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DIVISION OF BOTANY AND PLANT PATHOLOGY

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EIGHTEENTH ANNUAL REPORT OF THE CANADIAN PLANT DISEASE SURVEY

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FOREWORD

The present report is the Eighteenth Annual Report of the Canadian Plant Disease Survey, and is the tenth to be compiled by the present writer.

A wealth of material was supplied by my collaborators last fall. I am particularly indebted to the District Inspectors for their reports on potato diseases, to Prof. J.E. Howitt, O.A.C., Guelph, Ont., Messrs. Fernand Godbout and Edouard Lavallee, Provincial Horticultural Service, Montreal, Que., Prof. D.L. Bailey, Univ. of Toronto, Toronto, Ont., and Prof. J.G. Coulson and Dr. I.H. Crowell, Macdonald College, Que., for data from their areas. Our knowledge of diseases of ornamentals has also been considerably extended, especially in Manitoba by the work of Drs. J.E. Machacek and W.L. Gordon. The tobacco reports were supplied by Dr. G.H. Berkeley. The report on phenological data being gathered in Western Canada is the work of Dr. R.C. Russell. Besides the collaborators specially mentioned, I wish to express my sincere thanks to the many members of the Division, both in Ottawa and at the Branch Laboratories, who have supplied material to the survey.

April 11, 1939.
Central Experimental Farm,
Ottawa, Canada.

I.L. Conners,
Associate Plant
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New or Noteworthy Diseases

Stem rust of wheat was destructive, not only in Manitoba and eastern Saskatchewan, but also in the Maritime provinces and Quebec. It appeared in southern Saskatchewan on June 21, two weeks earlier than normal, and in Manitoba on June 22, a week before the usual date. As the result of frequent heavy spore showers and favourable weather conditions, a severe epidemic developed in Manitoba. While susceptible wheat varieties were materially reduced in both yield and grade by rust, fortunately only about 14% of the wheat acreage in that province was sown to susceptible varieties. Rust development was limited to slight traces on the rust resistant varieties, Renown and Thatcher. Stem rust spread throughout Saskatchewan and far into Alberta, but severe rust damage was confined to eastern Saskatchewan. It caused moderate damage to a few late fields in western Saskatchewan, and eastern Alberta. Severity of infection ranged from 30-100% at the time of examination in over half the fields in Nova Scotia, Prince Edward Island, and New Brunswick, and it is estimated that in most fields it eventually caused moderate to severe damage. However, the rust-resistant varieties now being extensively tested in these provinces were clean or showed only traces of rust. Rust damage was apparently severe in Quebec and slight to moderate in Ontario, but this conclusion is based on a strictly limited number of observations.

Leaf rust of wheat was unusually prevalent in western Canada in 1938. It was epidemic in most sections of Manitoba and of eastern Saskatchewan. Of all the commercial wheat varieties, Thatcher was the most severely attacked. Renown was also rusted, but less severely, while the old standard varieties, Marquis, Reward, and Ceres, bore infections intermediate between those of Thatcher and Renown. Yields of all varieties were considerably reduced by this rust. Controlled experiments at the Dominion Laboratory of Plant Pathology, Winnipeg, demonstrated that yields and grades of Thatcher and Renown were reduced by leaf rust and in the case of Thatcher the reduction in yield was quite pronounced. It is conservatively estimated that leaf rust, in some localities, reduced the yield of early-sown Thatcher by about 25% and in late-sown fields the reduction in yield amounted to 35% or more. Leaf rust was prevalent from Quebec eastward on Huron and other varieties commonly grown in these provinces.

Stem rust of oats was mildly epidemic in Manitoba and eastern Saskatchewan this year. In addition, stem rust would appear to have been locally destructive in Ontario and Quebec, but no information is available to indicate whether these outbreaks

centre about plantings of barberry, or are due to wind-borne inoculum from a distance. In the Maritime provinces stem rust seldom exceeded a trace. At a few points, badly rusted spots were seen, but the infection was even less than last year. Barberries are definitely known to occur in some of these centres.

