudomonas pisi). Infection was a trace in fields at Beaverlodge and Lacombe, Alta., trace to moderate at Edmonton and slight to moderate at Lethbridge (S.G. Fushtey). Infection was general but light in the Nipawin-Aylsham area, Sask. (H.W.M.). Bacterial blight was found in 12 of 17 fields of field peas and 4 of 19 fields of garden peas in Man. The disease failed to spread during the latter part of the season and only slight damage occurred. This mild attack was in contrast to 1946, when the disease continued to spread rapidly during the growing season and cause severe damage in some fields. Severe damage to canning peas was caused by bacterial blight in Prince Edward Co., Ont., according to information received from A.N.L. Butler, Vineland Station. In several instances the crop was abandoned (W.A.F. Hagborg).

LEAF SPOT (Septoria flagellifera) moderately affected garden peas at the Station, Melfort, Sask. (H.W.M.).

LEAF SPOT (Septoria Pisi) was recorded in 2 fields in Alta. (S.G. Fushtey). Infection was moderate in a garden at Saskatoon, Sask. (E.J. Hawn). Infection was severe in garden peas at Whitemouth, Man., and a trace at Birds Hill (W.A.F. Hagborg). Infection was about 5% in most plots of garden peas, at C.E.F., Ottawa, Ont. (V.R. Wallen).

RUST (Uromyces Fabae) was fairly general on Giant Stride, Lincoln and Stratagem at the Station, Saanichton, B.C., and infection was slight on 2 seed crops in the Saanich district (W. Jones). Infection was a trace to moderate on peas in Queens Co., P.E.I. (R.R. Hurst).

MOSAIC (virus) affected 5% of the plants in one seed crop at Saanichton, B.C. (W. Jones). A trace of mosaic (Pisum virus 1) was found in 2 gardens in Fredericton, N.B. (D.J. MacLeod).

MARSH SPOT (manganese deficiency). In a sample of pea seed received through Plant Products Division, Production Service, from Kinistine, Sask., about 12% of the seeds were characterized by internal necrosis typical of marsh spot. Of 200 seeds placed in moist sand and sawdust to germinate 169 produced normal and 20 abnormal seedlings; 8% of the normal and 45% of the abnormal had cotyledons which were necrotic at the centre (W.A.F. Hagborg, G. Warner, N.A. Phillips).

PEPPER

GREY MOULD (Botrytis cinerea). In the outdoor beds of a grower at Harrow, Ont., 6% of the pepper transplants were attacked in the region of the growing point. Attacked plants were rapidly killed and the fungus fruited abundantly on the dying tissues. Plants similarly attacked were received from other districts in southern Ont. (C.D. McKeen).

SOFT ROT (Erwinia carotovora). A few fruits were found infected in all plantings in Essex Co., Ont., in September. As in 1947, infected fruit had been attacked by corn borer larvae (C.D. McKeen).

LATE BLIGHT (Phytophthora infestans) affected about 50% of the fruits in the test plots, University, Point Grey, B.C. (H.N.W. Toms).

DAMPING OFF (Pythium sp. and Rhizoctinia Solani) was found in several greenhouses in the Huron district, Ont., but the loss of seedlings did not exceed 4% in any house. These small losses are in marked contrast with the heavy losses in previous years. The control of the disease in 1948 was obtained by treating the soil with Arasan prior to seeding (C.D. McKeen).

WILT (Verticillium Dahliae) was found on a few plants at the Station, Summerland, B.C. (G.E. Woolliams).

STUNT (virus). Less than 1% of the plants were affected in an 8-acre field in Essex Co., Ont. Affected plants showed a mild chlorosis with considerable dwarfing and rosetting (C.D. McKeen).

BLOSSOM-END ROT (non-parasitic). About 2% of the fruits in all pepper plantings were affected in Essex Co., Ont. (C.D. McKeen).

STUNTING (excess fertilizer). Severe stunting affected several hundred plants of a grower in Lincoln Co., Ont., early in the season. The trouble was diagnosed by soil analysis. After several good rains the condition was corrected and a good, rather late crop was produced (J.K. Richardson).

POTATO

The Plant Protection Division, Science Service, supplied the data included in Tables 4 to 7 on Seed Potato Certification. All fields of potatoes entered for certification are planted with Foundation or Foundation A seed.

The potato seed crop grown in 1948 was the largest ever produced. Not only the yields but the acreage planted were high. The percentage of crop passing inspection was, however, the second lowest passing inspection in the past five years. A large part of this decrease resulted from a further increase in the rejections due to mosaic, which has been very low since fields for certification have been planted with Foundation or Foundation A seed. This increase was especially noticeable in P.E.I. Rejections for ring rot continue to be high in Que. and are relatively high in Man. For years Irish Cobbler and Green Mountain have been the leading varieties, but Katahdin has been increasing in popularity until the certified acreage of Katahdin was more than that of either of these two varieties in 1947 and nearly equalled their combined acreage in 1948.

EARLY BLIGHT (*Alternaria Solani*) was prevalent in the B.C. Interior owing to the excessively wet season; ordinarily it is not seen there (G.E. Woolliams). It was found in 31.8% of the 932 fields inspected in B.C., nearly a 3-fold increase over last year; infection was 246-sl. 42-mod. and 8-sev. (H.S. MacLeod). Infection was tr.-sl. in commercial plantings at Edmonton and severe at the Station, Lacombe, Alta. (T.R. Davidson, J.W. Marritt). Early blight was fairly general in Sask., but infection varied greatly; tubers affected by Alternaria rot were received from Lumsden and Weyburn (A. Charlebois). Foliage damage was sl.-mod. at four places in Man., mostly in early varieties. Traces occurred through northwestern Ont., but infection was considerable in the Thunder Bay District (D.J. Petty). Traces occurred in southwestern Ont. (F.J. Hudson); little or no damage occurred in Inspection District 2 (W.L.S. Kemp); it was less prevalent in District 3 than in 1947 although it was reported in several fields (H.W. Whiteside).

Of 913 fields inspected in Que., infection was 306-tr. 55-sl. and 5-sev.; no tuber rot was seen (B. Baribeau). Very light infections were noticed in a few fields of early varieties in N.B.; no tuber rot was seen (C.H. Godwin). Early blight was first reported in N.S. on Irish Cobbler on 9 Aug. in the Valley, Kings Co., and infection was later severe in one field

of Warba and one of Early Rose. Infection was moderate in Antigonish Co., but it was only a trace in Colchester and Cumberland Counties; no rot was seen (R.C. Layton). A few leaves of plants on a cull pile were affected at Pereaux on 20 July (K.A. Harrison). Infection was negligible in P.E.I. (S.G. Peppin).

Table 4. Seed Potato Certification: Number of Fields and Acres Inspected, 1948

Province	Number of Fields		Fields Passed %	Number of Acres		Acres Passed %
	Entered	Passed		Entered	Passed	
P.E.I.	9,142	7,020	76.8	38,743	29,384	75.8
N.S.	642	530	82.6	1,376	1,085	78.9
N.B.	2,761	2,602	94.2	20,748	19,472	93.9
Que.	913	593	65.0	2,560	1,578	61.6
Ont.	850	658	77.4	2,536	2,032	80.1
Man.	151	90	59.6	573	373	65.1
Sask.	74	66	89.2	122	96	78.7
Alta.	170	142	83.5	781	534	68.4
B.C.	932	803	86.2	3,122	2,838	90.9
Total	15,635	12,504	80.0	70,561	57,392	81.3

Previous Yearly Totals

1947	14,616	12,605	86.2	60,385	53,474	88.5
1946	14,198	11,628	81.9	66,665	55,256	82.8
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

Acres Entered

1947	60,385
1948	70,561

Increase of 10,176 or 16.9%

Acres Passed

1947	53,474
1948	57,392

Increase of 3918 or 7.3%

Table 5. Seed Potato Certification: Acreage Passed by Varieties, 1948

Variety	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.-Alta.	B.C.	Total
Katahdin	4,503	558	15,307	9	1,456	35	36	21,904
Irish Cobbler	10,411	201	550	194	172	171	2	11,701
Green Mountain	7,859	105	2,001	1,366	52	22	172	11,577
Sebago	6,383	102	414		39	2		6,940
Netted Gem	2		9		3	558	1,574	2,146
Bliss Triumph	6	64	928			8	3	1,009
White Rose			11			4	681	696
Chippewa	37	2			253	9	17	318
Warba	8	25	4		8	38	163	246
Pontiac	21		163			16		200
Sequoia	153	15						168
Columbia Russet						54	62	116
Canus					3	17		20
Others	1	13	85	9	46	69	128	351
TOTAL	29,384	1,085	19,472	1,578	2,032	1,003	2,838	57,392

Table 6. Seed Potato Certification: Fields Rejected on Field Inspection, 1948

Province	Leaf Roll	Mosaic	Ring Rot in field	Ring Rot on farm	Black Leg	Adjacent Diseased Fields	Foreign Varieties	Misc.	Total
P.E.I.	156	1122			225	222	202	195	2122
N.S.	13	13	13	23	5	35	5	5	112
N.B.	5	46	41	12	13	5	35	2	159
Que.	12	29	174	52	27	14	6	6	320
Ont.	101	4	18	5	5	8	11	40	192
Man.	2	8	8	31	2	1		9	61
Sask.			1		5			2	8
Alta.			2	1	17	3		5	28
B.C.	22	6			24	14	9	54	129
TOTAL	311	1228	257	124	323	302	268	318	3131
Rejections as a percentage of fields:									
Entered	2.0	7.9	1.6	0.8	2.1	1.9	1.7	2.0	20.0%
Rejected	9.9	39.2	8.2	4.0	10.3	9.6	8.6	10.2	100%

Table 7. Seed Potato Certification: Average Percentages of Diseases found in Fields, 1948

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	.27	.05	.06	.18	.03	.10	.32	.48	.10
Leaf Roll	.28	.24	.18	.08	.11	.30	.04	.05	.13
Mosaic	.73	.19	.10	.19	.02	.55	.14	.01	.05
Fields passed: (final inspection)									
Black Leg	.09	.02	.04	.07	.02	.05	.03	.09	.04
Leaf Roll	.09	.12	.17	.07	.07	.03	.01	.01	.05
Mosaic	.09	.10	.04	.08	.01	.03	.03	.01	.01

BLACK DOT (Colletotrichum atramentarium). A light infection was observed in a field of Green Mountain at Ste. Anne de la Pocatiere, Que.; a small percentage of plants were killed before the others reached maturity (A. Payette). Several plants were dead or dying on a cull pile at Pereaux, N.S. (K.A. Harrison).

BACTERIAL RING ROT (Corynebacterium sepedonicum) was not found in any crop inspected for seed certification in B.C. In field inspections at digging time, covering about 600 acres, a trace of the disease was found in tablestock on two farms in the Lower Fraser Valley. It was also found in 3 back-yard gardens. The potatoes used were uncertified and were imported into B.C. (H.S. MacLeod, W.R. Foster, I.C. MacSwan). Ring rot was found in 23 of the 33 cars shipped into B.C. from Man., some of which were badly affected. On the other hand only a trace was found in 6 out of 177 cars received from Alta. Most of the inspections are made by the Dominion Inspectors, Fruit and Vegetable Division, and suspected ring-rot specimens have to be confirmed by a microscopic examination by a pathologist. Under present regulations carloads found affected must be disposed of in special markets or returned to the province or country of origin. Potatoes are now virtually free from bacterial ring rot in B.C. and the aim is to keep them free (W.R. Foster).

A very thorough survey for bacterial ring rot was possible in Alta. in 1948 on account of the open fall. The disease was found in a few more fields in the Lethbridge and Edmonton areas but there has been a decrease about Brooks and Calgary. Of the 1,394 farms (8,339 acres) surveyed, in 1948 ring rot was found on 93 (529 acres) or 6.7% of the fields, compared with 6.6% in 1947. Incidence of the disease was usually very low, being a trace to 0.5%. Factors that tended to increase its incidence were the use of poor seed because of the unusual high price of good stock this spring and potato growing was taken up by several new growers. An increasing number of farmers cooperate in disposing promptly of their infected stocks. When a grower fails to do so by a date set by the Field Crops Branch,

Alberta Department of Agriculture, such stocks are disposed of under the authority of the Agricultural Pests Act. It is felt that the extension programme should be increased and the regulations rigidly enforced if the disease is ever to be eliminated. Among the specimens sent to the Department for examination bacterial ring rot was detected in 1948 in tubers from two points outside the areas mentioned above. Such cases are regularly followed up to prevent further spread. The assistance of Dr. G.B. Sanford and Dr. L.E. Tyner is acknowledged (W. Lobay). Bacterial ring rot was found in 3 fields entered for certification in Alta.; two were planted with imported seed (J.W. Marritt). Ring rot was found in one field entered for certification in Sask.; slight to severe infections were seen in table stock fields at Estevan, Lumsden, Wilkie, Battleford, Saskatoon, Wynyard, Norquay, and Calder (A. Charlebois). A trace was found in 5 fields entered for certification in Man. (D.J. Petty). Bacterial ring rot was found in Man. in tubers of Irish Cobbler table stock submitted by the Dominion inspectors. These specimens were from 41 carload lots intended for shipment to B.C. About 31 carloads were diverted to special consumers on arrival in B.C. because of the presence of ring rot. It appears that the provincial legislation has not been enforced (W.A.F. Hagborg).

Bacterial ring rot was not found in southwestern Ont. (F.J. Hudson). The disease was found in only 5 fields entered for certification and in other fields on the farm in 6 cases in District No. 2 (W.L.S. Komp). Ring rot was found in 9 fields for certification in District No. 3, and infection was rather heavy in one in the Walford section where the disease has not previously been detected. No ring rot was found for the second year in Morgan Township in the Sudbury district where a clean up campaign was carried out in 1946. We believe that such programmes are effective in the control of the disease (H.W. Whiteside). Ring rot was found on 5 farms of seed growers in eastern Ont. (O.W. Lachaine).

In the 6th annual survey of table stock potatoes conducted by the Ontario Department of Agriculture, bacterial ring rot was found on 250 farms (about 8 % of the farms inspected); about 1200 acres of crop were affected. The percentage infection was very low in most cases. The amount of disease was less than in 1947 when 1900 acres on 351 farms were affected. Of the 250 farms where ring rot was observed in 1948, the disease was found on 39 in 1947 and on 49 in 1946 or earlier; it was found for the first time on the remaining 162 farms. Thus, 89% of the farms on which ring rot was detected in 1947 were apparently free of disease in 1948. The greatest reduction in the incidence of disease was in the Sudbury District where the number of farms affected fell from 128 in 1947 to 21 in 1948 (L.T. Richardson).

Bacterial ring rot was more prevalent in fields entered for certification this year in Que. than in 1947. Of the 913 fields inspected 174 fields or 19% were rejected on account ring rot in 1948 compared with 110 fields or 12% in 1947. The prevalence of the disease may be attributed mainly to the use of custom machinery or other contaminated equipment. Infection varies from a trace to 1%.

From examination of a large number of fields of table stock in many counties in Que. it appeared that bacterial ring rot would probably cause more loss to table stock growers than all other potato diseases combined. In Matane and Rimouski Counties where a large number of fields were visited 104 fields planted with uncertified seed of Irish Cobbler, Green Mountain, Warba, Sebago, Katahdin, Spaulding Rose and mixed varieties

were affected, infection ranging from 16 to 60% and in a great many of the affected hills there were no marketable tubers. Only 17 of these fields were visited at harvest time, but it is estimated that 10-16% of the tubers were left in the field because of rot. These figures only represent certain districts where the disease is prevalent whereas the average loss for the province is much lower (B. Baribeau).

Bacterial ring rot was found in 41 fields entered for certification and in other fields on 12 farms in N.B. Infection was very low this year, the highest being 1.4% (C.H. Godwin). A survey was again conducted for bacterial ring rot in N.S. by Dominion inspectors, Fruit and Vegetable Division, and men of the N.S. Department of Agriculture. Inspection was completed of the commercial producing area in Kings Co., the more important areas in Hants, Cumberland, Colchester and Pictou Counties, and all fields where ring rot had been reported in the past two years. Out of 1602 fields (1673 acres) inspected ring rot was found in 16 fields (42.5 acres). Four of the affected fields were planted with table stock and 12 with certified seed. One of the table stock fields was apparently a repeat from 1946 due to an incomplete clean-up. Nine fields were planted with certified seed from the same source; the seed for the other 3 fields apparently was clean but had become contaminated from second hand bags or barrels. In 10 of these 12 fields ring rot was found only during third inspection. All potatoes from affected farms are marketed where it is believed they will be consumed immediately (R.C. Layton). No bacterial ring rot was found in fields entered for certification in P.E.I. (S.G. Peppin).

POTATO ROT NEMATODE (Ditylenchus destructor). The present status of this pest in P.E.I. is discussed in an introductory section, Notes on Some Plant-Parasitic Nematodes, by Dr. A.D. Baker.

BLACK LEG (Erwinia phytophthora) was found in 188 (20%) of the fields inspected in B.C., but it was much more severe in the affected fields in 1948 than in recent years and caused the rejection of 24 fields. Factors believed to have favoured the disease were high soil moisture and unfavourable growing conditions in the early part of the season -- many fields were flooded after the crop was planted (H.S. MacLeod). Black leg was found in crops of both seed and table stock planted with Warba, Epicure, Great Scott and Katahdin at Ladysmith, Keating and Sidney, B.C.; damage was severe in some fields (W. Jones). Black leg was found in 73 (43%) of the fields entered for certification in Alta. and caused the rejection of 17. The disease was twice as prevalent as last year; soil moisture was excessive in spring and early summer. Black leg was severe in fields of Irish Cobbler grown for the early market about Lethbridge (J.W. Marritt). Infection was a trace to severe in commercial plantings about Edmonton (T.B.D.).

Black leg was found in 22% of the fields inspected in Sask. and caused the rejection of 5 fields. The marked increase in prevalence in 1948 may possibly have been due to the soils of affected fields being too wet at planting time; late spring and early summer were dry and unusually hot (A. Charlebois). Although few cases of black leg were reported in Sask., two or three cases were observed where 10-30% of the plants were killed (H.W.M.).

Diseased plants were received from Brandon, Man. (W.A.F. Hagborg). Black leg affected 30% of the fields inspected in Man., infection ranging from a trace to 0.3%, and one field was rejected. In northwestern Ont., 20% of the fields were affected, infection ranging from a trace to 0.75% (D.J. Petty). Black leg was found in only 2 fields inspected in southwestern Ont. (F.J. Hudson) and in 6 fields in the Leamington area, where a few plants were affected (C.D. McKeen). In District 2, only 2 fields were rejected on account of black leg in 1948 (W.L.S. Kemp). Black leg was not prevalent in District 3. Only 3 fields were rejected, but the seed had not been treated before planting. The disease was confined to Irish Cobbler in the Dufferin area, where it was prevalent in the early years of seed production but was gradually eradicated by seed treatment (H.W. Whiteside). Black leg was found in 4 out of 53 fields inspected in eastern Ont. (O.W. Lachaine). Black leg caused the rejection of 27 fields out of 913 inspected in Que. Of these fields, 19 were in the Chicoutimi and Lake St. John districts where the weather had been cool and wet early in the season; moreover, a survey revealed that the disease was mostly confined to farms where the cut seed was left in bags for 5-7 days before planting. One grower of certified seed planted 25 acres in 3 fields, two of which were planted with freshly-cut seed, whereas the seed for the third field was cut and left unplanted in bags for a week; black leg was absent from the first two fields but was affecting 4% of the plants in the third at the time of inspection (B. Baribeau). The incidence of black leg seems to be on the increase in recent years in N.B. Sebago and Katahdin appeared to be most infected, with fields showing up to 10% of the plants affected. Late infections are common in Katahdin. Some fields of table stock about Grand Lake showed up to 30% infection in Warba. The disease caused the rejection of 13 fields (J.L. Howatt, C.H. Godwin). Black leg was found in 56 fields of the 642 inspected in N.S. and caused the rejection of 5 fields all of Sebago. Infection ranged up to 4.2%. Very high infections were reported in fields of Sebago in Pictou Co. (R.C. Layton). Black leg was more prevalent than usual in P.E.I. and caused the rejection of 225 fields. Sebago seems to be very susceptible wherever it is grown (S.G. Peppin).

WILT (Fusarium oxysporum) was found in only 56 (6%) of the fields inspected in B.C. and caused 3 to be rejected; the disease was much less prevalent than last year (H.S. MacLeod). In contrast with other years infection was very low in Sask. (A. Charlebois). Wilt was found in 12% of the fields inspected in Man. In the Winnipeg area 1% of the plants were affected in one field and 10-20% in 5 other fields causing their rejection. It is believed that soil infection was responsible for the high incidence of wilt in the area (D.J. Petty). Wilt was more prevalent in the London area, Ont., than in 1947 (F.J. Hudson). Very little wilt occurred in District 2; one field was rejected (W.L.S. Kemp). Wilt was observed in fields throughout District 3 and one field was rejected. Wilt seemed on the increase in an excellent strain of Irish Cobbler planted about Charlton; no fields were rejected on field inspection but up to 25% of the tubers showed stem-end browning on bin inspection (H.W. Whiteside). Three fields were rejected on account of wilt in eastern Ont. (O.W. Lachaine). Wilt was quite common on first inspection in N.B., especially in imported stock, although no field was severely affected (C.H. Godwin).

WILT (Fusarium and Verticillium). Wilt was found in 14 (8%) of the fields inspected in Alta.; the fields were mostly under irrigation in southern Alta. (J.W. Marritt).

DRY ROT (Fusarium spp.). Some 5% of the table stock inspected in the Edmonton district, Alta. in the fall of 1948 showed some dry rot (J.W. Marritt). Fully 75% of the storage rot observed in reinspected carloads of Maritime stock appeared to be caused by Fusaria (W.L.S. Kemp). Dry rot was more prevalent in District 3 than in 1947; due to the fact that the crop is dug in this district while it is still immature, it suffers from bruising, but the lesions are usually superficial (H.W. Whiteside). Growers, who imported Irish Cobbler seed potatoes from the Maritime provinces for planting in Essex Co., Ont., brought tubers affected by dry rot to the laboratory; up to 1% of the tubers were affected in varying degrees (C.D. McKeen). Storage rot (F. sambucinum f. 6.) was quite severe in many potato lots harvested in 1947 in P.E.I. Losses in Green Mountain and Sebago were 5-10% of the crop with smaller losses in other varieties. Individual losses varied from a trace to 40% (G.W. Ayers). Dry rot affected 50% of the seed pieces in a field in Prince Co. (W.A. Hodgson). Storage rot was far less prevalent in P.E.I. this year than in the past 2 years; average loss in all varieties was about 1% (S.G. Peppin).

SKIN SPOT (Oospora pustulans). A few affected tubers were seen on two occasions in Queens Co., P.E.I. (R.R. Hurst).