Crown rust was prevalent in eastern Saskatchewan and Manitoba. It was also prevalent through most of Eastern Canada, although it was not as destructive as in 1937. Further evidence was obtained that buckthorn plantings are responsible for severe outbreaks of crown rust. Moreover, crown rust apparently possesses greater powers of spreading than stem rust, so that a few bushes strategically located may be responsible for an epidemic over a relatively large area.

The prevalence of wheat bunt (Tilletia caries and T. laevis) in Western Canada remains unchanged at about 3 smutty cars per 1,000. However, out of 309 cars of winter wheat from Alberta, 69 cars or 22.3% graded smutty. Bunt was also reported to be heavy in winter wheat from Armstrong, B.C. The oat smuts (Ustilago Avenae and U. Kolleri) continue to be prevalent across Canada. In the Maritime provinces this year 25% of the fields examined showed 5% or more of smut.

Head blight of cereals is evidently a minor disease in Canada. However some of the fungi isolated from disease heads are worthy of mention. Botrytis cinerea was isolated from blighted heads of oats from Nova Scotia, and New Brunswick. As far as we are aware this is the first report of a Botrytis on oats. Fusarium graminearum was isolated from head blight samples of wheat collected in the Maritimes. While this species is reported as common in some countries, it has been rarely encountered in Canada. The common head blight pathogens in this country are F. Poae, F. avenaceum and F. culmorum. Head blight in barley is usually caused by Fusarium spp. (usually the three just mentioned) and Helminthosporium sativum.

Ergot (Claviceps purpurea) was suddenly a problem in wild rice (Zizania aquatica) in northern Manitoba, where the crop was of considerable commercial value this year, due to a crop failure in Minnesota. The sclerotia have been collected previously in Ontario, New Brunswick, and Nova Scotia.

Our present knowledge of certain leaf spots and stem blights of alfalfa, common clover, and sweet clover in Canada is briefly summarized. Stemphylium leaf spot (Stemphylium sarcinaeforme) was

found on red clover at Macdonald College, Que. This is the first record for Canada, although it is reported as common in the State of New York.

Late blight (Phytophthora infestans) was epidemic over most of Eastern Canada. In New Brunswick a loss of 50% of the crop from rot was not uncommon, while in Prince Edward Island, early killing of the tops in a crop, which was planted late due to wet weather in the spring, resulted in a marked reduction in the yield of marketable tubers. Bacterial wilt and rot (Phytomonas sepedonica (Spieckerm. & Kotth.) Magrou) was destructive in Quebec and was found in a larger number of fields in New Brunswick. In addition it was observed for the first time in Alta., Sask., Man., Ont., and P.E.I., where it was detected in one or a few fields. The smear method has proved extremely useful in detecting the organism in tubers suspected of harbouring the disease, and it is anticipated that its use will accelerate the elimination of diseased stocks.

Phyllid Yellows was epidemic in Alta. and Sask., although the damage was not great except near psyllid-infested greenhouses about Calgary and other urban centres, where it has been known since 1932. The epidemic was severe in several of the States to the south.

Purple Top is another somewhat similar disease occurring in the Prairie provinces. While it is widely distributed, the damage has seldom exceeded a trace in Canada. The recent work of Leach at Minnesota, suggests that it may be Aster Yellows, but the trouble has not been transmitted through the tubers. Further studies are necessary to determine whether or not the disease can be induced only by viruliferous leafhoppers.

Vegetable diseases worthy of mention are: Leaf blight (Macrosporium Carotae) of carrot was found in Nova Scotia for the first time. Bacterial blight (Phytomonas Carotae Kendr.) previously unreported in Canada, has been observed at Brandon, Man., in 1935 and again this year at Brandon and near Winnipeg. Bacterial blight (Phytomonas Phaseoli)was estimated to have caused a loss of $50,000 in the bean crop grown in the irrigated areas of southern Alberta. Blight (Phomopsis vexans) was destructive to egg-plant in the Niagara peninsula, Ont. Black root (Aphanomyces Raphani Kendr.) is a new Canadian disease of redish found at Macdonald College, Que. Downy mildew (Peronospora Spinaciae) was unusually destructive this year at Vancouver, B.C., and in the Niagara peninsula, Ont. Anthracnose (Colletotrichum phomoides) a not uncommon disease of imported tomatoes, was epidemic and greatly reduced the quantity of marketable fruit in Essex and Kent counties, Ont.