RHIZOCTONIA (Pellicularia filamentosa (R. Solani) was found in 802 (86.5%) of the fields inspected in B.C., the infection being 611-sl. 194-mod. and 42-sev., and caused 2 fields to be rejected. Tubers were in general slightly to moderately infected (H.S. MacLeod). A moderate infection occurred in 14 (8%) of the fields inspected in Alta.; little or no disease occurred in the others. Sclerotial development was slight to moderate on late harvested crops and those injured by an early severe frost (J.W. Marritt). Rhizoctonia appeared to have caused little damage in Sask. (A. Charlebois), Man., or northwestern Ont. (D.J. Petty). A slight development of sclerotia occurred on tubers where the disease was present in southwestern Ont. (F.J. Hudson). Sclerotia developed on about one quarter of the crops in District 2; infection varied from 1-2% to 10-20% (W.L.S. Kemp). Rhizoctonia was less prevalent in District 3 than in 1947 and only crops harvested long after the vines were dead showed any appreciable development of sclerotia on the tubers (H.W. Whiteside). Rhizoctonia was found on a few tubers at bin inspection in eastern Ont. (O.W. Lachaine). Infection was 150-sl. 4-mod./913 fields inspected in Que. On bin inspection the average infection of the tuber was slightly above 1% and ranged up to 15% (B. Baribeau). Rhizoctonia was severe on Chippewa, Houma and McIntyre Blue in a planting at Deschambault (H. Genereux). Little rhizoctonia was seen in the growing crop in N.B.; tubers also showed few sclerotia (C.H. Godwin). Infection in the field was never more than slight in N.S.; on the tubers it varied from 1 to 20% in 68 out of 175 bins so far inspected (L.C. Layton). Infection was negligible in P.E.I. (S.G. Peppin).

PHOMA ROT (P. tuberosa). A single affected tuber was seen on a local market, Queens Co., P.E.I. (R.R. Hurst).

STEM-END HARD ROT (Phomopsis tuberivora) was found on an occasional tuber in North Saanich, B.C. (W. Jones).

PINK ROT (Phytophthora erythroseptica) caused severe damage to a field of potatoes at Summerland, B.C., on clay-loam soil that was flooded late in the season (G.E. Woolliams, W. Jones). One case of the disease was observed in the Cochrane district, Ont. (H.W. Whiteside). Affected tubers were received from Ramore and Trenton, Ont. (L.T. Richardson). A few tubers affected by watery rot were found in the variety plots at Ste. Anne de la Pocatiere, Que.; the pathogen was isolated (A. Payette).

LATE BLIGHT (Phytophthora infestans) was more general and widespread in B.C. than any previous year and many fields were severely damaged. The disease was general in Vancouver Island, in the Fraser Valley, Kamloops, North Okanagan and the West Kootenay. It was found for the first time in the Cariboo. Dry weather during September and October checked the disease to some extent (W.R. Foster). The unusually heavy rainfall and cool weather throughout the spring and summer was a major factor in the development of the highest incidence of late blight on record in the coastal area. The high rainfall was favourable for the spread of the disease and hindered spraying operations. Vine and tuber infection was severe in many fields and the crop was a total loss in some. In the East Delta area tuber infection was much higher in crops on clay than those on peat and muck soils (I.C. MacSwan). Late blight was found on 27 May at Ladner on Early Epicure being grown as table stock for the early market. It is suspected that the disease was initiated from affected culls. Infection was 276-sl. 120-mod. 149-sev./932 fields inspected; 3 fields were rejected. Although the disease was prevalent and severe on the vines, tuber infection was less than expected. (H.S. MacLeod). In most years late blight is unknown in the B.C. Interior, but due to very heavy rains in August the disease was found frequently in most of these districts, where it affected both the vines and tubers. Only on one previous occasion has late blight been reported in the semi-arid districts of B.C. (G.C. Woolliams).

Late blight caused moderate damage in some areas in eastern Sask., particularly in those adjacent to the Man. boundary. Specimens or reports were received from a dozen localities. Previous to 1947 (P.D.S. 27:67), when the disease was noted in 2 localities, but caused no damage, it was unreported in Sask. (H.W.M.). Late blight appeared first on 13 July in south-eastern Man. and spread with great rapidity over the remainder of the arable part of the province. Although at first it appeared that a severe epidemic of late blight would occur its spread was arrested by dry weather in August and September. Blight continued to develop, however, in the more northern areas and considerable tuber rot occurred before digging. Serious loss in storage is not anticipated (J.E. Machacek). Damage to the foliage was quite general throughout Man. and northwestern Ont. but tuber loss was small. However, the loss was considerable in the Dauphin and Clear Lake areas in Man. where heavy rains fell in mid-August. The loss was 10% of the tubers also in some areas in the Thunder Bay district, Ont. (D.J. Petty).

Late blight appeared almost simultaneously around 15 July in widely scattered potato and tomato areas of Ont. from Haldimand Co. to Temiskaming.

Within two weeks it was reported from all the major producing areas in northern, central and southwestern Ont., from Prince Edward Co. early in August and from the easternmost part of the province later in August. In general late blight first appeared on potatoes and then spread to adjacent tomatoes. The first outbreaks were in many cases in small gardens in towns and villages. By July the major potato and tomato areas were threatened by heavy losses from late blight, but dry weather through August and most of September held the disease in check and losses were relatively small. It would appear that the blight fungus overwintered in diseased potato tubers. The disease spread to the vines from diseased tubers which were planted or left in exposed cull piles. Then the disease spread from the potato plants to tomatoes. Several samples of diseased potato tubers were received about harvest time. Undoubtedly such tubers will serve as a source of inoculum next year (J.D. MacLachlan). Early in August 4 fields in Middlesex Co. were severely affected (F.J. Hudson). One severely affected field of Early New Yorker in District 2 (W.L.S. Kemp). Although late blight became general over District 3, most growers were able to keep the disease well under control. However, in the Cochrane district where late blight was not fully controlled by the application of fungicides, the vines were killed by calcium cyanamid, 50-100 lb. per acre being most commonly used (H.W. Whiteside).

Late blight was first reported on 30 July in Temiscouata Co., Que.; on 6 Aug. from Papineau and Gaspe Counties and the Eastern Townships. It spread slowly in August and by 3 Sept. the disease was usually only a trace in most potato growing centres except in the Matapedia valley and at Douglastown, Gaspe Co. where 40-50% of the foliage was destroyed. By mid-September only well sprayed fields or those of the variety President were still green. Some 5-10% tuber rot occurred in early dug fields. The disease was checked by clear dry weather in late September and early October. Growers were encouraged to use vine killers sodium arsenite with waste crankcase oil and copper sulphate in partially blighted fields. Excellent results were obtained and more growers would have used sodium arsenite if they could have purchased a supply. Late blight was found in 30% of the bins and fields inspected at digging time, the average infection being 1.6% of the tubers in the affected fields (B. Baribeau). Late blight became quite general on the potato foliage about Quebec City. In spite of the low rainfall, the humidity was sufficiently high for the fungus to sporulate freely (O. Caron). Late blight appeared by 30 July in N.B. Conditions were favourable for early infection and unsprayed fields were soon defoliated. Intermittent periods of unfavourable weather prevented the development of an epidemic and where spraying was thorough the disease was held in check. It was possible to postpone digging until all spores were destroyed; average tuber infection did not exceed 1%. All shipments this year were very free from tuber rot (J.L. Howatt, C.H. Godwin). Late blight was first reported on 3 Aug. in Kings Co., N.S., 5 Aug. in Yarmouth Co., etc. By 11 Sept. the disease was severe in most coastal areas of Annapolis, Yarmouth and Digby Counties; practically every unsprayed field was completely defoliated. Late blight was general in Kings Co. this year but due to an extensive spray programme almost no tuber rot was reported. More rot might have been reported but a severe frost caused a loss of 20% of the late crop. In other counties where less spraying is done up to 5% of the crop was affected by tuber rot in some fields. Late blight had

destroyed 20% of the foliage of plants nearly in bloom in a cull pile at Centreville on 17 July (R.C. Layton, K.A. Harrison). Late blight was observed on young potato sprouts in a small cull pile near Charlottetown, P.E.I., on 3 July and the first field infection was noted on Irish Cobbler at Harrington on 26 July. During the next several days infected fields were found in the other two counties. Weather in July was ideal for the development of an epidemic. Frequent rains spread over 2-3 day periods rather, than the total rainfall, were important in the spread of the disease. By 20 Aug. many unsprayed or poorly sprayed fields were dead, but the disease was kept under control in fields where the spray programme was adequate. Failure to spray until the disease had become established was the principal cause of losses.

In most fields loss from tuber rot was slight. Destruction of the vines by chemical sprays or mechanical beaters was very general this season and was probably responsible for reducing tuber rot to a minimum. The main loss was due to reduction in yield brought about by injury to the vines and their early death. (L.C. Callbeck). Losses from defoliation and early death of the vines averaged 5-10% in P.E.I., losses from tuber rot 8% (S.G. Peppin).

LEAK (Pythium ultimum), as a set rot, caused severe damage in a 5-acre field in North Saanich, B.C.; rainy warm weather prevailed at the time (W. Jones). Leak was found affecting 10% of the Canus tubers in storage on 20 Oct. and the Horticulture Substation, Smithfield, Ont. Other varieties grown in the same field appeared to be free. The causal organism was isolated and positively identified from the sporangia, oogonia and antheridia, which corresponded with Trow's original description of P. ultimum and not with P. de Baryanum. This storage rot has frequently been attributed to bacterial soft rot in the past as a result of casual examination. After identifying these specimens the same trouble was found in tubers of Green Mountain grown at Ottawa and stored at the Central Laboratory. The causal organism depends mainly on mechanical injuries for entrance into the tubers and its development is favoured by relatively high temperatures. Canus is quite thin-skinned and thus more easily bruised than most varieties. The presence of Pythium in suspected specimens is readily determined by microscopic examination of a scraping of the affected tissue in a cut tuber especially near the boundary between the diseased and healthy tissues. Abundant inter- and intracellular coenocytic hyphae will be observed. A useful account of the disease has been published by Walter Jones (Sci. Agric. 15(6):402-410. 1935). Affected specimens were received 4 Nov. from Renfrew; the enquirer reported "there were quite a few like this" in picking over 325 bags (L.T. Richardson). Only a few affected tubers were found this year in the Laboratory plots, Ste. Anne de la Pocatiere, Que. The organism was isolated. Affected tubers have also been brought in by local farmers (A. Payette). Leak was found in 2 lots on bin inspection; 0.5-1% of the tubers were affected (B. Baribeau).

In the light of these observations it seems probable that much of the bacterial soft rot reported (P.D.S. 27:65) is actually leak. This year according to A. Charlebois tubers affected by bacterial soft rot were seen in more bins than usual in Sask. due possibly to the warm fall. Upon request, 6 tubers were submitted for examination; 4 were found affected by leak and 2 by Fusarium dry rot by Dr. Richardson (I.L. Conners). The disease was present in District 3, Ont. (H.W. Whiteside).

POWDERY SCAB (Spongospora subterranea) was present in a few lots in Rimouski, Temiscouata, Terrebonne, Megantic, Arthabaska and Chicoutimi

Counties, Que.; infection was slight (B. Baribeau). The disease was found in 6 lots of potatoes on bin inspection in the Scotts Bay district, N.S. The highest infection was about 3% in Irish Cobbler, with under 1% in Green Mountain, Bliss Triumph and Katahdin (R.C. Layton). Two lightly infected tubers of Green Mountain from a vegetable garden at Charlottetown, P.E.I., were seen 20 April 1948 (R.R. Hurst).

SILVER SCURF (Spondylocladium atrovirens). Traces were observed on 6 varieties of potatoes in Que. during bin inspection or on the local markets (B. Baribeau).

COMMON SCAB (Streptomyces scabies (Thaxt.) Waksman & Henrici (=Actinomyces scabies (Thaxt.) Güssow) was not as prevalent nor as severe in B.C. as in 1947, although it was present on a few varieties in some areas (H.S. MacLeod). Scab infection was in general slight and superficial in Alta. (J.W. Marritt). Infection was mod.-sev. in the variety plots at Lacombe and tr.-sl. at Edmonton (T.R.D.). The growing season was dry over much of Sask. Common scab was quite prevalent and in several commercial fields about Saskatoon it was more severe than usual (H.W.M.); severe in a private garden at Prince Albert (T.C. Vanterpool). Light infections were observed in a few fields in Man. and northwestern Ont.; one crop of Chippewa at Clear Lake, Man., showed 30% moderate to severe scab (D.J. Petty). Very little severe scab was observed in southwestern Ont.; slight scab was quite general (F.J. Hudson). Common scab occurs annually in District 2, but its occurrence on any one farm fluctuates widely from year to year. Scab is the chief cause of surface blemish to tubers of Irish Cobbler, Chippewa and Katahdin. No scab resistant variety was grown for certification in 1948 (W.L.S. Kemp). Scab infection was general throughout southern Ont., the amount being extremely variable in quantity and severity from farm to farm and in different districts. Samples were collected from 82 fields; area of tuber surface covered by lesions was: over 10% (max. 30%) in 10 fields, 5.1-10.0% in 14, 3.1-5.0% in 17, 1.1-3.0% in 26 and 0.2-1.0% in 15; average was 4.5% (J.K. Richardson). Scab was less severe in district 3 than in 1947 (H.W. Whiteside). A very light infection was present in eastern Ont. (O.W. Lachaine). Common scab was more prevalent in Que. than in 1947 but the percentage of infection was slight. In some localities where fresh manure or lime were used scab was moderate to severe. In certain areas in Kamouraska and Temiscouata Counties where tuffa predominates in the soil potatoes show a mild scab russetting. Scab was moderate on local table stock on the Montreal market (B. Baribeau). Of the 30 varieties under cultivation at Deschambault scab was severe on Arran Chief, Sunrise, Mohawk, Houma, Pawnee and Early Rose; about half the tubers were lesioned with about 5% of scab on the affected tubers (H. Genereux). Scab was found in all parts of N.B. and caused about 2% loss of crop (C.H. Godwin). A carload of Irish Cobbler from Woodstock showed about 40% of the tubers severely affected by russet scab; the organism fruited on the tubers when held in a moist chamber (H.N. Racicot). Scab was not prevalent in N.S. in 1948. Two lots were reported where 30 and 50% of the tubers were severely scabbed and small amounts of scab occurred in 30% of the bins inspected (R.C. Layton). Common scab was quite prevalent in P.E.I.; average loss was about 2% (S.G. Peppin).

WILT (Verticillium spp.) was noted in some fields of Green Mountain of P.E.I. origin; infection was slight to moderate (B. Baribeau). Wilt was reported in 88 (13.7%) of the fields inspected in N.S. and caused 3 to be rejected. The highest infection was 5% (R.C. Layton). Wilt was less prevalent in P.E.I. than in 1947, and only 22 fields were rejected this year as compared with 92 last year (S.G. Peppin). Verticillium wilt did not reach serious proportions in P.E.I. in 1948 and was confined to Irish Cobbler and Sebago. As in past years, Kings Co. remained practically free of the disease (G.W. Ayers).

LEAF ROLL (virus) was found in 312 (33.5%) of the fields inspected in B.C. and caused 22 to be rejected. The disease was more prevalent and severe particularly in the Grand Forks and Bridesville areas (H.S. MacLeod). It was present in 25 (15%) of the fields inspected in Alta., in 1948, a marked decrease from 1947 (J.W. Marritt). Slight to moderate infections were seen in 30 commercial plantings about Edmonton (T.R. Davidson). Leaf roll affected 18% of the fields inspected in Sask. (A. Charlebois) and 30% of those inspected in Man. and northwestern Ont. and 3 fields were rejected. (D.J. Potty). Low infections of leaf roll were found in many fields in southwestern Ont.; 7 fields were rejected (F.J. Hudson). Fifteen fields were rejected on account of leaf roll in district 2; it is the most common cause of rejection in this district (W.L.S. Kemp). In district 3, 72 (14%) of the fields inspected were rejected on account of leaf roll. Chippewa appears to be the most susceptible of the varieties being grown and cannot be maintained free of leaf roll for more than two years when grown in this district south of the Cochrane area. Aphids had not been observed in this area until 1948, when a few aphids, mostly Macrosiphum solanifolii, along with an occasional Myxus persicae were observed (H.W. Whiteside). Three fields were rejected in eastern Ont. on account of leaf roll (O.W. Lachaine). Leaf roll infection was at a very low figure in Que., only 1.3% of the fields inspected being rejected in 1948 (B. Baribeau). There has been a marked decline in the amount of leaf roll in the last two years in N.B.; this year only 5 fields were rejected. Aphid infestation has been very slight in the past 2 years. With the use of DDT becoming quite general and the early killing of tops practised by the best growers field transmission of leaf roll has been almost negligible and thus much cleaner seed is being distributed in the commercial areas. Considerable leaf roll occurs in table stock where old stock is still planted (C.H. Godwin). Leaf roll was reported in 251 fields of 642 inspected in N.S. and caused 13 to be rejected (R.C. Layton). Leaf roll caused the rejection of only 156 fields in P.E.I. in 1948, a slight reduction from last year (S.G. Peppin).

LEAF ROLLING MOSAIC (Solanum virus 1). Two plants were found infected in a field of table stock of Green Mountain in Sunbury Co., N.B. (D.J. MacLeod).

LATE LEAF ROLL (virus) was common in potato fields in Carleton, York and Sunbury Counties, N.B. It was observed in Katahdin, Irish Cobbler, Bliss Triumph, Sebago, Pontiac and 7 seedlings (cf. P.D.S. 27:69) (D.J. MacLeod).

LEAF STREAK (Solanum virus 1, N strain). A trace was found in Katahdin, Houma, Sequoia and Chippewa in fields in Carleton and York Counties, N.B. (D.J. MacLeod).

MILD MOSAIC (Solanum virus 3) ranged from a trace to 12% in table stock fields of Green Mountain in Carleton, York and Sunbury Counties, N.B. (D.J. MacLeod).

MILD MOSAIC (Solanum virus 11) was found affecting 4 plants in a field of Irish Cobbler table stock in York Co., N.B. (D.J. MacLeod).

CRINKLE MOSAIC (Solanum viruses 1, 2 and 3) ranged from a trace to 7% in fields of Green Mountain table stock in York, Sunbury and Carleton Counties, N.B. (D.J. MacLeod).

MOSAIC (virus) was found in 204 (22%) of the fields inspected in B.C. and caused 6 to be rejected (H.S. MacLeod). It was found in 16 (9%) of the fields inspected in Alta. (J.W. Marritt) and 57 (47%) in Sask. (A. Charlebois). Due to the cool weather in 1948 mosaic was much more apparent in Man. and northwestern Ont. than last year. In fact all fields of Bliss Triumph except one indexed field were rejected for mild mosaic, some fields showing 50% or more affected plants (D.J. Petty). Little mosaic was observed in District 2 and no fields were rejected (W.L.S. Kemp). Mosaic was observed in Green Mountain and Chippewa in District 3, but no fields were rejected. Mild mosaic was present in all Green Mountain fields in eastern Ont., but none were rejected (O.W. Lachaine). Mosaic was more prevalent in Que. than last year and 3.1% of the fields inspected were rejected (B. Baribeau). Mosaic appears to be increasing in N.B. Of 159 fields rejected 46 were turned down for mosaic; 45 were fields of Green Mountain with some running as high as 10% and one of Bliss Triumph with 12.9% mosaic. The disease showed up early and was prominent throughout the season (C.H. Godwin). Mosaic was reported in 188 of 642 fields inspected in N.S. and 13 fields were rejected; last year only one field was rejected (R.C. Layton). There was a marked increase in the prevalence of mosaic in P.E.I. in 1948; 1,122 fields were rejected this year compared with 358 in 1947 (S.G. Peppin).

PURPLE DWARF or HAYWIRE (virus) was found in 4 fields in Alta.; infection was less than 0.5% (J.W. Marritt).

PURPLE or BUNCH TOP (virus). Only a small percentage of affected plants was seen in one field in Alta. (J.W. Marritt). Infection ranged from 1 to 4% in one third of the fields inspected in Man. and northwestern Ont. (D.J. Petty). An occasional plant was found in fields in southwestern Ont. (F.J. Hudson). Only an odd plant found affected in District 2 usually near the road allowance; the common milkweed is believed to be the weed host (W.L.S. Kemp). Affected plants were observed in President, one field of Green Mountain and plots of Arran Chief and Arran Victory in Que.; percentage infection was low (B. Baribeau).

Purple or bunch top was general in potato fields in Carleton, York, Sunbury, and Westmorland Counties, N.B. Infection ranged from a trace to 7%. Current season symptoms of the disease were found in Green Mountain, Irish Cobbler, Bliss Triumph, Houma, Katahdin, Chippewa, Sebago, Mohawk and 9 seedlings. The secondary (haywire) stage was found in Green Mountain, Katahdin and Sebago fields in York Co.

Sixty-seven seed pieces which remained firm and intact during the growing season in a field of Green Mountain Foundation seed were planted in a greenhouse; 37 produced plants showing the secondary or haywire symptoms of the bunch-top virus; the other 30 failed to grow (D.J. MacLeod).

Purple top annually affects a small percentage of the plants in fields entered for certification in N.B. It is most prevalent in Katahdin (C.H. Godwin). Small percentages were reported in 3 fields of Sebago in N.S. (R.C. Layton).

RUGOSE MOSAIC (Solanum viruses 1 and 2). Infection ranged from a trace to 4% in table stock fields of Green Mountain in York, Carleton, Sunbury and Westmorland Counties, N.B. (D.J. MacLeod).

SPINDLE TUBER (virus). A small amount was found in 3 fields planted with the same stock in Alta. (J.W. Marritt). Virtually no spindle tuber was seen in Man. or northwestern Ont. except for one seed stock in Man., which showed 8% (D.J. Petty). A trace was seen in several fields in District 2 (W.L.S. Kemp). A few tubers were seen in the bin in District 3 (H.W. Whiteside). Observed in a few lots during bin inspection in Que. (B. Baribeau). Only a trace of spindle tuber is now found in N.B. seed due to the high quality of seed being planted (C.H. Godwin). Spindle tuber was reported in only one field in N.S. Both tops and tubers showed definite symptoms in this 9-acre field of Sebago (R.C. Layton).

WITCHES' BROOM (virus) was found in 123 (13.2%) of the fields inspected in B.C. and caused 10 fields to be rejected (H.S. MacLeod). The disease was present in 4% of the fields inspected in Alta. (J.W. Marritt). Four affected plants were found in plots at Edmonton (T.R.D.).

YELLOW DWARF (virus) was found in 3 fields of Green Mountain in District 3, Ont.; although the disease only affected the odd plant, they were usually severely injured (H.W. Whiteside).

YELLOW TOP (virus). Seven plants in a field of Green Mountain in N.B. developed an upward rolling and yellowing of the leaves in the upper part of the plant. Later these leaves turned a rusty yellow and the plants died prematurely. When scions from these plants were grafted to tomato the latter became severely stunted and distorted. Many axillary shoots with small chlorotic leaves developed. It may be noted that a virus obtained from the common milkweed, Asclepias syriaca showing a severe yellows produced the same symptoms in tomato (D.J. MacLeod).

FROST INJURY. A 5-10% loss occurred in crops dug late in District 2, Ont.; most of the affected tubers had already suffered from sunburn (W.L.S. Kemp). A heavy frost on 28 Sept. caused considerable damage in most districts in Que. The frost penetrated 1-1½ inches and many tubers near the surface were injured; up to 5-10% of the tubers were left in some fields. Field frost caused considerable damage in N.S. The loss in certified seed was at least 10%, and in some fields 25% of the crop was lost (R.C. Layton).

GIANT HILL was reported in 161 (17%) of the fields inspected in B.C. (H.S. MacLeod). Giant Hill was more prevalent in Alta. in Netted Gem than in 1947; it was found in 17 (10%) of the fields inspected (J.W. Marritt). Affected hills were seen in a few fields of Green Mountain in Que. (B. Baribeau). Giant Hill was reported in 4 fields of Green Mountain and 2 of Irish Cobbler, all planted in tuber units, in N.S. The tops were larger, coarser, and longer blooming than in normal plants, but the tubers were indistinguishable (R.C. Layton).

HOLLOW HEART (non-parasitic) was widespread in Man. in 1947 especially in Irish Cobbler, some crops containing 40-60% of affected tubers; in 1948 a trace to 10% of the tubers of Irish Cobbler were affected (D.J. Petty).

LIGHTNING INJURY was observed in one field in Que.; a patch 30 feet in diameter was burned in the middle of the field and at digging time no potatoes were found in the patch (B. Baribeau).

MAGNESIUM DEFICIENCY was observed in a field of Irish Cobbler on 22 June at Medford, N.S.; the plants reacted immediately to an application of magnesium sulphate (K.A. Harrison). Magnesium deficiency was not severe in P.E.I. in 1948. The increased use of dolomitic limestone and fertilizers containing magnesium is proving a corrective in many soils low in the element. The check plot in the 1948 magnesium fertilizer tests showed slight to moderate deficiency symptoms (G.W. Ayers).

NET NECROSIS was more prevalent and severe in crops of the B.C. interior than those at the coast. What was believed to be heat necrosis was noted in the Grand Forks and Bridesville districts. Net necrosis of all types caused the rejection of 24 fields in B.C. (H.S. MacLeod). Very little net necrosis was observed in Que. (B. Baribeau) and N.B. (C.H. Godwin).

NITROGEN DEFICIENCY caused considerable damage in a very sandy field in Queens Co., P.E.I. Shoots occurred singly, were small and upright, and the leaves were a very pale green (R.R. Hurst).

POTASH DEFICIENCY was general throughout a small field in Kings Co., P.E.I. (R.R. Hurst).

SUNSCALD. Some crops showed 1% of the tubers affected in Man. following extremely warm weather in September and early October with maximum temperatures of 75°-80°F. (D.J. Petty).

STEM-END BROWNING. Only a few cases of stem-end browning have been observed so far in N.B.; the long growing season permitted the crop to mature fully (C.H. Godwin). Stem-end browning was severe in the Scotts Bay area, N.S., in 1947; very few lots passed registration and in some lots 40% of the tubers were affected. Most growers used tubers from their own crop for seed in 1948 and again in some lots 40% of the tubers were affected. No pathogenic organism has been found by either K.A. Harrison or H.N. Racicot. Soil temperature and moisture were unfavourable (R.C. Layton).

RADISH

SCAB (Streptomyces scabies (Thaxt.) Waksman & Henrici). Radishes were affected by scab to such an extent in certain areas in a field of several acres in Wentworth Co., Ont., that considerable culling was required before the crop could be marketed (J.K. Richardson).

RHUBARB

LEAF SPOT (Ascochyta Rhei) affected every leaf on Early Sunrise at Kentville, N.S. (K.A. Harrison).

GREY MOULD (Botytris cinerea) attacked 15-20% of the petioles in one acre field at Essondale, B.C. affecting the petioles only where they were split following a period of heavy rain (I.C. MacSwan).

SOFT ROT (Erwinia carotovora) caused severe damage to plants in a garden at Ste. Anne de la Pocatiere, Que.; infection appeared to begin at the base of the petiole, causing the fall of the leaf (A. Payette).

SPINACH

LEAF SPOT (Stemphylium botryosum). Infection was general in a seed crop of Dark Green Bloomsdale at the Station, Saanichton, B.C., causing the foliage to wither prematurely (W. Jones).

SQUASH

MOSAIC (virus). The plants in 3 small plantings at Leamington, Ont., were so badly affected by mosaic that the crop was a total loss. In other fields in Essex Co. where the disease developed later in the season the damage was slight (C.D. McKeen).

SWISS CHARD

BLACK LEG (Phoma Betae). A light infection was observed on the main stem of a seed crop of Lucullus at the University, Point Grey, B.C. (H.N.W. Toms).

TOBACCO

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

Diseases in the Seedbed

BLUE MOULD (Peronospora tabacina). The presence of blue mould of tobacco in Ont. was confirmed at least one day earlier during the past season in the new tobacco belt, in Norfolk Co., than any previous year. In the old tobacco belt in Essex Co. the disease developed a few days later, which nearly equalled the record early occurrence of last year. Earliest occurrences were carefully investigated. Temperatures during this period ranged from 46° to 77°F. Various circumstances, including location of initial attacks in seedbeds, presence of weeds, and developmental stages of the host strongly indicated overwintering of the causal organism in most instances. Not only did they occur in widely-separated areas (200 miles) but also in areas where seedbed steaming is consistently practised, as well as areas where the seedbed muck is merely replaced annually. The usual source of overwintering material appears to be dead parts of the tobacco plant remaining in the permanent seedbeds.

A few seedbeds in Essex Co. where control measures were not initiated until blue mould became severe were destroyed by the disease. In other cases where infection was moderate to severe in both the old and new tobacco belts seedlings were retarded and transplanting was delayed, but the overall damage to tobacco seedlings in Ont. due to blue mould was less in 1948 than in 1947. During the latter part of the transplanting season the disease was prevalent throughout all Ont. tobacco-growing districts, except east of Toronto although the average damage was slight. Its mildness was apparently due to the fact that about 95% of the growers sprayed or dusted their beds with Fermate or Karbam; some growers in the old tobacco belt used PDB crystals and a few the new aerosol bomb containing benzyl salicylate. Weather conditions throughout the critical period were not unfavourable for disease development.

YELLOW PATCH (excessive nutrients) caused moderate damage during the past season in both the old and new tobacco belts. One severe case was traced to the application of commercial vegetable fertilizer containing 7% nitrogen.

DAMPING-OFF (Pythium sp., Rhizoctonia sp., etc.) caused the loss of some seedbeds in the northern part of Essex Co. and in Kent Co. soon after germination and necessitated their re-seeding. In nearly all cases these losses occurred in outside, cotton-covered seedbeds. It is felt that the practice in Kent Co. will need to be changed to prevent this recurring loss.

MUSHROOMS proved to be troublesome in Kent Co. and were responsible for loss of seedlings in portions of certain seedbeds.

2,4-D (Dichlorophenoxyacetic acid) INJURY. Several cases of 2,4-D injury, reported for the first time last year in Ont. tobacco, occurred again in Kent Co. Spraying outfits imperfectly cleaned were responsible in at least a few cases.

Diseases in the Field

BLUE MOULD (Peronospora tabacina). Damage to plants in the field during June and early July was widespread and greater than ever before in the new tobacco belt. Similar damage was observed in the old tobacco belt although it was less severe, indicating the greater abundance of inoculum and host material in the flue-cured tobacco districts. In some fields even top leaves were affected and damage was regularly more severe where air drainage was poor. The disease has not yet reached Que. where occur the oldest tobacco-growing areas in Canada.

BROWN ROOT ROT (cause undetermined) caused moderate damage in the old tobacco belt of Ont. The varieties Halley's Special and Harrow Velvet suffered most damage.

BLACK ROOT ROT (Thielaviopsis basicola) caused moderate damage in the dark tobacco area of Kent Co. Less than the usual amount of damage occurred in flue tobacco in Ont.

MOSAIC (virus) was widespread on burley tobacco in both Essex and Kent Counties. Damage became severe in certain fields near harvesting time and appeared to be associated in many cases with high populations of the tobacco aphid. While more than one virus strain was present, cucumber mosaic appeared to be the most prevalent.

RING SPOT (virus) occurred in mild form in some fields of burley tobacco in Essex Co. and about $\frac{1}{2}$ acre of a field near Blenheim was severely affected.

FRENCHING (cause undetermined) was more widespread than usual in the old tobacco belt. Severe cases were nearly all limited to poorly-drained fields both north and south of Leamington.

SORE SHIN (Rhizoctonia Solani) was observed in moderate form on flue tobacco approaching maturity in Essex Co. This disease was extremely widespread and caused considerable damage in large areas of the Que. tobacco-growing district east of Montreal. More damage was observed on flue tobacco than on other types and appeared to be associated with large amounts of undecomposed plant residues in the soil.

LEAF SPOT (physiological) caused slight to moderate damage in certain crops during the latter part of the season in Essex Co.

POTASH DEFICIENCY was widespread during the latter part of the season in numerous burley tobacco crops, particularly near Leamington.

Other Observations

MOSAIC (virus). A 1% infection was observed in a field at Sumas, B.C.; it appeared that the disease was spread in two rows at topping (H.N.W. Toms). Infection was a trace to 7% in flue-cured varieties in the Joliette district, Que. The season was favourable for the spread of mosaic by implements, insects, etc. (F. Godbout).

TOMATO

EARLY BLIGHT (Alternaria Solani) caused moderate damage at North Saanich, B.C. (W. Jones). Scattered infections were seen on the leaves in the plots at Agassiz (H.N.W. Toms). It was found in May on young plants still growing in the cold frames at Vernon (G.E. Woolliams). Infection tr.-sl. in the plots at Lethbridge and Taber, Alta., and mod. in a field at Barnwell (M.W. Cormack). Early blight was very common in tomato-growing areas in central and southwestern Ont., but caused no significant loss (J.D. MacLachlan). Infection was moderate on the leaves of early varieties with a few fruits also affected in a 2-acre field at Harrow, Ont., and a trace to light in the Leamington area (C.D. McKeen). Infection was general on the lower leaves of 40 plants in a garden in Westboro, Ont. On 7 Aug. about 6 leaves per plant were dead and several more heavily spotted. The plants were staked but few suckers had been removed; plants were sprinkled up to late July. Plants were dusted on 1 Aug. and again 7 Aug. when all severely blighted leaves were removed. Some further spread took place, but a fair crop was harvested. Several other severe outbreaks occurred in the district (D.B.O. Savile). In one such outbreak damage was 10% (L.T. Richardson).

A 10% infection was present 27 May on plants in hot beds at Aylmer East, Que. (L.T. Richardson). Early blight was only observed late in the season in N.B. and it caused no reduction in the yield of green fruit (S.F. Clarkson). Young plants in flats were lightly affected in a greenhouse at Hantsport, N.S., but there was little further spread in the field (K.A. Harrison). Early blight was severe on the foliage in a field at Mill Village (D. Creelman).

GREY MOULD (Botrytis cinerea). Slight infection on green fruit in a greenhouse, Sidney, B.C.; humidity high at the time (W. Jones).

LEAF MOULD (Cladosporium fulvum). Infection was general on the foliage on commercial crops of V121 in 3 greenhouses about Victoria, B.C. (W. Jones). Present on greenhouse plants at Summerland (G.E. Woolliams). Infection severe in a greenhouse at Edmonton, Alta. (A.W. Henry). Leaf mould was found on many occasions attacking the foliage of early tomatoes in fields in the Leamington district, Ont., and in 2 fields considerable defoliation occurred. Humidity was high about the leaves due to frequent rains. In the fall greenhouse crop, V121 and other susceptible varieties were heavily infected and crops were severely damaged. V473 and Improved Bay State showed high resistance in all houses (C.D. McKeen). A light infection seen in a greenhouse in Queens Co., P.E.I. (R.R. Hurst).

ANTHRACNOSE (Colletotrichum phomoides). A few fruits were affected after a week in storage in Carleton Co., Ont. (L.T. Richardson). Anthracnose caused a 10% loss in a small garden at Beaumont, Que. (R.O. Lachance).

BACTERIAL CANKER (Corynebacterium michiganense). Infection was slight in some fields and severe in others in the Vernon district, B.C. (G.E. Woolliams). The disease was severe in the plots, University, Winnipeg, Man., and was also observed in a few home gardens. Diseased plants were received from Niverville (W.A.F. Hagborg).

FUSARIUM WILT (F. Lycopersici). In an 8-acre field of late tomatoes near Wheatley, Ont., 85% of the plants were affected. Harvesting had just begun and more than half of the plants were wilted or dead. A trace of wilt was found in a few greenhouse crops (C.D. McKeen).

LATE BLIGHT (Phytophthora infestans). Infection was general in Vancouver Island, B.C. At the Station, Saanichton, Stokesdale proved very susceptible and damage to the fruit was severe. Weather conditions were very favourable for the development of the disease. Late blight has not previously been observed in North Saanich (W. Jones). Infection was general about Vancouver; losses were 50-75% of the crop (H.N.W. Toms, H.N. Racicot). A slight infection was observed on tomato leaves at Gilbert Plains and Brandon, Man. (J.E. Machacek). Late blight appeared about 15 July almost simultaneously in widely scattered potato and tomato areas in Ont. and spread rapidly in the next two weeks. As outlined under late blight of potato, heavy losses were threatened but hot dry weather held the disease in check and losses were relatively small. Doubtless the chief source of inoculum is the fungus overwintering in the potato tuber, but some late blight may start in tomato fields from diseased plants brought in from the southern States and there is a possibility that spores are blown northward from the United States (J.D. MacLachlan). Late blight was first observed on both early and late tomatoes in the Harrow area on 16 Aug. One week later the disease was found in 15 late tomato fields. Severe fruit and leaf infection was apparent in all fields attacked. The disease then become quiescent during a hot dry spell, 23-30 Aug. On 16 Sept. late blight was again active in these and many other fields in Essex Co. However the harvest was nearly completed; losses were light in the fields where the disease appeared late in September but they amounted 20-75% of the crop where it first appeared in August (C.D. McKeen). Losses were comparatively light in the Niagara Peninsula except in a few fields (J.K. Richardson). A large part of the crop was reported lost on several farms in Russell Co. (H.N. Racicot). Late pickings were almost a complete loss at Ste. Anne de la Pocatiere, Que. (R.O. Lachance). Although the disease was kept well under control by spraying and dusting in N.B. a large amount of rot developed when the fruit was stored for a short period (J.L. Howatt). Late blight was general in all tomato plantings examined in P.E.I.; infection was slight to moderate (D.B. Robinson).

STEM ROT (Phytophthora parasitica). A damping off and stem rot was destructive to young plants growing in flats at Edmonton, Alta. (A.W. Henry). Stem rot caused the loss of upwards 20% of the seedlings in flats in 2 greenhouses at Leamington, Ont. The disease developed about 5 days after the seedlings were transplanted for the first time (C.D. McKeen).

BACTERIAL SPECK (Pseudomonas tomato) caused slight damage about Winnipeg, Man. (W.A.F. Hagborg). Only a few tomatoes in two small fields in the Leamington area, Ont. were affected (C.D. McKeen).

DAMPING OFF (Rhizoctonia Solani). Post emergence damping off caused considerable stunting of growth of tomato and pepper seedlings in Lincoln Co., Ont. from lesions near the soil line (G.C. Chamberlain).

STEM ROT (Sclerotinia sclerotiorum). A trace was found in several early tomato fields in the Leamington area, Ont. (C.D. McKeen).

LEAF SPOT (Septoria Lycopersici), as in previous years, in Essex Co., Ont., appeared early, and heavy infections were observed on many early tomato plants in April and May before they were transplanted to the field. Much defoliation occurred in many fields before harvesting had begun. Leaf spot was also found in many fields of canning tomatoes but in general appeared late in the season and was not destructive. It seems probable that the source of inoculum for the early crop is the unsterilized flats and soil that is used for the second transplanting (C.D. McKeen). A slight infection reported in a large planting near Ottawa, Ont.; a specimen was brought in for identification (D.B.O. Savile).

VERTICILLIUM WILT (V. albo-atrum) was found on both greenhouse and field tomatoes in the B.C. Interior (G.E. Woolliams).

BACTERIAL BLIGHT (Xanthomonas vesicatoria). Diseased plants, ready for transplanting to the field, were brought to the laboratory by 3 large growers of early tomatoes in Essex Co., Ont. Leaf and stem lesions were abundant. Source of infection was probably contaminated seed (C.D. McKeen). Traces were seen in a garden in Queens Co., P.E.I. (R.R. Hurst).

MOSAIC (virus). Fairly general in 5 greenhouses in Victoria, B.C. (W. Jones); a few plants affected in a greenhouse at Summerland (G.E. Woolliams). Infection was trace to severe in variety plots at Taber and moderate in a field at Barnwell, Alta. (M.W. Cormack). Leaves from diseased plants from Brandon, Man., received from the Division of Horticulture; 5 plants were inoculated and each showed typical symptoms of Nicotiana virus 1 (H.N. Racicot). Mosaic was of common occurrence in Ont. In some fields, especially in Prince Edward Co., severe stunting of the plants occurred before the first blossoms set fruit (J.D. MacLachlan). Up to 50% of the plants were affected in fields in south-western Ont. Aphids were abundant early in the season and may account for the high incidence of the disease (C.D. McKeen). Some 25% of the John Baer plants were affected in a planting in Prince Edward Co., whereas no disease was present in nearby plantings of Nystate, Clark's Early, Rutgers and Camdown. John Baer is a relatively susceptible variety (G.C. Chamberlain).

Mosaic (Cucumis virus 1) was widespread on tomatoes in Montreal, Que., and the vicinity. Specimens showed symtoms typical of this virus as described by Smith and by Doolittle (U.S.D.A. Farmers' Bull. 1934, pp. 39-41. 1948). Inoculations were made on healthy tomatoes in the greenhouse; symptoms typical of the virus developed (H.N. Racicot, J.E. Jacques). About 20% of the plants were affected in a field of early Bounty in Queens Co., N.B. (S.F. Clarkson).

PURPLE TOP (virus) was found in 7 plants at the Station, Fredericton and in 3 plants in a field in York Co., N.B. The disease is similar to that described in P.D.S. 23:77 (D.J. MacLeod).

STREAK (virus). A field of staked tomatoes in the Burlington area, Ont., showed rather severe symptoms of streak just prior to the time of the first picking (J.D. MacLachlan). A scattered infection was reported by a grower in Prince Edward Co.; report was accompanied by specimens (G.C. Chamberlain).

YELLOWS (Beta virus 1) was found only rarely in the B.C. Interior in 1948 (G.E. Woolliams).

BLOSSOM-END ROT (non-parasitic) was very prevalent in Ont. in 1948 (J.D. MacLachlan). The trouble was prevalent in Essex Co. in the earliest maturing fruit of the canning crop. It also affected 1-2% of fruit in most fall greenhouse crops (C.D. McKeen). Considerable loss was reported in the Niagara Peninsula in the early field crop (J.K. Richardson). It also caused heavy loss (up to 50%) of the early fruit in several plantings of staked tomatoes (G.C. Chamberlain). Heavy losses were reported by a grower at St. Pierre les Becquets, Que.; several cases were also reported from the Montreal district (J.E. Jacques). Blossom-end rot was very destructive in one garden and was present in trace to moderate amounts in others in Queens Co., P.E.I. (R.R. Hurst).

SKIN CRACK (non-parasitic) affected several varieties of the fall greenhouse crop in Essex Co., Ont. Up to 20% of the fruit were affected, the percentage varying according to the cultural conditions under which the crop was grown. All affected fruits are unsaleable (C.D. McKeen).

SUN SCALD (non-parasitic) was quite prevalent during hot dry weather in Ont. in areas where the fruit was exposed by loss of foliage (J.D. MacLachlan).

TURNIP

DRY ROT (Phoma lingam). Infection was severe on two farms in the Gaspereaux Valley, N.S., in fields planted with the same lot of seed; a specimen was sent in for identification (K.A. Harrison).

CLUB ROOT (Plasmodiophora Brassicae). Three severe cases were found in crops near Charlottetown, P.E.I.; losses were about 5, 10, and 50 % of the crop (D.B. Robinson).

STORAGE ROT (Rhizoctonia Solani) caused considerable infection in the roots in a retail store at North Saanich, B.C. (W. Jones).

STERILITY (virus) was common in Swede turnip seed plots in York and Sunbury Counties, N.B. Infection was a trace to 8% (D.J. MacLeod).

WITCHES' BROOM (virus). A trace was found in 3 commercial seed plots of Swede turnip in York Co., N.B. (D.J. MacLeod).

PHOSPHORUS DEFICIENCY. Although this condition has not been previously reported it has been observed for many years in Swede turnip in P.E.I. The dull reddish to purplish tints of the leaf near or at the margin are strikingly like those of phosphorus deficiency (R.R. Hurst).

BROWN HEART or WATER CORE (boron deficiency) was severe in the table turnip areas of Ont. in 1948; a prolonged period of hot, dry weather occurred in mid to late summer. Satisfactory control was obtained by spraying or dusting the crop. In certain fields that were sprayed or dusted, some water core developed but it was usually found that the technique was poor or the application was not made until the crop was too advanced. In some fields the disease was controlled by applying granulated borax with a hand cyclone grass seeder applied at the rates of 30 lb. per acre. This application was made shortly after thinning. Where equipment is not available for either spraying or dusting it is believed that applications of borax after thinning are much more effective than soil applications prior to seeding (J.D. MacLachlan).

WATERMELON

ANTHRACNOSE (Colletotrichum lagenarium). Spores of the organism were present on a specimen of diseased watermelon plants received from Kleefeld, Man. Surface sterilized stem tissues yielded the organism in pure culture. Seedling watermelons inoculated in the greenhouse became lesioned and died, but seedling cucumbers similarly inoculated failed to become infected. Sporulation was abundant on the inoculated watermelon seedlings and from them the organism was re-isolated in pure culture. No setae have been found associated with the ascervuli on the lesions or found in the cultures on artificial media. G. Nicolas and B. Aggery (Comptes rendus Soc. de Biol. 112:125-126. 1933) state that Gloeosporium lagenarium and Colletotrichum oligochaetum Cav. are two stages of the same organism and that setae develop in old infections only (W.A.F. Hagborg). Anthracnose was found in all watermelon fields in Essex Co., Ont., examined and infection was heavy (up to 75% in some). Lesions were so plentiful on the ends of the vines in 2 fields that the tips were killed. Some fruit infection was observed (C.D. McKeen).

POWDERY MILDEW (Erysiphe Cichoracearum) was very common on pumpkins, squashes and watermelons about Guelph, Ont., in the later part of the season (J.D. MacLachlan).

WILT (Fusarium bulbigenum var. niveum) was severe in 3 watermelon fields in the Harrow area, Ont., and up to 70% of the vines were killed in 2 small fields. The organism was isolated and found to be non-pathogenic to muskmelons. Other experiments showed that watermelons are not attacked by the organism isolated from muskmelons in Essex Co. The sudden appearance of the disease in these fields suggested that the pathogen was seed-borne (C.D. McKeen).

STORAGE SOFT ROT of VEGETABLES. Losses from storage rots of vegetables were high in the fall of 1948 in home basements in Sask. This sudden flare-up was probably due to the exceptionally long mild fall when temperatures were high in storage bins. Sclerotinia Rot (S. sclerotiorum) was suspected but Rhizopus sp. developed rapidly all over carrots and cabbages in two cases where material was incubated (T.C. Vanterpool).

IV. DISEASES OF FRUIT CROPS

A. POME FRUITS

APPLE

FRUIT ROT (Botrytis cinerea) affected the odd fruit of Lobo, McIntosh, Wealthy and Wolf River in late September at Ste. Anne de la Pocatiere, Que. (C. Perrault).

FIRE BLIGHT (Erwinia amylovora) was general in much of the interior of B.C., causing blossom, spur and twig infection; it was especially severe on crab apples (G.E. Woolliams). A few twigs were blighted on most trees in the Creston Valley; on Rob Roy and Jonathan larger limbs were sometimes attacked (M.F. Welsh). Blight was widespread at Edmonton, Alta., the situation being about as in 1947 (T.R. Davidson). Fire blight was light at Saskatoon, Sask., compared with 1946 and 1947. The dry weather of May and June probably reduced spread (T.C. Vanterpool).

For the first time in many years no infections were found in the Montreal district, Que. (R. Desmarteau, F. Godbout). In the Quebec City district blight was less general than last year, but was quite severe where it had not been regularly checked (O. Caron). At L'Islet Station blight was particularly severe in a small orchard, consisting largely of Yellow Transparent, but infection was also general in other untended orchards (R.O. Lachance). A single specimen was brought in at Charlottetown, P.E.I. (R.R. Hurst).

STORAGE ROT (Gloeosporium album) was found fruiting on five out of six rotting Linda apples at the Division of Horticulture, C.E.F., Ottawa, Ont., on 9 March 1948 (L.T. Richardson).

RUST (Gymnosporangium clavipes). A trace was found on McIntosh, Cortland and Delicious in the Laboratory orchard, St. Catharines, Ont. (G.C. Chamberlain).

ANTHRACNOSE (Neofabraea malicorticis) caused considerable damage in neglected orchards at Cowichan, B.C. (W. Jones).

PERENNIAL CANKER (Neofabraea perennans). Under some of the new spray schedules, the woolly aphis has been increasing recently in the Okanagan Valley, B.C. (See P.D.S. 27:83-84, 1948). This increase has been accompanied by increasing canker development. The fruit rot phase has also been troublesome in some orchards in certain years (H.R. McLarty). Some shipments, especially of Wagner, Delicious and McIntosh, from the 1947 crop in the Creston Valley suffered a rot due to N. perennans. A survey in May, 1948, of the orchards concerned showed most Wagner trees to be severely cankered, and occasionally cankers were found on the lower branches of Delicious and McIntosh. Most cankers appeared to be one or two years old. This re-appearance of perennial canker seems to be correlated with increase of woolly aphis (M.F. Welsh).

STORAGE ROT (Penicillium expansum) was more severe than usual in fruit stored at the Experimental Station, Fredericton, N.B., in November and December. Infection was usually centered around minute skin injuries (J.L. Howatt).

FROG-EYE SPOT (Phyllosticta limitata). A scattered infection of of McIntosh foliage occurred in an orchard at Meaford, Ont., damage was negligible (G.C. Chamberlain).

BLACK ROT (Physalospora obtusa) was seen on a few trees at Terrace, B.C. (W. Jones). Leaf spotting was quite common in orchards in N.B. during July and August and was heavy on unsprayed trees. Prolonged wet weather in May and part of June apparently favoured infection (S.F. Clarkson).

POWDERY MILDEW (Podosphaera leucotricha) was fairly general in the Saanich district, B.C. The usual spray schedule did not give good control. Damage was considerable in some orchards (W. Jones). It was general on the lower mainland (I.C. MacSwan). Mildew was severe in the southern parts, especially, of the Okanagan Valley, except for some orchards in the Kelowna area. A schedule of four sprays did not control fruit infection adequately in some experimental orchards. None of the newer fungicides have shown much promise (H.R. McLarty).

BROWN ROT (Sclerotinia fructicola). A small amount was found on cull Delicious and McIntosh apples held in common storage at St. Catharines, Ont. Infection followed insect injury or scab. It was also found on windfall fruits in the orchard (G.C. Chamberlain).

SCAB (Venturia inaequalis) was general on leaves and fruit throughout the lower mainland, B.C. (I.C. MacSwan). This was one of the worst scab years on record in the Okanagan Valley. Scab occurred as far south as Summerland and Penticton where it has not been seen for many years. The season was so cool and wet that losses were heavy in the Grand Forks area where sprays were inadequate or poorly timed. In the Vernon area four sprays were needed for adequate control. McIntosh was most seriously affected (G.E. Woolliams, H.R. McLarty). The situation in the Kootenays was equally serious, 1948 being one of the worst scab years in the history of the district. Where spraying was inadequate McIntosh was 100% affected and loss was heavy in other varieties. Foliage infection was also heavy, especially where no cluster-bud or pre-pink spray was applied (M.F. Welsh).

In the Guelph district, Ont., scab was less severe than in recent years. Hot, dry weather in mid-summer curbed spread and well-sprayed orchards were fairly free of the disease. (J.D. MacLachlan). Scab was moderately heavy on specimens received from a nursery at Windsor (D.B.O. Savile). Infection was serious in several orchards in the Niagara Peninsula. Unsprayed trees were seriously defoliated in July in the Laboratory orchard, St. Catharines. Infection ranged from 1.6 to 58% in sprayed plots. Scab was apparently less serious in other districts and only small amounts were seen in the Georgian Bay

area (G.C. Chamberlain). Relatively dry weather in spring and early summer and good conditions for spraying made scab easy to control in the Montreal district, Que., but some unsprayed trees were heavily infected (R. Desmarteau, F. Godbout). Scab was moderately heavy on leaves received from Hudson Heights (H.N. Racicot). Dry weather prevented serious development of scab at Quebec City, and it was soon checked where adequate spraying was practised. Ascospores were first seen on 12 May; they were abundant on 19 May and were found until mid-June (O. Caron).

Conditions in N.B. particularly favoured scab infection during the pre-bloom stages. The weather was extremely wet from 25 May to 14 June. Consequently scab was severe in unsprayed or poorly sprayed orchards. Ascospore discharge started on 26 May, and infections were first seen on 9 June on the undersides of leaves. Heavy infection combined with winter injury caused much defoliation in some orchards. Infection ranged from 0 to 100% (J.L. Howatt, S.F. Clarkson). Prolonged infection periods in May and June aided scab development in N.S. A three-day wet spell before the delayed dormant spray had been applied in most orchards coincided with the heaviest ascospore discharge of the season and resulted in considerable infection. Ascospores were discharged on 25 days in May and June. Primary infections were seen on 29 May. Spread of the disease continued at intervals throughout the season, and considerable late infection appeared in October on McIntosh, Wagner and other varieties. The intensity of ascospore discharge was less in 1948 than in some years, but this was offset by the frequency and duration of infection periods. Rainfall and spore discharge occurred for eight successive days just before bloom (J.F. Hockey). Scab was difficult to control and caused considerable loss in most orchards in P.E.I.; but little damage occurred in several that were very thoroughly sprayed (R.R. Hurst).

MOSAIC (virus). All the leaves of a Fameuse tree at Northampton, N.B., were mottled. This tree has been under observation for several years, during which it has borne no crop, but no spread seems to have occurred. The owner has now undertaken to remove the tree (S.F. Clarkson). The grafting programme in the Annapolis Valley, N.S., seems to have caused some spread of mosaic, which was seen on new scion wood in several orchards (J.F. Hockey).

BITTER PIT (non-parasitic) affected 15% of the fruit of 4 out of 7 Northern Spy trees in an orchard in Lincoln Co., Ont. Pitted fruits occur annually on these trees (G.C. Chamberlain). It was more common than usual this year at Guelph, especially on Spy (J.D. MacLachlan). Several specimens, all from isolated trees of Spy in N.B., were received (J.L. Howatt). Bitter pit was general and severe in N.S. on Stark, and was also seen on Gravenstein, Cox Orange, Northern Spy, Baldwin and other varieties. Losses ranged up to 65% (J.F. Hockey).

DROUGHT SPOT, etc. (boron deficiency). In the Okanagan Valley, B.C., growers are still experiencing some loss from die-back in trees on very light soil, even where the regular recommendations for boron applications have been followed. In such locations spray applications seem to be more effective than soil treatments (H.R. McLarty). No drought spot was seen in

the orchard in P.E.I., but it was recorded several times in imported fruit. Some die-back was seen, but it was not definitely known to be due to boron deficiency (R.R. Hurst).

MAGNESIUM DEFICIENCY caused leaf mottling in a young orchard at Lower Gagetown, N.B. The trouble was identified by Drs. O.L. Wyman and M.T. Hilborn, Dept. of Agriculture, Orono, Me. (S.F. Clarkson).

SOFT SCALD (physiological). A specimen of affected B.C. Jonathan was submitted from Montreal, Que., in Feb., 1948 (L.T. Richardson).

SPRAY INJURY occurred near Burlington, Ont., on unthrifty McIntosh sprayed with lime sulphur 1-60 plus lead arsenate (G.C. Chamberlain).

SUN SCALD. Specimens of McIntosh and other varieties were received from Cap St. Ignace, Montmagny Co., Que., in October (R.O. Lachance).

WINTER INJURY was exceptionally severe in 1947-48 in many parts of Ontario. The mild, open fall may have prevented the normal progress of dormancy, with consequent injury at the sudden advent of severe cold. Mild weather in late February, followed by sub-zero temperatures in early March may also have caused injury (J.D. MacLachlan). In many parts of N.B., McIntosh, in particular, suffered from winter injury as a result of five weeks of extremely cold weather in January and February. The damage varied from the killing of a few fruit and leaf buds to extensive killing of buds, twigs and small branches. Distortion of leaves and fruit accompanied by leaf and fruit drop was common in many orchards. Limb and trunk injury were reported on Linda and Sandow (J.L. Howatt, S.F. Clarkson). The winter in P.E.I., was favourable for apple trees and only one case of apparent winter injury was seen (R.R. Hurst).

PEAR

FIRE BLIGHT (Erwinia amylovora) was severe in only a few orchards in the Okanagan Valley, B.C. Growers have been given special warnings this fall to cut out infections, for it is felt that there has been a considerable build-up this season (H.R. McLarty). A severe outbreak in 1947, inadequate winter pruning, and a wet spring and summer in 1948 conspired to produce the worst fire blight situation for many years in the Kootenays. D'Anjou was less affected than other varieties (M.F. Welsh). In Lincoln Co., Ont., only scattered trees of Bartlett and one of Flemish Beauty were found with twig and branch infections (C.G. Chamberlain).

SCAB (Venturia pirina). In a commercial orchard of d'Anjou at Sidney, B.C., many overwintered pustules were found on the twigs in

April, despite an application of lime sulphur 1-16 in March. Later scab was very prevalent on foliage and fruit (W. Jones). Scab was severe on Flemish Beauty in the Salmon Arm and Oliver districts of the Okanagan Valley. The recommended spray schedule did not give adequate control at Salmon Arm (H.R. McLarty). In specimens of Flemish Beauty from B.C., placed in cold storage at Ottawa on 12 Oct., and submitted for examination on 27 Oct., extensive storage scab had developed (L.T. Richardson). The same conditions that produced an epidemic of apple scab in the Kootenays made this a season of very severe scab on Flemish Beauty (M.F. Welsh). In the Laboratory orchard at St. Catharines, Ont., Flemish Beauty trees were given a delayed dormant spray of 1% Krenite and foliage sprays of Phygon or Fermate according to the schedules used for apples. Both treatments were ineffective, 8% of the fruit being heavily scabbed (G.C. Chamberlain). Scab was very heavy on Flemish Beauty in imperfectly sprayed orchards in Queens Co., P.E.I. (R.R. Hurst).

STONY PIT (virus). Trees of d'Anjou in the Laboratory orchard, St. Catharines, Ont., grafted in 1946 with scions from suspected trees, bore nothing but pitted and worthless fruit (G.C. Chamberlain).

KILLING of TREES (cause unknown) occurred in various varieties in the Penticton, Naramata and Oliver districts, Okanagan Valley, B.C. Cultural conditions do not appear to be responsible and no parasitic organism has been found associated with the condition. The possibility of a virus is being examined (H.R. McLarty).

WINTER INJURY. Considerable injury occurred in pear orchards in parts of Ontario. See under Apple (J.D. MacLachlan).

QUINCE

LEAF BLIGHT (Fabraea maculata (Entomosporium m.). Specimens were received from Huntington, B.C. (H.N. Racicot, W. Toms, R.E. Fitzpatrick).

B. STONE FRUITS

APRICOT

CORYNEUM BLIGHT (Clasterosporium carpophilum) was very severe in those orchards in the Okanagan Valley, B.C., where it was present in 1947. Growers have applied a protective spray this fall, the first time that such a protective practice has been generally carried out (H.R. McLarty). This disease was unusually severe in unsprayed orchards in the Kootenays on fruit, leaves and twigs (M.F. Welsh).

FRUIT SPOT (Cylindrosporium sp.). Fruits with spots resembling those caused by Coryneum were received from two orchards in the Oliver district, Okanagan Valley, B.C. Examination showed masses of Cylindrosporium spores in each specimen. This is believed to be the first report of this

disease in B.C. (H.R. McLarty). The exact identity of this fungus is in doubt. It has been reported under the name C. Padi, but is apparently distinct, physiologically at least. All the isolates from Prunus spp. tested by Keitt (J. Agr. Res. 13:539-569. 1918) gave uniformly negative results on apricot.

BROWN ROT (Sclerotinia ?fructicola). Fruit rot and twig blight were common in the West Kootenay districts, B.C. (M.F. Welsh).

CHERRY

CORYNEUM BLIGHT (Clasterosporium carpophilum) was general and often caused serious defoliation in the lower mainland, B.C. In some orchards Shot hole was also present and made assessment of the blight injury difficult (I.C. MacSwan, R.E. Fitzpatrick). In the Kootenays, cherry trees adjacent to peach or apricot suffered severe leaf infection and some fruit infection (M.F. Welsh).

BLACK KNOT (Dibotryon morbosum) was abundant on wild cherry trees at Beaconsfield, Que. (H.N. Racicot). It was heavy near Quebec City, especially on trees in home gardens, which receive less attention than those in orchards (O. Caron). Infection was 40% on Prunus Mahaleb used for rootstocks at Kentville, N.S. (J.F. Hockey). Two severe cases were seen in gardens near Montague, P.E.I. (W.A. Hodgson, D.B. Robinson). Damage was very severe on wild and cultivated trees at Emerald Junction (R.R. Hurst).

SHOT HOLE (Higginsia hiemalis) was very prevalent and caused considerable defoliation in the lower Fraser Valley, B.C. (R.E. Fitzpatrick). Many orchards in the West Kootenay districts were almost defoliated by mid-summer (M.F. Welsh). Shot hole was generally of little importance in the Niagara district, Ont., until the onset of fall rains. On unsprayed trees at St. Catharines percentage infection of sweet cherry varieties was as follows: Schmidt's Bigarreau 9.2, Yellow Spanish 10.4, Elkhorn 19.0, Windsor 21.5, Napoleon Bigarreau 25.2, Gov. Wood 26.0, Bing 53.6, Black Tartarian 57.8. On unsprayed Montmorency sour cherries infection was 17.1% (G.C. Chamberlain). Shot hole caused complete loss of crop in trees at Highfield, P.E.I. (D.B. Robinson, W.A. Hodgson).

BROWN ROT (Sclerotinia fructicola). In the West Kootenay districts, B.C., some blossom blight occurred and there was severe fruit rotting in the orchard. Unsprayed crops were not fit for picking. In Creston Valley there was some decay of fruit during packing and transit (M.F. Welsh). On unsprayed trees in the Laboratory orchard, St. Catharines, Ont., the percentage of blighted blossoms on unsprayed sweet cherry trees was as follows: Black Tartarian 6.2, Elkhorn 11.0, Bing 13.2, Gov. Wood 18.9, Windsor 19.3, Napoleon Bigarreau 21.7, Yellow Spanish 39.6, Schmidt's Bigarreau 44.0. Rot of mature fruit was of no importance. Blossom blight and stem rot ranged from about 10 to 20% in orchards of Montmorency sour cherries in Lincoln Co. (G.C. Chamberlain).

WITCHES' BROOM (Taphrina Cerasi) was severe on a few trees in a home orchard at Brentwood, B.C. (W. Jones). It was seen at several places on the lower mainland (R.E. Fitzpatrick).

VERTICILLIUM WILT (Verticillium sp.). In a 2-year-old orchard in Lincoln Co., Ont., on soil devoted to tomato growing for 13 years, Hedelfingen was outstandingly susceptible in comparison with Lambert and Bing (G.C. Chamberlain).

GREEN RING YELLOWS (virus) was found in 6 orchards of Montmorency or Early Richmond sour cherries in the Niagara Peninsula, Ont., infection ranging from 0.5 to 2.8%. Infection of all trees examined was 0.31%, of which 0.125% was recurrent and 0.185% was new infection (R.S. Willison).

LITTLE CHERRY (virus). Further inspections have failed to reveal any little cherry in the Okanagan Valley, B.C., or at Edgewood, Needles and Grand Forks between the Okanagan and the Kootenays. Inspections were made by staffs of the Summerland Laboratory, Plant Protection Division, and the Horticulture and Plant Pathology Branches of the Provincial Department of Agriculture (W.R. Foster). Little cherry was seen in a few more of the remaining healthy orchards in the Kaslo and Creston districts in the Kootenays. In general, fruit from infected trees was slightly larger but with poorer flavour this year than previously, apparently because of the wet season (M.F. Welsh).

NECROTIC RING SPOT (virus). Orchards of Montmorency and Early Richmond sour cherries in the Niagara Peninsula, Ont., were again surveyed. In 5 orchards (892 trees) examined for the first time, shock symptoms ranged up to 0.9% (av. 0.2%) and etching, etc., often obscured by spray residue, averaged 1.0%. In orchards surveyed at least once previously, 36.5% of the trees were definitely infected, as judged by symptoms in one or more years, but the percentage of shock symptoms was so low in all but one of these that it is believed that infection is near the saturation point in the majority. Inoculation experiments this year indicated that shock symptoms on sour cherry nearly or quite indistinguishable from each other are the initial symptoms of tatter leaf, yellows and prune dwarf as well as necrotic ring spot. Thus these other diseases may in part pass as necrotic ring spot. The histories of some of the trees in the surveyed orchards suggest that other viruses have actually been involved to some extent in the production of shock symptoms (R.S. Willison).

RASP LEAF (virus). No further spread could be found at Erickson, B.C., and symptoms in the 6 affected trees were less pronounced than in 1947. Symptoms are very similar to those seen in the Okanagan Valley, but not identical (M.F. Welsh).

REVERSION (virus). A single tree of Late Duke at Creston, B.C., several years ago developed the habit of ripening its fruits unevenly, ripe ones and very small green ones being present simultaneously through the summer. The disease was identified by E.L. Reeves, U.S.D.A., Wenatchee, Wash. First report to the Survey (M.F. Welsh).

TATTER LEAF (virus). In 7 sweet cherry orchards in the Niagara Peninsula, Ont., surveyed for the first time, definite infection was 0.0-21.6 (av. 8.0)%, and suspected infection was 1.2-35.4 (av. 13.5)%. In 23 orchards previously surveyed definite infection averaged 15.9%, including 2.4% symptomless in 1948, and suspected infection averaged 16.1%, including 8.9% symptomless in 1948. Necrotic ring spot of sour cherries may cause slight tattering or necrotic spotting of some varieties of sweet cherries. These figures may, therefore, include some necrotic ring spot. In the varieties tested, tatter leaf has always shown definite symptoms annually. Trees infected with tatter leaf in 1948 tended to occur in groups near trees infected previously (R.S. Willison).

TWISTED LEAF (virus). One tree of Bing at Osoyoos, B.C., showed severe twisted leaf and other symptoms not usually seen in this disease. This orchard has been under observation for many years and is not close to any known infected trees (T.B. Lott).

YELLOWS (virus). In 5 orchards of Montmorency and Early Richmond sour cherries in the Niagara Peninsula, Ont., surveyed for the first time, 24.9% of trees were definitely infected and 3.8% suspected. In 22 orchards surveyed once or more previously infection was 41.2%, of which 9.9% was new. The range of total incidence was 5.1 to 90.9% and of new outbreaks was 0.0 to 39.6% in these orchards (R.S. Willison).

CRINKLE (bud sport) varied from 0 to 6% in 7 sweet cherry orchards examined for the first time in the Niagara Peninsula, Ont. In 23 orchards previously surveyed it ranged from 0 to 57% (R.S. Willison).

DIE BACK (boron deficiency). Symptoms are appearing in a number of orchards scattered through the Kootenays, B.C. Apparently cherry plantings have seldom been included in the regular boric acid applications (M.F. Welsh).

DISTORTING NECROSIS (cause unknown). The leaves of 3 trees in a block of 161 Seneca sweet cherries in Lincoln Co., Ont., were small, pale and distorted, with irregular necrotic areas. The trees appeared to be dying and adjacent trees were either dead or had been removed (R.S. Willison).

MOTTLED FOLIAGE (cause unknown). In 7 sweet cherry orchards in the Niagara Peninsula, Ont., surveyed for the first time, 19.6% of the trees showed various forms of mottling, 6.7% being associated with tatter leaf. In 23 orchards previously surveyed 30.4% of the trees showed mottling, 15.6% being associated with tatter leaf or crinkle. Some trees showed symptoms in 1947 but not in 1948; in general, however, the trouble increased (R.S. Willison).

Four trees in a block of 35 sweet cherries in Lincoln Co., Ont., showed pale green or yellow leaves with dark green rings, spots or lines. The trees were $\frac{1}{4}$ to 1/3 defoliated when inspected in June, and affected leaves were still dropping. A similar condition was seen in a tree of

Napoleon Bigarreau at the St. Catharines Laboratory in 1946; symptoms did not recur in 1947, and only a few leaves were affected in 1948 (R.S. Willison).

SMALL BITTER CHERRY (cause unknown). The extent of this trouble in the Okanagan Valley, B.C., principally on Bing, was much the same as in 1947 (T.B. Lott).

YELLOW FOLIAGE (cause unknown). In 28 out of 67 trees of Hedelfingen sweet cherry in an orchard in Lincoln Co., Ont., the leaves tend to become clear yellow and some of them fall prematurely. The symptoms are recurrent. The condition suggests some root or crown trouble, but none has been found. Aphids were not prevalent (R.S. Willison).

NECTARINE

BROWN ROT (Sclerotinia fructicola) was severe on fruit in a home orchard at Yale, B.C. (R. Hall, W. Jones).

PEACH

CORYNEUM BLIGHT (Clasterosporium carpophilum) was general for the first time in the Okanagan Valley, B.C., in peach orchards adjacent to infected apricots. Several growers applied fall sprays (H.R. McLarty). It was unusually severe throughout the Kootenays in unsprayed orchards, especially on the fruit (M.F. Welsh).

BLOSSOM BLIGHT and BROWN ROT (Solerotinia fructicola). Loss from fruit rot was heavy throughout the Kootenays, B.C., on all varieties. In the Robson district blighting of Rochester extended from the twigs into the main limbs. Less severe twig and branch blight occurred elsewhere in the West Kootenays (M.F. Welsh).

Spray tests for the control of blossom blight were again carried out at the Laboratory, St. Catharines, Ont., with results as follows:

Variety	Treatment	Blossom Blight (%)
Elberta (Significant difference 1.4%)	Mulsoid sulphur, 1 spray	5.9
	" " , 2 sprays	0.7
	" " plus P.E.P.S., 1 spray	6.4
	" " plus P.E.P.S., 2 sprays	4.9
	Magnetic 70 paste, 1 spray	8.9
	" " " , 2 sprays	3.7
	Check	2.5
	Bartlett's sulphur, 1 spray 1/	12.2
	Phygon, 1 spray 1/	8.4
Rochester (Significant difference 2.24%)	Mulsoid sulphur, 1 spray	12.6
	" " 2 sprays	8.4
	" " plus P.E.P.S. 1 spray	11.2
	" " plus P.E.P.S. 2 sprays	8.2
	Magnetic 70 paste, 1 spray	12.8
	" " " , 2 sprays	9.9
	Check	15.3
Valiant	Check	3.54
	Mulsoid sulphur	5.36
	" " plus P.E.P.S.	4.17
	Check	4.69
	"Quick job" 2/	8.35
	Extra spray	4.64
	Check	5.20

1/ In Separate Block

2/ Slapdash, careless application simulating practice in some commercial orchards.

The weather during the bloom period was wet and cool with frequent drizzles (R.S. Willison). Spraying for blossom blight has often been disappointing, and has occasionally, according to Dr. Willison, tended to give increased infection; but the 1948 results for Elberta and Valiant are too remarkable to be ascribed to chance. The obvious moral from the Valiant tests is that a poor spray job may be worse than useless. The cause of the increased infection in several spray plots remains in doubt. It could conceivably be a mechanical washing of spores into the nectaries, lowered osmotic pressure of the nectar, or direct stimulus of the pathogen; but it seems likely that it is, at least in part, a destruction of the normal microflora of the blossoms analagous to that of wheat, shown by P.M. Simmonds (Sci. Agr. 27:625-632. 1947) to be antagonistic to Helminthosporium sativum (D.B.O.S.).

Control of brown rot in the harvested fruit in the Niagara Peninsula was quite satisfactory, in contrast to the blossom blight tests. In Elberta, total wastage up to the 7th day after harvest was 28.1% in the checks and varied from 10.7 to 20.9% in the various treatments; fruit moth injury added appreciably to the amount of infection. Rochester showed 63.0% wastage up to the 8th day in the checks and 14.7 to 32.2% in the sprayed plots. In Valiant, wastage up to the 6th day was 15.4 to 33.8% in the checks, being least in a central block that probably was partly protected by drifting spray from adjacent treated trees; wastage in sprayed blocks was 2.0 to 6.6%, the last figure being for the "quick job" described above in the blossom blight tests. Surveys of commercial orchards in the Niagara Peninsula showed that incidence of brown rot was closely correlated with fruit moth injury. Weather conditions were reasonably uniform and favourable through the harvest periods of the various varieties; consequently it was possible, for the first time in these investigations, to demonstrate varietal differences in susceptibility to brown rot. By calculating the percentage of moth-injured fruit attacked by brown rot in sprayed and unsprayed plots, varieties were found to range in decreasing order of susceptibility from Rochester (67.5%, 75.7%) through Fisher, Elberta, Vedette, Valiant and Oriole to Veteran (0.0%, 15.4%) (R.S. Willison). Brown rot destroyed 30% of the crop of Early May at the Station, Kentville, N.S.; the crop was light owing to winter injury (K.A. Harrison).

POWDERY MILDEW (Sphaerotheca pannosa) was less serious than usual in the Okanagan Valley, B.C., perhaps because of the unusually wet season; but it should be noted that the wet weather did not curb apple mildew in the southern sections (H.R. McLarty).

LEAF CURL (Taphrina deformans) was quite severe and general on the lower mainland, B.C. (R.E. Fitzpatrick, I.C. MacSwan). It was exceptionally serious in the Okanagan Valley, B.C., and some unsprayed orchards were defoliated. It may be noted that the pink stage, lime sulphur spray, for the control of twig borer, gave a measure of control in most orchards (H.R. McLarty). Leaf curl was severe in Creston Valley and very severe in West Kootenay where unsprayed trees were completely defoliated (M.F. Welsh). Specimens were received from Queenstown and Ingersoll, Ont. (J.D. MacLachlan). It was conspicuous in many orchards in the Niagara Peninsula, its occurrence always indicating inadequate spraying (G.C. Chamberlain).

WESTERN X DISEASES (virus). Some trees in the Okanagan Valley, B.C., showed striking symptoms, but on the average symptoms were less pronounced than usual. New infections in 9 mapped orchards were only 4 trees compared with the average of 21.7 per year since 1940 (T.B. Lott).

X DISEASE (virus). Single trees of Rochester and Swan were found infected in the border rows of an orchard in Lincoln Co., Ont. (G.C. Chamberlain).

PLUM

LEAF SPOT (?Cladosporium carpophilum). Specimens were received from Minden, Ont., with a report that the tree had been defoliated. Cladosporium sp. fruited fairly consistently on the spots and may have been the cause; but C. carpophilum is generally regarded as a fruit parasite on this host, although it is known to cause a leaf spot occasionally on peach (G.C. Chamberlain, D.B.O. Savile).

SCAB (Cladosporium carpophilum). Specimens were received from Cobden, Ont. (L.T. Richardson).

CORYNEUM BLIGHT (Clasterosporium carpophilum) was severe in the lower mainland, B.C. (R.E. Fitzpatrick, I.C. MacSwan).

BLACK KNOT (Dibotryon morbosum) was general in a neglected orchard of damson plums at North Saanich, B.C. (W. Jones). It was widespread and severe in the lower mainland (R.E. Fitzpatrick, I.C. MacSwan). Progress has been made in reducing the amount of black knot in plums in the Fraser Valley. The Indian Affairs Branch has considerably reduced the main source of infection on the reserves. Over one thousand illustrated circulars were distributed and an article was prepared for newspapers in the area. There are still many roadside trees that should be destroyed (W.R. Foster). An unusually large number of specimens was received from various parts of Ont. (J.D. MacLachlan). Scattered infections caused slight damage in a planting of Stanley prune in Lincoln Co.; the variety seems to be quite susceptible (G.C. Chamberlain). Specimens were received from Willowdale, near Toronto (L.T. Richardson). Specimens were brought in from a garden in Montreal, Que., in which it was said to be severe (J.E. Jacques). It was abundant near Quebec City, especially in home gardens (O. Caron). Between 30 and 40 knots were seen on a single tree at Kentville, N.S., necessitating removal of more than half the top (K.A. Harrison).

BROWN ROT (Sclerotinia fructicola) was heavy in a garden at Ottawa, Ont. (H.N. Racicot).

PLUM POCKET (Taphrina communis). Infection was 100% on a single tree in a small mixed orchard near Vancouver, B.C. (H.N.W. Toms). It was destructive on individual trees throughout Montreal, Que., and was seen at St. Hyacinthe (J.E. Jacques). Infection was almost 100% on a

tree in a garden at Granby, and specimens were received from Knowlton (H.N. Racicot). In the Quebec City region plum pocket is not receiving enough attention from growers and completely destroys the crops of neglected trees (O. Caron). Half the crop of several trees in Westmorland Co., N.B., was destroyed (J.L. Howatt).

BACTERIAL BLIGHT (Xanthomonas pruni) caused a scattered fruit spotting and leaf shot hole of Shiro in Lincoln Co., Ont. (G.C. Chamberlain).

PRUNE DWARF (virus). One affected tree of Italian prune was seen at Oliver, B.C. The only other occurrence of this disease in the Pacific Northwest known to the writer was that at Penticton reported in P.D.S. 20:82. 1941 (T.B. Lott).

STEM-END SHRIVELLING (?physiological). An unusual shrivelling that started at the stem end of prunes shortly before picking, at Grand Forks and quite generally in the Okanagan Valley, B.C., caused affected fruit to be graded as cull. The cause is unknown, but it is thought to have been a result of the cool, rainy season (G.E. Woolliams).

SAND CHERRY

BROWN ROT (Sclerotinia fructicola). Specimens were received from Eganville, Ont. (H.N. Racicot).

C. RIBES FRUITS

CURRANT

WHITE PINE BLISTER RUST (Cronartium ribicola). At Glenora, B.C., rust was general on Red Lake red currant. It was also general on all varieties of black currant except O-381 (W. Jones), O-381 (Crusader) and O-393 are the immune varieties produced from a cross between Ribes ussuriense and R. nigrum var. Kerry (P.D.S. 23:88-89. 1944). G.G. Hahn (Phytopath. 38:451-456. 1948) reports these two varieties as immune to blister rust inoculum from Conn., Me., Va., and Wis., but moderately susceptible to Sphaerotheca mors-uvae (I.L.C.). Blister rust was unusually severe at Winndel, Creston Valley, on all black currant varieties, most plantations being defoliated by mid-summer (M.F. Welsh). Rusted currant specimens were received from Larder Lake, Glencoe, St. Thomas, Norval and Thornhill, Ont. (J.D. MacLachlan). It was common and caused premature defoliation of black currants in the Niagara Peninsula, and specimens were received from Kemptville (G.C. Chamberlain). All red and black currants examined in the Grand Lake district, N.B., were heavily infected, but no rust was seen on the Ottawa hybrids at Fredericton (J.L. Howatt). Black currants were moderately infected at Kentville, N.S. (C.O. Gourley). A severe outbreak was seen at Montague and less serious ones at Summerside and Charlottetown, P.E.I. (D.B. Robinson, W.A. Hodgson).

ANTHRACNOSE (Drepanopeziza Ribis) was moderately heavy on red currants at Melfort, Sask. (H.W.M.).

POWDERY MILDEW (Sphaerotheca mors-uvae) was general in a one-acre planting of black currants at Victoria, B.C. (W. Jones). It was severe on red currants in gardens at Edmonton, Alta. (T.R. Davidson), and specimens were received from Trochu and Strome (A.W. Henry). Mildew was seen on black currants at several points in Ont. (J.D. MacLachlan). In variety tests of currants at Ste. Anne de la Pocatiere, Que., most of the plants were attacked in spite of spraying, but injury was mainly on the latest leaves produced (A. Payette). At Kentville, N.S., lime sulphur 1-50 gave good mildew control on red and black currants (C.O. Gourley).

GOOSEBERRY

ANTHRACNOSE (Drepanopeziza Ribis). Specimens were received from a nursery at Port Burwell, Ont. (G.C. Chamberlain). At Kentville, N.S., a slight infection was seen on 0-275 early in June. It increased steadily throughout the season on unsprayed plants (C.O. Gourley).

SEPTORIA LEAF SPOT (Mycosphaerella Grossulariae). A trace was seen late in the season at Kentville, N.S. (C.O. Gourley). A light infection, coupled with insect injury, caused slight damage at Charlottetown, P.E.I. (W.A. Hodgson, D.B.O. Savile).

CLUSTER CUP RUST (Puccinia Pringsheimiana). Traces occurred at the Botanical Garden, Montreal, Que. (J.E. Jacques). A light infection caused slight damage at Kentville, N.S. Organic fungicides did not appear to give appreciable control (C.O. Gourley).

POWDERY MILDEW (Sphaerotheca mors-uvae) was severe in some gardens at Edmonton, Alta. (T.R. Davidson). The entire crop of five bushes in a garden at Ste. Anne de la Pocatiere, Que., was lost, although no leaf infections could be seen (A. Payette). Specimens were received from St. Philippe de Neri, Kamouraska Co. (H.N. Racicot). It was observed at Kentville, N.S. (C.O. Gourley).

POTASSIUM DEFICIENCY caused considerable defoliation in the gooseberry planting at the Station, Kentville, N.S. Potash deficient plants showed increased susceptibility to Septoria leaf spot (C.O. Gourley).

D. RUBUS FRUITS

BLACKBERRY

CROWN GALL (Agrobacterium tumefaciens) was general and caused moderate injury in a 9-acre planting of Himalayaberry, Rubus procerus, at Keating, B.C. (W. Jones).

BOYSENBERRY

SEPTORIA LEAF SPOT (Mycosphaerella Rubi) was general and caused moderate damage in a commercial planting at Saanichton, B.C. (W. Jones).

LOGANBERRY

DRY BERRY (Haplosphaeria deformans) was moderately heavy in a few plantings at Keating, B.C. (W. Jones).

SEPTORIA LEAF SPOT (Mycosphaerella Rubi) caused considerable damage to leaves and fruit pedicels of loganberry at Keating and Salt Spring Island, B.C., and of Rubus macropetalus at North Saanich (W. Jones).

DOWNY MILDEW (Peronospora Rubi Rab.) was fairly general in low-lying wooded areas at Saanichton and Sidney, B.C., on Rubus macropetalus. See also under Raspberry (W. Jones).

RASPBERRY

CROWN GALL (Agrobacterium tumefaciens). Specimens were received from Creemore and Fort Erie, Ont. (J.D. MacLachlan). It was found on plants of Latham rogued for virus infection at Campbellford and Port Burwell, Ont., but damage was negligible (G.C. Chamberlain). A few plants of Washington were found to be infected at Kentville, N.S., during roguing; some canes were killed (K.A. Harrison). All 25 plants in a garden planting of Viking at Charlottetown, P.E.I., were infected and seriously injured (R.R. Hurst).

CANE BLIGHT (Botrytis cinerea). A moderate infection occurred on several varieties at the Agricultural College, Truro, N.S., and in a few home plantings in the vicinity (J.F. Hockey).

SPUR BLIGHT (Didymella applanata). Infection was light in commercial plantings at Edmonton, Alta. (T.R. Davidson). It was commonly found in plantings throughout central and southern Ont., especially on Latham although all commercial varieties appear susceptible. In one Taylor plantation in Lincoln Co. 56% of the canes bore lesions (G.C. Chamberlain). Two heavily lesioned lengths of cane were received from Pembroke. Infection was a trace in one acre of Viking and $\frac{1}{4}$ acre of Latham near Ottawa, and was moderately heavy on other specimens brought in from the district (H.N. Racicot). Spur blight was heavy and caused severe damage to Viking in Queens Co., P.E.I. (R.R. Hurst).

ANTHRACNOSE (Elsinoe veneta). Specimens were received from Teeswater and Woodstock, Ont. It was severe in a plantation of black raspberries at Guelph (J.D. MacLachlan). In a nursery at Port Burwell anthracnose was very extensive on black raspberries, especially Morrison, which was seriously injured; infection was also moderate on Sodus and Marion purple raspberries (G.C. Chamberlain). Infection was a trace in one acre of Viking and $\frac{1}{4}$ acre of Latham near Ottawa (H.N. Racicot). Anthracnose was severe in a planting

at Berthier, Que. The fungus fruited on the berries (R.O. Lachance). Anthracnose lesions appeared on half the new growth in a Viking plantation at Waterville, N.S. (K.A. Harrison). Viking was severely injured at Charlottetown, P.E.I. (R.R. Hurst).

ROOT KNOT (Heterodera marioni). A light infestation was found on a few plants at the University of British Columbia, Point Grey, B.C. (H.N.W. Toms). This appears to be the first report to the Survey of this nematode on Rubus.

CANE BLIGHT (Leptosphaeria Coniothyrium) destroyed 30% of the canes in a commercial planting at St. Norbert, Man. (W.A.F. Hagborg).

SEPTORIA LEAF SPOT (Mycosphaerella Rubi) caused a general leaf spotting and a die back of fruiting canes of cultivated black raspberry, Rubus occidentalis, at Duncan, B.C. It appeared that canes became infected during the first year but were not killed back until the following year. Leaf spot was common on wild R. occidentalis at Ladysmith (W. Jones).

DOWNY MILDEW (Peronospora Rubi Rab.) was prevalent in August on Rubus parviflorus (Anoplobatus) and R. spectabilis (Idaeobatus) in sheltered, low-lying areas at North Saanich, B.C. (W. Jones, W. Newton). See also under Loganberry. These appear to be the first records of P. Rubi in Canada. Since a species of the section Idaeobatus is included in the hosts recorded above, it is conceivable that cultivated raspberry might be attacked; but, as the fungus was confined to moist situations even in an unusually wet season, little fear need be entertained of its becoming a serious raspberry disease. The fungus is probably endemic on the west coast of Vancouver Island where higher rainfall occurs (D.B.O. Savile).

YELLOW RUST (Phragmidium Rubi-idaei) was common on wild Rubus occidentalis at Ladysmith, B.C. A general infection occurred in a plantation of Washington at Glenora. Leaves and petioles were infected and shrivelling of fruit spurs resulted, with substantial reduction of yield (W. Jones). The effect of yellow rust on Washington, until recently favoured for its resistance, appears to be serious and control measures are necessary (W.R. Foster). This is the fourth year since Washington was first reported rusted in B.C. See P.D.S. 25:97 and 27:95 (D.B.O.S.). Yellow rust was quite general in much of the B.C. interior; damage ranged from negligible on some varieties to quite extensive on others (G.E. Woolliams).

ROOT ROT (Phytophthora sp.). Oospores of Phytophthora sp. were abundant in the fibrous roots of raspberry plants submitted from Courtenay, B.C. The grower stated that many of the plants were dying. Root symptoms were somewhat similar to those of strawberry red stele (W. Jones).

LATE YELLOW RUST (Pucciniastrum americanum) caused some defoliation of Newburgh and Viking in a nursery at Arkona, Ont., but did not noticeably attack other varieties (G.C. Chamberlain).

POWDERY MILDEW (Sphaerotheca Humuli). Specimens were received from Watford, St. Thomas, Coldwater and Newmarket, Ont. (J.D. MacLachlan). Mildew was more or less general in all Latham plantings examined, especially in propagation beds. Severe infection caused stunting or spindly growth. Scattered infections were also seen on Madawaska, Ottawa and Viking (G.C. Chamberlain). Infection was a trace in one acre of Viking and ¼ acre of Latham near Ottawa (H.N. Racicot).

WILT (Verticillium albo-atrum) attacked and killed 5% of the canes in a Viking plantation in Welland Co., Ont., on land that had previously been used for tomatoes (G.C. Chamberlain). An infected specimen of Viking was received from Aylmer East, Que. (H.N. Racicot).

LEAF CURL (virus) and mosaic were more conspicuous than usual at Saskatoon, Sask. (T.C. Vanterpool). A trace, with severe stunting of affected plants, was seen in a plantation of Chief in southern Ont. (G.C. Chamberlain). A trace occurred in one acre of Viking near Ottawa (H.N. Racicot). Traces were found in two plantations in York Co., N.B. (D.J. MacLeod).

MOSAIC (virus) affected a few plants of Rubus occidentalis in a commercial planting at Duncan, B.C. The symptoms were well defined (W. Jones). Considerable mosaic was encountered in 7 nursery plantings of Latham, 2 of Cuthbert and Chief, and one of Trent and Viking in Ont. (G.C. Chamberlain). Traces were found in one acre of Viking and ¼ acre of Latham near Ottawa; specimens of an unnamed variety were also received from the Ottawa district (H.N. Racicot). Infection was 2% in a Latham plantation in Sunbury Co., N.B. (D.J. MacLeod). Five per cent of a new Viking planting at North Kingston, N.S., was infected (K.A. Harrison). Traces to 50% infection were found in various plantings examined in P.E.I. (R.R. Hurst).

YELLOW MOSAIC (virus) was seen in plantings of Ottawa and Taylor in Ont.; plants were markedly stunted (G.C. Chamberlain).

WINTER INJURY. Many specimens apparently affected by winter injury were received from various parts of Ont. (J.D. MacLachlan). Winter injury resulted in the death of 35% of the canes in a plantation of Taylor near St. Catharines. Spur blight was heavy in this plantation before the injury and unquestionably weakened the canes and later killed some that might have recovered; but winter injury was most severe in a few rows on one side of the planting, whereas spur blight infection was quite uniform (G.C. Chamberlain).

E. OTHER FRUITS

BLUEBERRY

A special survey was made by Mr. D.W. Creelman in mid-August, 1948, of the principal blueberry growing areas in the Maritime Provinces. The survey embraced areas in Kings and Queens Counties, P.E.I.; Westmorland, Northumberland, Restigouche, Gloucester, and Charlotte Counties, N.B.; and Kings, Digby, Cumberland, and Yarmouth Counties, N.S.

The following diseases were observed on wild lowbush blueberries:-

RED LEAF (Exobasidium Vaccinii) was by far the most widespread and serious disease encountered in 1948. It was recorded in all fields surveyed. Infected plants did not bear fruit and became defoliated soon after the fungus sporulated. Red leaf is the first disease to appear after burning. It was impossible to determine whether the disease seen in newly burned fields arose from systemic infection of the rhizomes of burned-off clones or from fresh infection by spores. The great variability in the development of separate infections in the same field suggested that both conditions might occur.

WITCHES' BROOM (Calyptospora Goeppertiana) was recorded in every county surveyed except Queens Co., P.E.I. Although only a limited number of shoots was affected in any one clone, the number of clones infected was very high in some fields. Again, no estimate was possible of the relative amounts of infection arising from systemic mycelium and from spores in the newly burned fields. The alternate host, Abies balsamea, grows in abundance in all the areas surveyed.

LEAF RUST (Thekopsora Vaccinierum) was not found even in fields close to the alternate host, Tsuga canadensis.

LEAF SPOTS (cause undetermined) were severe in Kings Co., P.E.I., Kings Co., N.S., and every county in N.B., especially Westmorland Co. Macroscopically there appear to be two distinct types, a red leaf spot and a brown leaf spot.

Defoliation was evident where leaf spot was severe. Growers state that yields and size of fruit are reduced where leaf spots were severe the previous year.

In newly burned fields new leaf spot infection is noticeable early in August. The intensity of infection increases annually as the time from the burn increases. In Yarmouth Co., N.S., where burning is practiced in some fields in alternate years, leaf spots are not serious.

POWDERY MILDEW (Microsphaera Alni var. Vaccinii) was found in Kings and Queens Counties, P.E.I., and in all counties of N.B. It was not found in N.S. during the survey, but it has been previously observed in the province. Powdery mildew was not severe in any fields but it is known that the disease may become severe and cause extensive defoliation later in the season.

MUMMY BERRY (Sclerotinia Oxydocci) was seen in all areas surveyed and was particularly noticeable in Northumberland and Restigouche Counties, N.B. In these counties the crop was somewhat later in ripening and fewer of the affected fruits had dropped. Mummied berries could easily be found on the ground in Kings Co., P.E.I. Severity of the disease could be better estimated in July.

TWIG and SHOOT BLIGHTS were recorded in all areas, the intensity varying from a blighting of individual tips to a killing of the entire shoot. Isolations from blighted twigs collected in Kings Co., N.S., yielded a Sclerotinia, probably S. Oxycocci, and Phomopsis Vaccinii. In some fields, notably one in Kings Co., P.E.I., plants over areas 4-5 feet in diameter were completely dead. The loss of crop is probably considerable.

STERILITY of entire clones was frequently observed.

PHYSIOLOGICAL DISORDERS. The cause was not determined. A wide range of symptoms, consisting chiefly of reddening of the foliage and dwarfing of the leaves, was noticed in some fields, particularly those on light soils. These symptoms are attributed to nutritional disorders, drought, or a combination of the two.

DIE BACK and CANKER (Godronia Cassandrae). Observations made on plantings of the high-bush blueberry in the Maritime Provinces this year have shown that all the diseases reported in the wild blueberry, with the exception of the leaf spots and red leaf, were present on the cultivated crop. In addition, die back and canker was again reported causing considerable injury. One planting near Kentville, N.S., composed largely of two-year old plants, suffered considerable loss of potential fruiting canes from Godronia this spring. The organism may be a virulent pathogen or a weak parasite of high-bush blueberry following winter injury. Evidence obtained to date is contradictory. If the damage observed this year were found to occur regularly this disease could well be a limiting factor in production.

STUNT (virus) was again recorded in two fields in Kings Co., N.S., and its appearance in an entirely different section of one planting suggests that some natural spread of the disease has occurred since last year.

BLOSSOM BLIGHTS (Sclerotinia Oxydocci and Botrytis cinerea) caused some damage in Kings Co., N.S.

The wild blueberry industry is one of considerable importance. The yield in N.B., is variously estimated at three to five million pounds and the yield for the three provinces is probably double that amount.

Although plant diseases and insect pests reduce crop yields considerably they are not considered the major problem in blueberry production. More serious are problems in cultural management especially the role of burning and the use of mineral fertilizers in maintaining a profitable stand of plants. The control of weeds, ranging from grasses to trees, is also a problem as these unwanted plants crowd out the bushes and make the economical harvesting of the crop more difficult or impossible.

Other Observations

RED LEAF (Exobasidium Vaccinnii) caused considerable loss at Ste. Anne de la Pocatiere and was also observed at Riviere Ouelle and St. Alphonse de Joliette, Que. (A. Payette).

CANKER (Godronia Cassandrae) is the most serious disease of the cultivated blueberry in B.C. It is particularly injurious in the younger plantations (R.E. Fitzpatrick).

CRANBERRY

LEAF BLIGHT (Naevia Oxycocci) caused heavy damage to wild Vaccinium macrocarpon at Ste. Anne de la Pocatiere, Que. Previously reported from N.B. (P.D.S. 21:71 and 22:82) (A. Payette, D.B.O. Savile).

RED GALL (Synchytrium Vaccinii). Infection was only a trace and damage was negligible in a bog at Port Mouton, N.S. This bog was heavily infected in 1938 and in previous years, but proper control of flooding has practically eliminated the disease. See P.D.S. 13:51, 16:55, 17:57, 18:80, 19:85 (D. Creelman).

FALSE BLOSSOM (virus). A trace was seen at Southampton, N.S. (D. Creelman).

GRAPE

WHITE ROT (Coniothyrium diplodiella (Speg.) Sacc.). Specimens were received from Meaford and Port Elgin, Ont. (J.D. MacLachlan). Not previously noted in the Survey, but reported from Winona and St. Catharines, Ont., by J.E. Howitt (Sci. Agr. 3:189. 1923), who stated that Agawam was quite susceptible. First reported in the United States in 1887. Apparently a minor parasite, readily controlled by the black rot schedule. Known also from Italy, France, Switzerland and England (D.B.O.S.).

DEAD ARM (Fusicoccum viticola). Infection was 10-12% in one Concord vineyard of 1100 vines in Lincoln Co., Ont. It is common in the Niagara Peninsula especially on Concord (G.C. Chamberlain).

BLACK ROT (Guignardia Bidwellii). A 5% infection was found scatteringly in a 5 acre vineyard of Concord at Smithville, Lincoln Co., Ont. (G.C. Chamberlain).

DOWNY MILDEW (Plasmopara viticola). Specimens were received from Meaford, Ont. (J.D. MacLachlan). In an unsprayed vineyard of Fredonia in Lincoln Co., Ont., 70-80% of the vines bore mildew infection; the damage was considerable because of loss of fruit clusters. Adjacent Agawam and Delaware, considered to be highly susceptible, showed only a trace of foliage infection (G.C. Chamberlain). Specimens showing considerable fruit infection were received from Hants Co., N.S. (J.F. Hockey).

POWDERY MILDEW (Uncinula necator) was prevalent on European grape varieties at the Experimental Station, Summerland, B.C., causing severe damage to both fruit and foliage (G.E. Woolliams). A specimen was received from Montreal, Que. (H.N. Racicot).

CHLOROSIS (cause unknown) affected 52% of the vines in one area of a Concord vineyard in Lincoln Co., Ont. It has occurred annually in this vineyard for 10 years (G.C. Chamberlain).

HERBICIDE INJURY. Stunting and distortion of the foliage of Concord in Welland Co., Ont., occurred in July as a result of roadside spraying with 2,4-D. The vines recovered later in the season (G.C. Chamberlain).

STRAWBERRY

LEAF BLIGHT (Dendrophoma obscurans (Ell. & Ev.) Anderson) caused about as much injury to strawberry foliage at Ottawa, Ont., as leaf spot or scorch. The lesions were medium to dark brown, mostly at the edges or tips of the leaflets and triangular; those in the blade were round or irregular. The fungus fruited only when infected leaves were placed in moist chambers. (See H.W. Anderson. Ill. Agr. Exp. Sta. Bull. 229. 1920). The disease was also found at St. Catharines and Park Hill (Joan E. Fall, H.N. Racicot).

LEAF SCORCH (Diplocarpon Earliana) affected all the plants in a small part of a field of Senator Dunlap in Carleton Co., Ont. (L.T. Richardson). It was moderately abundant on all varieties at Ottawa (H.N. Racicot).

ROOT KNOT (Heterodera marioni). A light infection occurred in the plots of the University of British Columbia, Point Grey, B.C. Nematodes, not positively identified, were also found in abundant root knots on Taraxacum officinale and Sonchus oleraceus growing as weeds in the same plots. Similar knots were found on roots of strawberry in a field at Sumas, but no nematodes could be found although H. marioni was present in knots on Cirsium arvense from the same field. Determinations were made by Dr. A.D. Baker (H.N.W. Toms, R.E. Fitzpatrick). This is the first report to the Survey of H. marioni on strawberry, but it is known to attack this host in the United States.

LEAF SPOT (Mycosphaerella Fragariae) occurred generally throughout the lower mainland, B.C., but caused little damage to British Sovereign, the main commercial variety (R.E. Fitzpatrick). It was general in the lower Fraser Valley (I.C. MacSwan). Leaf spot was found in two plantings of Valentine in the Niagara Peninsula, Ont.; the variety appears to be susceptible, but the damage was negligible (G.C. Chamberlain). It was observed at St. Catharines and Park Hill and was abundant on most varieties at Ottawa. Premier seems to be quite resistant (H.N. Racicot). Leaf spot was severe on Louise throughout N.S., and was moderate on Senator Dunlap in Yarmouth and Kings Co. It was more prevalent than for several years (J.F. Hockey). A moderate infection was recorded at De Sable, P.E.I. (D.B. Robinson).

RED STELE (Phytophthora Fragariae) was severe in southern Vancouver Island, B.C. (W.R. Foster). A slight infection was seen in a planting of British Sovereign at Keating (W. Jones). Scattered outbreaks were found in Colchester, Kings, Lunenburg and Yarmouth Co., N.S. Oogonia 26-33 x 30-44 microns were present in the distal and median parts of roots from many sources during May and June, but were not seen after the first week of July. The presence of red stele was first suscepted in 1945, but no general outbreak occurred before 1948. The presence of the organism in widely scattered parts of the province, and on farms where no new plants had been introduced for several years, suggests that it may be indigenous or at least long established. The exceptionally wet soil conditions in May and June clearly favoured the fungus (J.F. Hockey).

POWDERY MILDEW (Sphaerotheca Humuli). Light infections were general throughout the lower Fraser Valley, B.C. It occurred generally on British Sovereign, in which it was the commonest cause of leaf spotting, but damage was usually negligible (R.E. Fitzpatrick, I.C. MacSwan). Specimens were received from Watford and Scarborough, Ont. (J.D. MacLachlan). Mildew appeared on 5 of 12 potted plants of Royal Sovereign in the laboratory greenhouse, St. Catharines, in December; adjacent Climax and Fragaria vesca were unaffected (G.C. Chamberlain). One specimen was brought in at Ottawa (L.T. Richardson).

CRINKLE (virus). What appeared to be this disease was seen in a 3-year-old garden planting at Saskatoon, Sask. (T.C. Vanterpool).

MILD MOSAIC (virus). Traces were found in two fields of Senator Dunlap in Queens Co., N.B. (D.J. MacLeod).

WITCHES' BROOM (virus). Infection was 7% and 10% in two plantations of Senator Dunlap in York and Queens Co., N.B. (D.J. MacLeod). A few infected plants, especially of Premier, were found in scattered plantings at Berwick, N.S. (J.F. Hockey).

YELLOWS (virus) was severe in Marshall in the lower mainland, B.C. All the Marshall plantations visited seem to be affected to some degrees by yellows and crinkle (R.E. Fitzpatrick). At the Horticultural Substation at MacDonald's Corners, Queens Co., N.B., yellows was severe in Catskill. Affected plants were stunted and showed crinkling, upward curling, and marginal and interveinal yellowing of the leaves. The yellowing was suppressed during hot weather, but was conspicuous early and late in the season. Stolon production was suppressed in some plants (D.J. MacLeod).

JUNE YELLOWS (genetic breakdown) was frequently seen affecting 5-10% of the plants in new fields of Premier in Lincoln Co., Ont., in April and May (G.C. Chamberlain). Eighty-seven per cent of the plants in a field of Premier in Queens Co., N.B., were affected (D.J. MacLeod). It was quite prevalent in Premier at Berwick, N.S., commonly affecting 25-100% of the plants, but it was not seen in the Lowden strain (J.F. Hockey).

ROOT ROT (cause unknown) was unusually prevalent in the lower mainland, B.C. (R.E. Fitzpatrick). A crown rot was prevalent in the lower Fraser Valley in all soil types, in high and low situations and in old and new fields (I.C. MacSwan). It is not clear whether this is a distinct trouble from root rot, but its severity in a wet season suggests that it may be the same (D.B.O.S.). Specimens were received from Prince Albert and Saskatoon, Sask. Prolonged flooding from an exceptionally heavy snow cover may have been largely responsible (T.C. Vanterpool). Severely stunted plants with blackened roots were received from Indian Head, Sask. (R.G. Atkinson). Plants growing adjacent to raspberries affected by cane blight at St. Norbert, Man., were attacked by a severe root rot, hundreds of plants being in various stages of destruction. H. Wormald (Diseases of Fruits and Hops. 1939. p. 219) states that Leptosphaeria Coniothyrium has been found in association with a root rot of strawberries. No isolations were made from this material (W.A.F. Hagborg). In view of the accumulating evidence that L. Coniothyrium is often a secondary invader of weakened or diseased canes, its presence in rotting strawberry roots is far from conclusive evidence that it is a cause of their decay. It is possible that conditions conducive to strawberry root rot may also encourage cane blight of raspberry (D.B.O.S.). Specimens were received from Fort William, North Bay, St. Mary's, Tillsonburg, Bright, New Hamburg, Kitchener, Port Nelson, Oakville, Cooksville, Meadowville, Scraborough Bluffs and Oshawa, Ont. (J.D. MacLachlan). Infection ranged from 0-50% in the strawberry plantings in the Grand Lake area, N.B. (J.L. Howatt).

DISEASES OF TREES AND SHRUBS

ABIES - Fir

Timber Rot. Organisms found causing decay of A. balsamea were: Fomes piniicola, Dore Lake, Sask.; Lenzites saepiaria, Dore Lake, Sask., Whiteshell Forest Reserve, Man.; Polyporus abietinus, Dore Lake, Sask., Whiteshell Forest Reserve, Man.; Stereum sanguinolentum, common at Dore Lake, Sask. (C.G. Riley). Reported from A. lasiocarpa were: Poria Weirii, Prince George district, B.C. (P.J. Salisbury); Lenzites saepiaris and Stereum sanguinolentum, Brule, Alta. (C.G. Riley).

ACER - Maple

Timber Rot (Daedalea unicolor) was observed at Fort Garry, Man. (C.G. Riley).

Tar Spot (Rhytisma spp.). R. acerinum was severe on a tree of A. ginnala at Edmonton, Alta. (J.D. Gilpatrick). It was prevalent on A. saccharinum at Rawdon, Que. (J.E. Jacques), and was very heavy on A. saccharum in Queens Co., P.E.I. (R.R. Hurst). R. punctatum was common on A. macrophyllum at Point Grey, B.C., but caused no damage (H.N.W. Toms).

AESCULUS - Horsechestnut

Leaf Blight (Guignardia Aesculi). Trees in communities in the Annapolis Valley, N.S., were severely blighted and disfigured. One tree that received two summer applications of Fermate was much less injured than others (D. Creelman).

ALNUS - Alder

Wood Rot (Daedalea unicolor) was found at Hudson Bay Junction, Sask. (C.G. Riley).

Catkin Deformation (Taphrina Robinsoniana) was found at St. Alphonse de Joliette, Que. (A. Payette, D.B.O. Savile).

AMELANCHIER

Black Leaf Curl (Apiosporina Collinsii) was observed at Whiteshell For. Res., Man. (C.G. Riley).

Rust (Gymnosporangium spp.). G. sp. was prevalent on leaves and fruits of wild Amelanchier in the Okanagan Valley, B.C. (G.E. Woolliams). G. clavipes was seen on A. sp. at Berens River and Whiteshell For. Res., Man. (C.G. Riley); it was heavy on fruit of A. canadensis near Arnprior, Ont. (D.B.O. Savile).

BETULA - Birch

Timber Rot. The following organisms were identified from B. papyrifera in the prairie provinces: Daedalea unicolor, Riding Mt. Nat. Park, Man.; Fomes fomentarius, Hudson Bay Junction and Dore Lake, Sask., Spruce Woods For. Res. and Riding Mt. Nat. Park, Man.; Fomes igniarius, Hudson Bay Junction and Dore Lake, Sask., Whiteshell For. Res., Man.; Polyporus adustus, Riding Mt. Nat. Park, Man.; P. betulinus, Dore Lake, Sask., Riding Mt. Nat. Park and Whiteshell For. Res., Man.; P. cuticularis, Hudson Bay Junction and Dore Lake, Sask., Whiteshell For. Res., Man.; P. pubescens, Buffalo Narrows, Sask.; Stereum fasciatum, Buffalo Narrows, Sask.; S. hirsutum, Slave Lake, Alta.; Trogia crispa, Slave Lake, Alta. (C.G. Riley).

Twig Blight (Melanconium sp.) was abundant in a birch tree at Guelph, Ont. (J.D. MacLachlan).

Die-Back (cause unknown). All birch trees, except the planted cut-leaves forms, appear to be dead or dying near Charlottetown, P.E.I. (R.R. Hurst). See L.S. Hawboldt and A.J. Skolko, Investigation of yellow birch die-back in Nova Scotia in 1947. Jl. For. 46:659-671. 1948.

CARAGANA

Seedling Blight (?Fusarium sp.) was severe in several blocks at the Forest Nursery Station, Sutherland, Sask.; Fusarium spp. and other fungi were isolated (H.W.M.).

CRATAEGUS - Hawthorn

Scald (Entomosporium Thuemenii) was moderately heavy on Crataegus sp. at Kentville, N.S. (D. Creelman).

FAGUS - Beech

Canker (Cytosporina sp.). C. sp. fruited freely in cankers on ornamental beech used for a hedge at Oakville, Ont. Several of the trees were dying. The fungus is thought to have followed winter injury (J.D. MacLachlan). Dodge and Rickett (Diseases and Pests of Ornamental Plants) refer to C. sp. as the cause of a canker of beech. Since it is a wound parasite it might be serious in a hedge where pruning wounds are necessarily abundant. Grove (British Stem and Leaf Fungi) includes Fagus as a host for C. Acharii, C. flavovirens and C. milliaria, which are the imperfect stages of Eutypa Acharii, E. flavovirens and Valsa milliaria respectively.

FRAXINUS - Ash

Rust (Puccinia sparganioides) was very heavy and malformed 5% of the twigs of F. americana at Hortonville, N.S. (K.A. Harrison).

ILEX - Holly

Tar Spot (Rhytisma sp.) was seen on a few leaves of a tree in a garden at North Saanich, B.C., in Dec. 1947. Material brought indoors matured in Feb. 1948 (W. Jones).

JUNIPERUS

Rust (Gymnosporangium spp.). G. Nelsoni was seen on a few trees of J. scopulorum in the Cariboo district, B.C. The aecial stage was found on Amelanchier florida in the same area (J.M. Macalister, W. Jones).

LABURNUM

Canker (Fusarium lateritium sensu Snyder & Hansen). Cankers on L. Watereri (L. anagyroides x alpinum), received from a nursery at Kingsville, Ont., in Dec. 1948, yielded this fungus. See also Hibiscus (I.L. Conners, W.L. Gordon).

PICEA - Spruce

Rust (Chrysomyxa spp.). C. ledicola severely attacked P. glauca in large areas east of L. Winnipeg, Man., imparting a conspicuous rusty colour to the forest as seen from the air. At Berens River leaf infection was practically 100%, resulting in severe defoliation in August. There was

evidence of a similar defoliation in 1945 (C.G. Riley). Specimens collected by J.M. Gillett at Churchill indicate that C. ledicola was abundant on P. glauca, Ledum groenlandicum and L. palustre var. decumbens (D.B.O. Savile). C. Ledi was observed on P. mariana at Berens River (C.G. Riley). Cone rust (C. Pyrolae) was prevalent in parts of western Alta. on P. glauca and P. mariana (P.J. Salisbury).

Witches' Broom (Peridermium colorandense) was seen on P. glauca at Riding Mt. Nat. Park, Man. (C.G. Riley).

Timber Rot. The following organisms were found causing decay of P. Englemanni in Alta.: Fomes Pini and Lenzites saepiaria at Coleman; Phlebia mellea, Trametes heteromorpha and T. serialis at Brule (C.G. Riley). R.A. Waldie (Interim report on decay losses in spruce in the Upper Fraser region, B.C. Nov. 1948. Mimeographed) discusses the fungi concerned in decay of spruce in that region; no distinction is made between host species, but the principal species is P. glauca and P. Engelmanni occurs to a small extent. Infections of root and butt comprised 83.5% of the total, those of the trunk 12.4%, and those of the sapwood 4.1%. The principal rots of root and butt were caused by: Polyporus circinatus, Corticium galactinum, Polyporus balsameus, Stereum sanguinolentum, Odontia bicolor, and Coniophora puteana, in descending order of importance. Stereum sanguinolentum was the principal cause of trunk decay. Thirteen other identified and a number of unidentified organisms were involved (D.B.O.S.). The following organisms were identified from P. glauca in the prairie provinces: Coniophora puteana, Hudson Bay Junction, Sask., Riding Mt. Nat. Park, Man.; Fomes Pini, Dore Lake, Porcupine Provincial Forest, Sask.; F. piniicola, Dore Lake, Hudson Bay Junction, Sask., Riding Mt. Nat. Park, Whitesholl For. Res., Man.; F. subroseus, Riding Mt. Nat. Park, Man.; Lenzites saepiaria, Athabaska, Alta., Dore Lake, Porcupine Prov. Forest, Hudson Bay Junction, Sask., Riding Mt. Nat. Park, Duck Mt. For. Res., Spruce Woods For. Res., Whiteshell For. Res., Berens River, Man.; Polyporus abietinus, Slake Lake, Alta., Dore Lake, Hudson Bay Junction, Porcupine Prov. Forest, Sask., Riding Mt. Nat. Park, Duck Mt. For. Res., Whitesholl For. Res., Man.; P. adustus, Riding Mt. Nat. Park, Man.; P. alboluteus, Brule, Alta.; P. anceps, Hudson Bay Junction, Porcupine Prov. Forest, Sask.; P. circinatus, P. circinatus var. dualis, P. immitus and P. volvatus, Riding Mt. Nat. Park, Man.; Stereum sanguinolentum, Dore Lake, Sask., Riding Mt. Nat. Park, Man. (C.G. Riley). The following organisms were identified from P. mariana: Fomes subroseus, Sassaginigak Lake, Man.; Polyporus sulphureus, Rocky Mountain House, Alta.; Poria subacida, Sassaginigak Lake, Man. (C.G. Riley). Poria vaporaria was found on Picea sitchensis in the Queen Charlotte Islands, B.C. (P.J. Salisbury).

PINUS - Pine

Witches' Broom (Arcuthobium americanum) was observed in abundance on P. Banksiana in Alta. and Sask., and in Man. east to Cowan. It is desirable to know whether this mistletoe is extending its range eastward. Observers in eastern Manitoba are asked to send details of its occurrence to the Dominion Laboratory of Forest Pathology, University of Saskatchewan, Saskatoon, Sask., and to send pressed specimens to the Division of Botany and Plant Pathology at Ottawa for deposition in the herbarium. Mistletoe was also seen on P. contorta var. latifolia at Kananaskis Forest Experiment

Station, Alta., and was reported from many localities in the foothills and subalpine forest belts (C.G. Riley). Previously reported in the Survey only from Sask., but there are specimens in the phanerogamic herbarium from B.C., Alta., Sask. and Man.

Rust (Cronartium spp.). C. coleosporioides caused slight damage to P. Banksiana at Ste. Anne de la Pocatiere, Que. The distal part of the branch was sometimes killed (A. Payette). See R. Pomerleau (Mycol. 34: 120-122. 1942) for discussion of the status of this rust in Que. and the occurrence of the telia on Melampyrum lineare and Rhinanthus borealis (D.B.O.S.). C. ?Quercuum was found on P. Banksiana at Cartier, Ont., 40 mi. N.W. of Sudbury and just within the limits of Quercus macrocarpa (A.W. McCallum).

Timber Rot. Trametes americana was found on P. Banksiana at Whiteshell and Duck Mt. Forest Reserves, Man. Poria purpurea was seen at Shilo Nursery, Man., and Stereum sanguinolentum at Brule, Alta., on P. contorta var. latifolia. Thelephora terrestris was found on the base of a living tree of P. sylvestris and on the adjacent ground at Spruce Woods For. Res., Man. (C.G. Riley).

Needle Cast (Hypodermella montana). Needle cast of P. contorta caused considerable yellowing and defoliation along the Alaska Highway in northern B.C. A single specimen received agreed most closely with H. montana (P.J. Salisbury, D.B.O. Savile).

Pole Blight (cause unknown), a disease that causes considerable mortality of P. monticola 40 to 100 years old in parts of northern Idaho and Montana, was reported, for the first time in Canada, at New Denver in southeastern B.C. (P.J. Salisbury). See C.A. Wellner, Journ. of Forestry 46(4):294-295. Apr. 1948.

Damping Off (Pythium de Baryanum) caused 50% loss of P. Banksiana and P. Pinaster seedlings near Charlottetown, P.E.I., in July (R.R. Hurst).

POPULUS - Poplar

Canker (Dothichiza populea) was heavy and caused severe damage to specimens of P. nigra var. italica brought in from McGregor Lake, Que., in late June, by Mr. R. Chamberland of the Dept. of Lands and Forests, who stated that all 12 of a row of 40-ft. trees were heavily cankered from top to bottom and that their death appeared to be unavoidable. The disease was first noticed by the owner in 1945. The fungus was immature in the most recent cankers, but was fruiting on some that appeared to have originated in 1947. Previously reported from Ont., N.B. and N.S. (Ruth Macrae, D.B.O. Savile).

Leaf Blight (Fusicladium radiosum) caused considerable damage to wild and ornamental poplars throughout Kings Co., N.S. The wet season apparently greatly favoured infection, which ranged from 20 to 100% (D. Creelman). At the Kentville Experimental Station leaf blight was seen, on 11 June, to be concentrated around and below twigs killed by the fungus in 1947, indicating overwintering on the attached twigs (K.A. Harrison).

Branch Gall (Macrophoma tumefaciens) occurred sporadically on P. trichocarpa in the Quesnel district, B.C. (P.J. Salisbury). Reported in the Survey from Alta. and in the herbarium from Kenora, Ont.

Anthracnose (Marssonina Castagnei) was so severe as a result of the wet season that leaves of P. tremuloides near L. Okanagan at Summerland, B.C., began to fall early in August. The trees were almost bare by the end

of August, whereas leaf fall does not ordinarily occur until late October (G.E. Woolliams). It caused heavy defoliation of Carolina poplars (P. canadensis) near the Welland Canal, Lincoln Co., Ont., in late August (G.C. Chamberlain).

Rust (Melampsora medusae) was observed on P. tacamahaca at Spruce Woods For. Res., Man.; and on P. tremuloides at Turtle Mt. and Whiteshell For. Reserves, Man. (C.G. Riley).

Leaf Spot (Septoria Populi) was abundant, but apparently not very injurious, on P. trichocarpa at Summerland, B.C. (G.E. Woolliams).

Yellow Leaf Blister (Taphrina aurea) was abundant but not serious on specimens of P. nigra var. italica from McGregor Lake, Que. Reported in Survey from B.C. and P.E.I. and in Herbarium from eastern Que. (D.B.O. Savile).

Timber Rot. The following organisms were identified from P. tacamahaca in the prairie provinces: Coniophora byssoidea and Eichleriella spinulosa, Rocky Mountain House, Alta.; Polyporus adustus, Swan River, Man.; Poria ambigua, Rocky Mountain House, Alta. (C.G. Riley). Fungi identified from P. tremuloides were: Corticium polygonium and C. udicola, Whiteshell For. Res., Man.; Fomes fomentarius, Dore Lake, Sask., Riding Mt. Nat. Park, Man.; F. igniarius, Brule, Slave Lake, Alta., Buffalo Narrows, Dore Lake, Hudson Bay Junction, Sask., Riding Mt. Nat. Park, Turtle Mt., Duck Mt. and Whiteshell For. Reserves, Man.; F. pinicola, Hudson Bay Junction, Sask., Berens River, Man.; Gloecystidium leucoxanthum, Whiteshell For. Res., Man.; Hypoxylon pruinatum, Riding Mt. Nat. Park, Turtle Mt. and Whiteshell For. Res., Man.; Lenzites saepiaria, Rocky Mountain House, Alta.; Merulius tremellosus, Hudson Bay Junction, Sask.; Phlebia strigoso-zonata, Benalto, Alta., Candle Lake, Sask., Turtle Mt. and Whiteshell For. Reserves, Man.; Pholiota adiposa, Riding Mt. Nat. Park, Man.; Polyporus adustus, Brule, Alta. Candle Lake, Sask., Riding Mt. Nat. Park, Swan River, Whiteshell For. Res., Man.; P. dichrous, Hudson Bay Junction, Sask.; P. hirsutus, Rocky Mountain House, Alta.; Hudson Bay Junction, Sask.; P. pargamenus, Dore Lake, Hudson Bay Junction, Sask., Riding Mt. Nat. Park, Man.; P. pubescescens, Swan River, Man.; P. velutinus, Swan River, Whiteshell For. Res., Man.; P. versicolor, Hudson Bay Junction, Sask., Whiteshell For. Res., Man.; Schizophyllum commune, Turtle Mt. For. Res., Man., Stereum fuscum, Riding Mt. Nat. Park, Whiteshell For. Res., Man.; S. rufum, Royal Park, Alta., Whiteshell For. Res. Man. (C.G. Riley). In the Quesnel area, B.C., decay of P. tremuloides by Fomes igniarius was serious in some stands. Other organisms attacking this species in the area were: Coniophora olivacea, Corticium polygonium, C. sulphureum, Oxydontia alboviride and Phlebia strigoso-zonata. The following were found in living trees of P. trichocarpa in the Quesnel area: Fomes igniarius, Ganoderma applanatum, Pholiota destruens, Pleurotus subareolatus, Pleurotus ulmarius, Polyporus delectans and Stereum purpureum (P.J. Salisbury).

PRUNUS

Black Knot (Dibotryon morbosum) was seen on P. pennsylvanica at Dore Lake, Sask., and Whiteshell For. Res., Man. (C.G. Riley).

Blossom and Twig Blight (Sclerotinia laxa) was severe on bushes of P. japonica at the Station, Saanichton, B.C. (W. Jones).

Leaf Curl (Taphrina confusa) was moderately heavy on P. virginiana at Ste. Anne de la Pocatiere and Notre Dame du Portage, Que., but was checked in June by dry weather (A. Payette).

PSEUDOTSUGA TAXIFOLIA - Douglas Fir

Rust (Melampsora albertensis) caused slight damage in the interior of B.C. (P.J. Salisbury).

Needle Blight (Rhabdocline Pseudotsugae) was apparently responsible for most of the considerable needle cast seen in the B.C. Interior (P.J. Salisbury).

PYRACANTHA - Firethorn

Scab (Fusicladium Pyracanthae) caused considerable damage to P. sp. in gardens at Salt Spring Island, B.C. (W. Jones). It was common on the foliage and fruit of P. coccinea at the University, Point Grey (H.N.W. Toms).

QUERCUS - Oak

Timber Rot (Polyporus pubescens) was observed on Q. macrocarpa at Spruce Woods For. Res., Man. (C.G. Riley).

RHAMNUS - Buckthorn

Rust (Puccinia coronata). Aecia on R. cathartica were reported near Kemptville, Ont., on 15 May, and a light infection was noted in the Arboretum, Ottawa, on 26 May (R.J. Baylis). Infection was moderately heavy on a bush of R. cathartica at Ste. Anne de la Pocatiere, Que. (A. Payette). A light infection occurred on bushes of R. cathartica at the Experimental Station, Fredericton, N.B., and a hedge and scattered bushes of R. Frangula bore moderate to heavy infections of P. c. var. Agrostis (J.L. Howatt).

SALIX - Willow

Scab (Fusicladium saliciperdum). Specimens of Salix sp. from Markham, near Toronto, Ont., showed the pathogen fruiting freely on all twigs and some leaves. This is the first report for Ontario and Markham is about 350 miles from the nearest reported centre in Que. (J.E. Bier, I.L. Conners).

Anthracnose (Marssonina Kriegeriana) severely damaged a weeping willow (S. babylonica) at Oyster River, B.C. (W. Jones), and caused heavy defoliation of several trees of the same species at Burnaby (I.C. MacSwan, H.N.W. Toms).

Rust (Melampsora sp.) severely infected wild Salix at Summerland, B.C., and caused premature defoliation (G.E. Woolliams). M. Bigelowii was observed on Salix spp. at Dore Lake, Sask., and Turtle Mt. and Spruce Woods For. Reserves, Man. (C.G. Riley).

Tar Spot (Rhytisma salicinum) was seen on Salix sp. at Spruce Woods For. Res., Man. (C.G. Riley).

Leaf Blight (Septogloeum salicinum (Pk.) Sacc.) caused considerable damage to willow shrubs at North Saanich, B.C., and generally throughout the district; the shrubs appeared in August as though burnt. In the herbarium from Que., but not previously reported in the Survey. The various Septogloeum spp. on willow are doubtfully distinct, the variation between species often being nearly equalled in a single collection; but they do not appear to overlap the several Marssonina spp., which, in turn, are doubtfully distinct from M. Kriegeriana (W. Jones, D.B.O. Savile).

SORBUS - Mountain Ash

Black Rot Canker (Physalospora obtusa (Sphaeropsis Malorum) caused twig and branch die-back on a few trees in a nursery at London, Ont. (G.C. Chamberlain). Not reported in the Survey on this host, but we have one specimen from Preston, Ont., on S. americana.

THUJA - Arbor-vitae

Die-Back. Specimens of dying branches of T. occidentalis were received from the Provincial Forest Station, St. Williams, Ont., on which Pestalotia funerea Desm. (det. J.W. Groves) was fruiting. It is possible that the fungus followed winter injury (J.D. MacLachlan).

TILIA - Basswood

Leaf Spot (Cercospora microsora). Infection was 90% on T. cordata at Canard, N.S., and caused 10% premature defoliation (J.F. Hockey).

ULMUS - Elm

Dutch Elm Disease (Ceratostomella Ulmi). During 1948 work on this project continued on about the same scale as in the preceding year. In Que. considerable intensification of the disease occurred in the eastern part of the infected area south of the St. Lawrence River. Infected trees were found for the first time in 7 additional counties, mostly south of the St. Lawrence, this making a total of 30 counties in which the disease occurred. There was some extension of the infected area southward, diseased trees being found approximately within 25 miles of the Maine border, within 16 miles of the New Hampshire border and within 20 miles of the Vermont and New York borders. A total of 3648 collections from suspected trees was made in Que. and of these 2581 proved to be positive. The policy of removing diseased trees in the outer sections of the general area of infection was continued.

The most important development during the year was the discovery of a single infected tree with typical symptoms in Ottawa close to the Parliament Buildings. In addition, positive cultures were obtained from 13 other trees, which were dead or dying, in six counties in eastern Ont. These trees occurred sporadically and there is no apparent explanation either for the scattered distribution or for the fact that most of the trees were far removed from the nearest known source of infection in Que. Several of these trees were within 16 to 18 miles of the New York border and one found in Cornwall was on the immediate shore of the St. Lawrence. There is ample evidence to indicate that in no instance was the death or poor condition of these trees caused by Dutch elm disease. It seems evident that the causal fungus of the disease has only recently reached Ont. and that it is existing as a saprophyte in dead wood or bark. This is important from the point of view of control. There is no doubt that the 14 trees that yielded positive cultures in 1948 would, had control measures not been adopted, have acted as centres of infection for adjacent healthy trees and that in time the disease would have become widely distributed in eastern Ont. However, all these trees were promptly removed and either sprayed with DDT or burned. It will require the work of another field season at least to clarify the situation in Ontario in regard to Dutch elm disease.

In Ont. 348 collections were made and 14 of these proved to be positive. In New Brunswick 4 collections were made, none of which were positive.

As in previous years work on Dutch elm disease was carried on co-operatively by the Dominion Department of Agriculture (Divisions of Plant Protection, Botany and Plant Pathology, and Entomology), the Quebec Department of Lands and Forests, and the Ontario Department of Agriculture (A.W. McCallum).

Wood Rot (Corticium vellereum) was observed at Lac du Bonnet, Man., on U. pumila (C.G. Riley).

Black Spot (Gnomonia ulmea). Affected leaves of U. americana were sent in from Beloeil Station, Que. It was also seen on U. pumila at the Botanical Garden, Montreal (J.E. Jacques). Infection was 25% on several trees at Kentville, N.S. (J.F. Hockey).

Leaf Spot (Mycosphaerella (Phleospora) Ulmi) caused 25% defoliation of U. americana at Annapolis Royal, N.S. (J.F. Hockey). Previously reported from southern Ont. and western Que.

Coral Spot (Tubercularia ulmea) was seen on U. pumila at Lac du Bonnet, Man. (C.G. Riley). A hedge of U. pumila was attacked at Calumet, Argenteuil Co., Que., and it was prevalent on the same host at the Botanical Garden, Montreal (J.E. Jacques). Three plants in a four and a half year old hedge of U. pumila were visibly infected in July at St. Lambert (A.W. McCallum).

VI. DISEASES OF ORNAMENTAL PLANTS

ACONITUM - Monkshood

Yellows (Callistephus virus 1). One infected plant was found in a garden at Fredericton, N.B. (D.J. MacLeod).

ALTHAEA - Hollyhock

Rust (Puccinia Malvacearum) was reported as follows on A. rosea: general in gardens at Vancouver, B.C. (H.N.W. Toms); general and light to severe in the Interior of B.C. (G.E. Woolliams); severe in several plantings at Lethbridge, Alta. (M.W. Cormack); caused severe blighting and defoliation at St. Catharines, Ont. (G.C. Chamberlain); heavily infected specimens received from Orillia, Stella, and Smiths Falls, and severe in many gardens near Ottawa with all lower leaves in one shady border later overrun by Alternaria tenuis (D.B.O. Savile); severe on about 25 plants in a garden at Ottawa (H.N. Racicot); heavily infected leaves received from Bourget, Ont., and also brought in from Montreal and L'Assomption, Que. (J.E. Jacques). severe in two gardens at Charlottetown, P.E.I. (W.A. Hodgson); very abundant and destructive at Charlottetown in late August (R.R. Hurst). A moderate infection caused some killing of the lower leaves of A. armeniaca Tenore in the Arboretum, Ottawa, Ont.; apparently the first report on this host (D.B.O. Savile).

ANCHUSA

Root Rot (Sclerotinia sclerotiorum) killed 30% of a commercial seed crop of A. azurea at Elk Lake, B.C. (W. Jones). First report to the Survey on this host.

ANEMONE

Rust (Tranzschelia Pruni-spinosae) was seen on a few plants of Anemone coronaria at Saanichton, B.C.; previously reported on plums at the same locality (J. Bosher, W. Jones).

ANTIRRHINUM - Snapdragon

Grey Mould (Botrytis cinerea) caused considerable damage to branches of seed plants of A. majus at Elk Lake, B.C., and caused premature ripening of the inflorescences. Rust was also prevalent (W. Jones).

Rust (Puccinia Antirrhini). The uredinial stage was seen on 5 June at North Saanich, B.C., and the disease was general throughout lower Vancouver Island. It caused considerable damage to seed plants at Elk Lake, despite consistent spraying with Bordeaux mixture (W. Jones). Rust was widespread in the interior, damage varying from slight to severe according to location and variety (G.E. Woolliams).

Yellows (Callistephus virus 1). A trace was found in two gardens in York Co., N.B. (D.J. MacLeod).

AQUILEGIA - Columbine

Leaf Spot (Actinonema Aquilegiae) was moderately heavy in a garden at Cobble Hill, B.C. (W. Jones).

Mosaic (Cucumis virus 1) caused moderately severe damage to several plants in a garden at Ottawa, Ont. (D.B.O. Savile).

ASTER

Powdery Mildew (Erysiphe Cichoracearum) was general but not severe at the Botanical Garden, Montreal, Que. (J.E. Jacques).

BEGONIA

Grey Mould (Botrytis cinerea). Affected specimens of Lady Mac were received from Crystal Beach, Ont. (G.C. Chamberlain). Several cases were observed in gardens at Montreal, Que., especially on tuberous begonias (J.E. Jacques).

Powdery Mildew (?Erysiphe Cichoracearum). Specimens were received from Evesham, Sask. (T.C. Vanterpool). Specimens of an elephant's-ear begonia, grown in a private house at Ottawa, Ont., were received in March and April 1948. The lesions were about $\frac{1}{2}$ to $\frac{3}{4}$ inch across and were necrotic, suggesting a hypersensitive reaction; but there were no other plants in the house, and the fungus must have maintained itself all winter; oidia were fairly abundant, but there was no sign of perithecia. This is presumably the fungus studied in Sweden by G. Hammarlund (Botaniska Notiser 1945:101-108. 1945), and named by him Erysiphe polyphaga. It is doubtfully distinct from E. Cichoracearum, the only morphological difference being, according to Hammarlund, that the asci occasionally contain 3-4 spores instead of the typical 2. Using conidia from Begonia var. Gloire de Lorraine, he inoculated 100 species of plants, selected on the basis of observations of imperfect mildews that had recently come into prominence. Inoculations were successful on 62 species in the Crassulaceae, Begoniaceae, Scrophulariaceae, Primulaceae, Solanaceae, Cucurbitaceae, Linaceae, Compositae, Verbenaceae, Labiatae and Euphorbiaceae. Perithecia were abundant on Veronica speciosa and occasional on Begonia. These are our first reports of powdery mildew on Begonia, but we have various records of what, judging from Hammarlund's results, might be the same strain on a number of hosts including: Cucumber, Ont., N.B., P.E.I.; pumpkin, B.C., Que., N.B.; Dahlia, Ont., N.B.; Kalanchoe, Sask. (P.D.S. 25:115. 1946); and Verbena hastata, Ont. Specimens of the last plant bear perithecia that are slightly immature, but in which the asci seem to be exclusively 2-spored (D.B.O. Savile).

BERBERIS - Barberry

Rust (Puccinia graminis) was moderate on a few bushes of B. vulgaris at Ste. Anne de la Pocatiere, Que. (A. Payette). It was heavy on bushes at the Station, Fredericton, N.B. (J.L. Howatt).

BOLTONIA

Streak (virus) affected 57% of the plants in the border at the Station, Fredericton, N.B. (D.J. MacLeod).

CALENDULA

Yellows (Callistephus virus 1) attacked 82% of plants in a garden at Fredericton, N.B. (D.J. MacLeod). Infection ranged from a trace to 100% in Queens Co., P.E.I., all varieties being affected (R.R. Hurst).

CALLISTEPHUS CHINENSIS - China Aster

Stem Blight (Botrytis cinerea). One specimen was brought in from Queens Co., P.E.I. (R.R. Hurst).

Wilt (Fusarium oxysporum f. Callistephi) attacked a few plants at the Station, Summerland, B.C. (G.E. Woolliams). An unusually large number of specimens was received from places in Ont. (J.D. MacLachlan). One plant out of 12 was affected in a garden at Ottawa (H.N. Racicot). Specimens were received from Caughnawaga, Que., with information that the damage was heavy (D.B.O. Savile).

Yellows (Callistephus virus 1). Specimens were received from various parts of Ont. (J.D. MacLachlan). Heavy loss was reported by a grower at Giffard, Que. (J.E. Jacques). Affected blooms were seen at the market in Charlottetown, P.E.I. (R.R. Hurst).

CAMPANULA

Rust (Coleosporium Campanulae) was moderate on a few plants of C. rotundifolia var. intercedens, transplanted some years ago into a rock garden at St. Aubert, L'Islet Co., Que. This rust seems to be general in the lower St. Lawrence (A. Payette).

CHEIRANTHUS - Wallflower

Downy Mildew (Peronospora Cheiranthi) was severe on a yellow-flowered variety at North Saanich, B.C. (W. Jones).

CHRYSANTHEMUM

Leaf Spot (Cylindrosporium Chrysanthemi). Several specimens were received from greenhouses in Ont. (J.D. MacLachlan).

Leaf Spot (Septoria Chrysanthemi) attacked 20 out of 100 rooted cuttings of Sunnyside at Leamington, Ont.; damage was heavy on the specimens received (D.B.O. Savile).

CONVALLARIA MAJALIS - Lily-of-the-Valley

Blight (Botrytis cinerea) attacked 30% of the stems in a crowded, well-shaded bed at the Central Experimental Farm, Ottawa, Ont., and killed at least half of them. Infection may have been aggravated by frequent sprinkling. The pathogen fruited freely on the stems, and small black sclerotia were rupturing the epidermis near ground level (D.B.O. Savile).

COREOPSIS

Yellows (Callistephus virus 1) severely damaged 9 plants in a garden at Fredericton, N.B. (D.J. MacLeod).

CYCLAMEN

Stunt (Cladosporium Cyclaminis) was prevalent in three greenhouses at Montreal, Que., and many of the plants for sale on the market were affected (J.E. Jacques).

DAHLIA

Stunt (virus). Coltness hybrids at St. Catharines, Ont., showed stunting and blossom malformation (G.C. Chamberlain).

DAPHNE

Anthracnose (Marssonina Daphnes). Infection of D. Mezereum was general in gardens in Point Grey and Dunbar districts, Vancouver, B.C. Defoliation was heavy in July (H.N.W. Toms).

DELPHINIUM - Larkspur

Powdery Mildew (Erysiphe Polygoni). A light attack occurred at the Botanical Garden, Montreal, Que. (J.E. Jacques). Slight to severe damage was seen in Queens Co., P.E.I. (R.R. Hurst).

Bacterial Blight (Pseudomonas delphinii). Infection was slight in plantings at Edmonton, Alta. (J.D. Gilpatrick). Spotting of the lower leaves was seen in a few varieties at the Botanical Garden, Montreal, Que. (J.E. Jacques). Infection was a trace at Kentville, N.S. (D. Creelman).

DIANTHUS

Damping Off (Alternaria ?Dianthi) caused considerable damage in a flat of carnation, D. Caryophyllus, at Elk Lake, B.C. (W. Jones).

Stem Rot (Heteropatella valtellinensis) was found by the Division of Plant Protection on imported carnation stock in a greenhouse at Burnaby, near Vancouver, B.C. (R.E. Fitzpatrick, H.N.W. Toms).

Rust (Uromyces caryophyllinas) caused slight damage to carnations in a greenhouse at Sidney, B.C. (W. Jones). It was general, but caused slight damage to greenhouse plants at the University of B.C., Point Grey (H.N.W. Toms). A severe outbreak occurred in the municipal greenhouses, Montreal, Que.; red varieties were particularly heavily damaged (J.E. Jacques).

Bud Rot (Fusarium Poae (Pk.) Wor.) destroyed nearly all the bloom of D. plumarius var. Mrs. Sinkins at Ottawa, Ont., but it did not occur on several other pinks. First report to the Survey (D.B.O. Savile).

DIMORPHOTHECA - Cape Marigold

Yellows (Callistephus virus 1). Traces were found in two gardens at Fredericton, N.B. (D.J. MacLeod).

ESCHSCHOLZIA

Yellows (Callistephus virus 1) affected 7% of the plants in a garden at Fredericton, N.B. (D.J. MacLeod).

EUPHORBIA

Stem Rot (Coniothyrium Euphorbiae) affected all the stems of two clumps of E. epithymoides in a garden at Ottawa, Ont. Lesions ran almost the full length of the stems, but there was no leaf infection. Some stems were nearly dead in late June, and most blossoms had abscissed. Reported previously on E. lactea from Que. (P.D.S. 25:112. 1946) (D.B.O. Savile).

GAILLARDIA

Yellows (Callistephus virus 1). A trace was found in two gardens at Fredericton, N.B. (D.J. MacLeod).

GARDENIA

Canker (Phomopsis Gardeniae). Specimens with severe cankers, accompanied by fusiform swellings at ground level, were received in Nov., 1947, from a greenhouse at Port Dover, Ont. A few pycnidia with typical spores were present and the pathogen was isolated (R.G. Atkinson).

GLADIOLUS

Penicillium Rot (P. Gladioli). Traces were seen in several varieties at the Botanical Garden, Montreal, Que. (J.E. Jacques). Infection

was 2% in a lot brought in for examination at Charlottetown, P.E.I. (R.R. Hurst).

Scab (Pseudomonas marginata) was severe in a garden at Vancouver, B.C., and caused spotting of leaves and blossoms (I.C. MacSwan). Plantings at Steveston and Vancouver showed 100% leaf spotting (R.E. Fitzpatrick, H.N.W. Toms). Damage was severe at Lorlie near Indian Head, Sask. (T.C. Vanterpool). Several varieties were affected in May at the Botanical Garden, Montreal, Que., and diseased corms were received in November from Dozois, Terrebonne Co. (J.E. Jacques). Moderately infected corms were received from Montreal; lesions were typical on Snow Princess, but were narrow and deeply tunnelled on Non Pareil (D.B.O. Savile). A trace was seen on corms at Kentville, N.S., in Jan., 1948 (D. Creelman).

Core Rot (Sclerotinia Draytoni). Foliage infection was seen at Milton, Ont. (S.A. Simmons). Specimens were received from Truro, N.S., in Nov., 1948. The sender stated that the disease was severe in his own and other growers' stocks, but that it had not been seen in previous years (D.B.O. Savile).

Dry Rot (Sclerotinia Gladioli) was severe in specimens received from Okanagan Mission, B.C.; light in specimens from Ancaster, Ont., and severe in others from Haileybury (D.B.O. Savile).

Hard Rot (Septoria Gladioli) was severe in two plants received from Ancaster, Ont., in July, but the rate of infection was said to be low (D.B.O. Savile). There was a noticeable increase of foliage infection in planting stock and plants from cormels in the Huttonville district (S.A. Simmons). Traces were noted in Picardy at the Botanical Garden, Montreal, Que. (J.E. Jacques).

White Break (virus). A severely infected plant was received from Renfrew, Ont., in late June; infection was a trace. This is apparently the first time that this disease has been definitely identified in Canada, but, owing to the confusion existing until recently over virus diseases of gladiolus, it has probably occurred sporadically for some time. What was probably the same disease was seen at Ottawa, but, in addition to the usual foliage symptoms, wider brown streaks occurred below the soil line (D.B.O. Savile).

Mosaic (Phaseolus virus 2). Seven plants in a mixed lot of gladiolus showed a well-defined mottle in a garden at Fredericton, N.B. The virus obtained from three of these plants produced typical symptoms of yellow mosaic on Phaseolus vulgaris and Vicia Faba (D.J. MacLeod). Specimens from Hants and Kings Co., N.S., showed leaf mottle and flower breaking; it seems to be becoming more prevalent (J.F. Hockey). Mosaic symptoms occurred on 20% of Aladdin and about 25% of an unidentified variety at Kentville (D. Creelman).

HELIANTHUS - Sunflower

Powdery Mildew (Erysiphe Cichoracearum) was heavy on a few plants of H. tuberosus in a garden at Woodroffe, near Ottawa, Ont. (D.B.O. Savile).

HIBISCUS

Canker (Fusarium lateritium) was present on specimens of H. syriaca, Rose-of-Sharon, received in Dec., 1948, from a nursery at Kingsville, Ont. (I.L. Conners, W.L. Gordon).

HYACINTHUS - Hyacinth

Soft Rot (Erwinia carotovora). Specimens of L'Innocence were received from a greenhouse at Toronto, Ont., in Jan., 1949, with lesions on the leaves and individual flower buds; the latter soon spread into the scape, which was then rapidly destroyed. A pink variety in the same bed was not visibly affected. In the early stages when progress was relatively slow, saprophytic nematodes were found to the extreme limit of the affected tissue, and the disease simulated bulb nematode infection; but decay developed so fast in the scape that the nematodes were generally left behind. Decay zones in some of the outer scales, spreading down from the top, suggest that the pathogen was carried in a more or less dormant state in the outer parts of the bulbs and that the young leaves became inoculated as growth commenced. Such dormant lesions would be extremely difficult to detect on a hyacinth bulb. W.C. Moore (Diseases of Bulbs. Bull. 117, Brit. Min. Agr. and Fish. 1939) states that L'Innocence, Perle Brilliant and Grand Maitre seem to be particularly susceptible and Queen of the Pinks relatively resistant. First report to the Survey; known from U.S.A., Europe and Japan (D.B.O. Savile).

IMPATIENS

Leaf Spot (Stemphylium botryosum associated). A target spot occurred on 75% of the leaves of mixed varieties of I. balsamina in the seed plots at University of British Columbia, Point Grey, and caused slight defoliation. S. botryosum, with some top-shaped and some typical spores, all falling within the size range given by Dr. J.W. Groves, fruited abundantly on the spots, but it is not definitely known whether it was the primary cause of the disease (H.N.W. Toms, D.B.O. Savile).

IRIS

Leaf Spot (Didymellina macrospora). Attention given to drainage by growers in Vancouver Island, B.C., has greatly reduced losses in bulbous iris. One grower planted his bulbs in a tile-drained field, which, however, stayed wet and soft until late spring; every depression became a focal point of infection, which rapidly spread and killed the foliage, with the result that hardly any bulbs reached the minimum saleable size of 8 cm. (R.J. Hastings). At North Saanich sporulation was abundant on overwintered leaves of I. germanica on 15 Feb., 1948, and on 16 Apr. it was quite abundant on a few plants of Dutch iris (?I. Xiphium) in a garden (W. Jones). Leaf spot was found in most plantings in the B.C. Interior (G.E. Woolliams). Infection was general in the iris planting at the Station, Vineland, Ont. (G.C. Chamberlain). Infection was 100% and damage considerable at Kentville, N.S. (D. Creelman). Infection was a trace to very heavy and damage sometimes severe in Queens Co., P.E.I.; a number of enquiries received (R.R. Hurst).

Bulb Nematode (Ditylenchus dipsaci). The main commercial stocks of bulbous iris in B.C., about 70% of the total, carry nematode infection, varying according to size; average in 10 cm. size is 3.2%, in 9 cm. 0.5%, in 8 cm. trace, and in smaller bulbs very occasionally (R.J. Hastings).

Soft Rot (Erwinia carotovora) caused considerable loss to many varieties in a nursery at the Botanical Garden, Montreal, Que. (J.E. Jacques). All the plants were attacked in one garden in Queens Co., P.E.I., and damage was very severe (R.R. Hurst).

Mosaic (virus). In the final field inspection of seven and a half million Wedgewood in B.C., infection above 2% occurred in only 5% of the stocks. Virus-free stocks are being developed, but at present these only comprise about 15% of the total. Most stocks carry about 2% infection. A few still carry about 95% infection, but they are rapidly disappearing (R.J. Hastings).

LATHYRUS

Root Rot (Fusarium ?Solani var. Martii). Many specimens were received from various parts of Ont. (J.D. MacLachlan).

Bud Drop (excess nitrogen). In a bed of sweet peas at Ottawa, Ont., prepared by trenching with sheep manure, 75% of the buds fell off (D.B.O. Savile).

LIGUSTRUM - Privet

Twig Blight (Glomerella cingulata) killed 10% of bushes of L. vulgare at Thorold, Ont. (G.C. Chamberlain). First report to the Survey.

LILIUM - Lily

Blight (Botrytis elliptica) was general and severe on L. concolor, L. Humboldti and L. Parryi at Oyster River, B.C. (W. Jones). It was severe at the Central Experimental Farm, Ottawa, Ont., in several lines of hybrids between L. dauricum and L. Willmottiae. As infection was trace or nil in most other lilies in the nursery it appears that all these lines have inherited the full susceptibility of L. dauricum (D.B.O. Savile).

LIMONIUM - Sea Lavender

Rust (Uromyces Limonii) was heavy on a single leaf of L. ?vulgare sent from Guelph, Ont., by Dr. S.A. Simmons (D.B.O. Savile).

LONICERA - Honeysuckle

Leaf Blight (Glomerularia Lonicerae) was common and caused much disfiguration of the honeysuckles near Fredericton, N.B. (J.L. Howatt). Damage was moderate at Digby, N.S. (J.F. Hockey).

Powdery Mildew (Microsphaera Alni). Hedges were moderately infected at the Botanical Garden, Montreal, Que. (J.E. Jacques).

LUPINUS - Lupine

Foot Rot (Sclerotinia sclerotiorum) caused wilting and death of 15% of a bed of 2-year-old Russell hybrids (L. polyphyllus) at Kentville, N.S. (J.F. Hockey).

LYCHNIS

Leaf Spot (Phyllosticta Lychnidis) was collected on L. chalcedonica at Oyster River, B.C. (W. Jones, D.B.O. Savile).

LYSIMACHIA - Loosestripe

Leaf Spot (Septoria Lysimachiae Westd.) was heavy and locally destructive in shady places on L. nummularia spreading from cultivation at Britannia, near Ottawa, Ont. As in material collected at Abbotsford, Que., in 1943, the pycnidia were often imperfectly formed and the spores

somewhat variable. There is some doubt whether S. conspicua Ell. & Mart., S. Steironematis Ell. & Ev. and Cylindrosporium Steironematis Atk. are distinct from this species (D.B.O. Savile).

NARCISSUS

Bulb Nematode (Ditylenchus dipsaci). Of 153 fields inspected in B.C. 12½% showed over 2% infection, the maximum tolerance at first inspection for certification (R.J. Hastings).

Basal Rot (Fusarium sp.). Infection in dry bulbs inspected in B.C. ranged from 0-16%. Field notes showed that bulbs on low, wet areas generally contained most basal rot (R.J. Hastings). A shipment of daffodil bulbs from B.C. consigned to England was examined at Montreal on 8 Sept. About 160 crates were a total loss (J.E. Jacques).

White Mould (Ramularia vallisumbrosae) was not serious in B.C. (R.J. Hastings).

Smoulder (Sclerotinia narcissicola). Most plantings in B.C. showed some infection, but it seldom exceeded 1% (R.J. Hastings).

Fire (Sclerotinia polyblastis) was not serious in B.C. (R.J. Hastings). A light infection was seen on Emperor at Aldergrove (R.P. Messum).

Leaf Scorch (Stagonospora Curtisii) was not serious in B.C. (R.J. Hastings).

Mosaic and Grey Streak (virus), considered together, were present in nearly all fields inspected in B.C. The amount of infection varies with the size of the stock and the amount of selection carried out; e.g. selected mother bulbs may carry 3-4% grey streak, and field-run planting stock 10-20% (R.J. Hastings).

PAEONIA - Peony

Blight (Botrytis spp.). Bud blight (?B. cinerea) was seen at Vancouver and in the lower Fraser Valley, B.C. (R.E. Fitzpatrick, H.N.W. Toms). Blight was moderate in several gardens at Saskatoon, Sask. (H.W.M.). Diseased plants (B. Paeoniae) were received from Marieville, Que. (J.E. Jacques). One third of the foliage of a new planting was destroyed at Pleasant Lake, Yarmouth Co., N.S. (K.A. Harrison). Damage was severe in some plants in a garden at Charlottetown, P.E.I., and many enquiries about the disease were received (R.R. Hurst).

Leaf Blotch (Cladosporium Paeoniae). Traces were found at the Botanical Garden, Montreal, Que. (J.E. Jacques).

Mosaic (virus) affected two clumps at the Botanical Garden, Montreal, Que. (J.E. Jacques).

Ring Spot (virus). A specimen was received from Indian Head, Sask. (D.B.O. Savile). Nine plants in a bed at the Station, Fredericton, N.B. were affected (D.J. MacLeod). Symptoms were seen for the third successive year in a clump at Charlottetown, P.E.I. (R.R. Hurst).

PARTHENOCISSUS

Leaf Spot (Cercospora Ampelopsidis) was heavy on leaves of P. quinquefolia received from Frelighsburg, Que. Spores were 19.5-81 x 3.5-5.0 microns and conidiophores 30-40 x 3.5-5.5 microns; such a range in a single specimen makes it doubtful whether C. arboreae and C. pustula can be maintained. Reported to the Survey from Man. and in the Herbarium from Ont. (D.B.O. Savile).

Downy Mildew (Plasmopara viticola) was locally heavy in shady situations on P. quinquefolia at Westboro, near Ottawa, Ont., in August (D.B.O. Savile).

PELARGONIUM - Geranium

Grey Mould (Botrytis cinerea). Large triangular areas of the leaf blades were killed in several gardens at Montreal, Que. (J.E. Jacques).

Stem Rot (Fusarium sp. associated). Severely damaged specimens were received from Montreal, Que., in August; it was stated to be general in an outdoor bed (D.B.O. Savile).

PETUNIA

Powdery Mildew (?Erysiphe Cichoracearum) was heavy on a single house plant at Winchester, Ont. Damage was heavy, but was partly due to red mite. This mildew, already reported from Man. and Ont., is possibly the same strain that attacks Begonia (q.v.) and many other plants (D.B.O. Savile).

PHILADELPHUS

Mosaic (?virus). Leaf variegations on a few shrubs at the Agricultural College, Truro, N.S., had the appearance of a typical mosaic (J.F. Hockey).

PHLOX

Powdery Mildew (Erysiphe Cichoracearum) was very common on susceptible varieties at Guelph, Ont. (J.D. MacLachlan). Mildew was moderately heavy on leaves received from Smiths Falls (D.B.O. Savile). Infection was moderate at the Botanical Garden, Montreal, Que., and heavy at St. Emile, Quebec Co. (J.E. Jacques).

Yellows (Callistephus virus 1). Two infected plants were found at the Botanical Garden, Montreal, Que. Diseased plants were also seen at Contrecoeur, Vercheres Co. (J.E. Jacques). Yellows was common on phlox in York and Sunbury Co., N.B. (D.J. MacLeod).

Blight (?virus) was prevalent at the Botanical Garden, Montreal, Que., and elsewhere in the district (J.E. Jacques).

PORTULACA

Wilt (Fusarium sp.) caused about 10% loss in fields of portulaca being grown for seed at Grand Forks, B.C. (G.E. Woolliams).

RIBES - Currant

Blossom Blight (Botrytis cinerea) destroyed the petals, calyx tubes, and ovaries of a shrub of R. odoratum at the Station, Kentville, N.S. (D. Creelman, R.G. Ross). First report to the Survey on R. odoratum, but recorded from B.C. on gooseberry.

ROSA - Rose

Grey Mould (Botrytis sp.) killed a number of buds and blossoms in a garden at Sidney, B.C. B. cinerea caused serious bud rot at Quebec, Que., according to information and specimens received (J.E. Jacques).

Black Spot (Diplocarpon Rosae) was seen commonly at and near St. Catharines, Ont., but was less serious than usual (G.C. Chamberlain). Infection was moderate on polyantha roses at the Botanical Garden, Montreal, Que., and specimens were received from Hudson Heights and St. Bruno (J.E. Jacques).

Kenneth F. Baker (U.S.D.A. Pl. Dis. Reptr. 32:260-274, 397, 448. 1948) reviews the history, distribution and nomenclature of this fungus. He concludes that the correct binomial for the imperfect stage is Marssonina Rosae (Lib.) Lind and for the perfect stage Diplocarpon Rosae Wolf. The first definite report of the fungus, by Fries in 1815, refers to a collection made in Sweden by Acharius and apparently called Sclerotium radiosum Achar. In 1822 Fries distributed the fungus in Scleromyceti Sueciae 254 as Erysiphe radiosum Fr. In 1827 Mlle. Libert gave the first definite description and illustrations of the disease, from specimens collected near Malmedy, Belgium, and called the fungus Asteroma Rosae. Fries later abandoned his name and called the fungus Actinonema Rosae (Lib.) Fr. The disease was known in France in 1822, was common in England by 1840, and was abundantly found in most countries of Europe. The first report for North America was made by Schweinitz in 1831 as Dothidea Rosae L.v.S.

In Canada, the earliest report cited by Dr. Baker was that of J.E. Howitt (Ont. Agr. Coll. Exp. Farm. Ann. Rept. 37:50. 1912), who found the disease common in Ontario in 1911; but search in the Mycological Herbarium has revealed an undated specimen, Canadian Fungi 106, labelled Phyllachora Rosae Sacc. = Actinonema Rosae, collected London, Ont., by John Dearness (D2176). In response to an inquiry Dr. Dearness wrote (22 Oct. 48): "Respecting the dating of Actinonema Rosae: "the oldest packet I have bears the date '1st of July 1893' in different inking from the other words. The locality - Gammage's grounds - may have been an earlier collecting ground. Your annotations [in Dr. Dearness' hand on the packet] make me think you have one of a set sent to Dr. Fletcher who had asked me to send him examples of economic species. The date cited may have been added when I complied with his request. Gammage was a commercial florist; I often visited his place and may have been there on that 1st of July to collect the rose leaves and other things if I found them. The paper of my 2176 bears printing on the inside and the date 'April 1890'. You may rest assured that the parasite in question was in the Gammage greenhouse before 1-7-93.".

Black spot is reported from every province of Canada, but the records are backed by specimens in the Herbarium from Ont., Que. and Sask. only (I.L. Conners).

Stem Canker (Leptosphaeria Coniothyrium). Specimens of affected hybrid teas were sent in from Thorold, Ont. (G.C. Chamberlain).

Rust (Phragmidium spp.) was common on roses throughout the B.C. Interior (G.E. Woolliams). The aecial state of P. ?subcorticinum was heavy on young fruits of R. spinosissima received in July from Shediac Cape, N.B. (D.B.O. Savile).

Powdery Mildew (Sphaerotheca spp.). S. Humuli was heavy on 2,000-3,000 seedling R. canina in a cold frame at Langley Prairie, B.C. and caused some defoliation (I.C. MacSwan, H.N.W. Toms). S. pannosa was heavy on Crimson Rambler in a garden at St. Catharines, Ont. (G.C. Chamberlain).

S. pannosa was heavy on buds and spines, but light on leaves, of rose specimens sent in from Brockville (D.B.O. Savile). A light outbreak of S. pannosa occurred at the Botanical Garden, Montreal, Que. (J.E. Jacques). Specimens of S. ?pannosa on R. rugosa were received from Chateauguay (D.B.O. Savile).

Mosaic (virus). Three bushes of Kirsten Poulsen were infected in a bed at St. Catharines, Ont. Only one plant was affected in 1945 (G.C. Chamberlain). A single plant of Purity climber at the C.E.F., Ottawa, was mottled and severely distorted, and bore no bloom; a single normal shoot of different habit from the edge of the clump, apparently originating from below the graft, indicated that the rootstock was either uninfected or was a symptomless carrier. One plant of R. gallica var. Tuscany also showed severe mottling and distortion; many blooms had failed to open normally (D.B.O. Savile).

SINNINGIA - Gloxinia

Bub Rot (Botrytis cinerea) prevented blossoming in specimens of S. speciosa received from Riviere du Loup, Que. (J.E. Jacques).

SOLIDAGO - Goldenrod

Powdery Mildew (Erysiphe Cichoracearum) was light but general at the Botanical Garden, Montreal, Que. (J.E. Jacques).

SYMPHORICARPOS - Snowberry

Bacterial Blight (?Pseudomonas syringae). A hedge of S. "roseus" (?orbiculatus) at Ste. Anne de la Pocatiere, Que., was completely ruined by this blight, which attacked leaves, flowers and fruit (A. Payette).

TAGETES - Marigold

Yellows (Callistephus virus 1). A few odd plants were affected at the Botanical Garden, Montreal, Que. (J.E. Jacques). Infection was 37% and 62% in two gardens at Fredericton, N.B. (D.J. MacLeod).

TULIPA - Tulip

Fire (Botrytis Tulipae). In coastal B.C. primary infections exceeded the certification tolerance of 1% in 17½% of the 304 fields inspected. Cool, wet weather in May promoted spread, and loss to the bloom crop was serious. Infection of Bartigon tulips by an organism closely resembling B. Tulipae apparently caused the loss of blue pigment at the base of the blooms. A high percentage of blooms with white, rather than the normal deep blue, bases were from partly decayed bulbs that bore numerous sclerotia of the fungus (R.J. Hastings). Fire was very heavy at the C.E.F., Ottawa, Ont., in late May, following a week of cool, wet, cloudy weather. The condition of the main planting, in which there was probably appreciable carry-over from 1947, was aggravated by nearby rows, bordering beds of perennials, having been left undug; one of these rows showed primary lesions on nearly half the plants (D.B.O. Savile). Fire was prevalent at the Botanical Garden, Montreal, Que., and in a planting at Westmount. Specimens were received from a grower at Levis who claimed serious losses (J.E. Jacques). Fire was severe in two-year-old plantings at Kentville, N.S. (J.F. Hockey). Damage was heavy throughout a commercial planting at Charlottetown, P.E.I. (R.R. Hurst).

Break (virus). The tolerance of 1% at first inspection for certification was exceeded in only 5.5% of the 304 fields examined in coastal B.C. (R.J. Hastings). Break occurred quite generally throughout the interior of B.C. in both home gardens and commercial plantings (G.E. Woolliams).

VERONICA - Speedwell

Leaf Spot (Gloeosporium Veronicarum Ces.) attacked a few plants of V. Tournforti at North Saanich, B.C. Not reported in the Survey, but in the Herbarium from Beauceville, Que. on V. officinalis. The various Gloeosporium spp. described on Veronica are doubtfully distinct, with the possible exception of G. arvense which is stated to have spores 8-9x3.5-4 microns. In the present specimen the spores are 9.5-15.5x2.3-3.8 microns, guttulate, often subclavate (W. Newton, D.B.O. Savile).

VIOLA

Blossom Blight (Botrytis cinerea) caused considerable damage to seed crops of pansy, V. tricolor var. hortensis, on Vancouver Island, B.C., during July (W. Jones).

Leaf Spot (Cercospora Violae) caused some shedding of lower leaves of pansy at the Arboretum, Ottawa, Ont., in July (D.B.O. Savile).

Anthracnose (Colletotrichum Violae-tricoloris) caused slight damage to pansies in a garden at Ottawa, Ont. (D.B.O. Savile).

Stem Rot (Myrothecium roridum) caused 20% loss in a seed planting of pansies at Elk Lake, B.C., and 6% loss in a seed planting of Swiss Giant pansies at Oyster River. Infected plants are eventually killed (W. Jones).

Leaf Spot (Ramularia lactea) was widely distributed in gardens and commercial plantings of pansy on Vancouver Island, B.C., and caused slight to moderate damage (W. Jones).

Powdery Mildew (Sphaerotheca Humuli) caused considerable damage to seed plants of pansy at Elk Lake, B.C. (W. Jones).

VITIS - Grape

Downy Mildew (Plasmopara viticola) was moderately heavy in August on V. vulpina in a garden at Westboro, near Ottawa, Ont. (D.B.O. Savile).

ZINNIA

Alternaria Blight (A. Zinniae) was general on foliage and blossoms of Z. elegans in ornamental plantings at Brentwood, B.C. (W. Jones).

Bud Blight (?Fusarium sp.) was stated to be abundant in a garden at Belleville, Ont., in late July. In specimens received the buds had dried up when about $\frac{1}{4}$ inch in diameter. Fusarium sp. was predominant (D.B.O. Savile).

Yellows (Callistephus virus 1). A grower at Montreal, Que., suffered 60-75% loss in an area of about $1\frac{1}{2}$ acres (J.E. Jacques). Four outbreaks were noted in P.E.I., but there was much less of this disease than in past years, presumably due to the use of DDT (R.R. Hurst).

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