Downy mildew or blue mould (Peronospora tabanica Adam) was reported in Canada for the first time, when it was found in eight seed beds and four fields in the Old Tobacco Belt in Essex and Kent counties, Ont.

The fruit disease situation has changed but little in the past year. While fire blight has been locally destructive in most parts of the Dominion, it has never been reported from Alberta or in the famous commercial orchards of the Annapolis valley, N.S. This year what appears to be this disease caused some damage to nursery stock in the latter province. Drought spot or corky core (boron deficiency) is no longer a problem in orchards receiving soil treatments with boric acid in B.C. Moreover, applications made in 1936 are still 100% effective in 1938. A survey of the cherry orchards in the Okanagan valley, B.C., revealed a small amount of crinkle, which is apparently a genetic abnormality. Coryneum blight (C. Beijerinckii) was reported on peach in Leamington district, Ont., which is the first report of its occurrence in eastern Canada.

The needle rust (Chrysomyxa Weirii) reported on Picea rubra at St. Martins, N.B., appears to be a new tree rust for eastern Canada.

Several new diseases of ornamentals or important extensions of range or host were recorded in 1938, as follows: Bacterial leaf spot (Phytomonas Woodsi (E.F. Sm.) Bergey et al.) was fairly destructive to greenhouse carnations in Ont.; a new record. Yellows (Fusarium spp., Elegans section) is an important disease of gladiolus, which has been known in P.E.I. since 1933; it was reported in Manitoba and Saskatchewan in 1937 and in Ontario this year. Fusarium corm rot (F. oxysporum var. Gladioli Massey), a disease of gladiolus new to Canada, was found at Winnipeg, Man., in 1938. Botrytis rhizome rot (Sclerotinia convoluta) was observed at Summerland, B.C.; a previous record was from Ottawa, Ont., in 1927. Powdery mildew (Microsphaera Alni) was found on privet in Ontario and Prince Edward Island; a new host. Bacterial blight (Phytomonas papavericola Bryan & McWhort.) was recorded at Salmon Arm, B.C., on Mecanopsis Baileyi; if the determination is correct this is a new host for the organism and a new disease for Canada. Phytopthora cactorum caused a blossom blight of tulip at Belleville, Ont., and dark berry of Cotoneaster horizontalis on Vancouver island, B.C.; its occurrence on pears at Kentville, N.S., was recorded in 1919 (H.T. Güssow. Agric. Gaz. Can. 6:951-952. 1919). Crown rot (Phytomonas Delphinii) was reported on a new host, Aconitum, at Brandon, Man. Hollyhock rust (Puccinia Malvacearum) on Althaea

rosea at Edmonton, Alta.; the rust is now known from every province in Canada, except Saskatchewan. A root rot caused by Diplodia radicicola Tassi was reported on Aristolachia Sipho from Ontario. Rust (Puccinia Cyani) on Centaurea Cyanus is now known from British Columbia and Nova Scotia as well as Ontario. Foliar nematode (Aphelenchoides ritzema-bosi Schwarz) was found on chrysanthemums in a greenhouse at London, Ont.; it is apparently a new record for Canada.

The Weather and Its Influence on Plant Disease

Crops suffered little winter injury due to the mild winter in British Columbia. Spring work was completed early and the moisture supply was adequate. Prolonged dry weather during the summer hastened the maturity of the crops.

Small fruits matured so rapidly during the hot dry weather in July that it was difficult to handle them on the market. The shipment of over-ripe strawberries from Coastal points resulted in heavy losses due to breakdown, upon arrival at their Prairie destination.

Diseases such as rust and downy mildew were quite prevalent, but the damage was less than in 1937. On the whole diseases did not seriously reduce the yield during the present growing season. (W. Jones)

In most parts of Alberta the crop went into the ground under more favorable conditions than in 1937, although seeding was somewhat delayed in the south by wet weather and in the north by lack of soil moisture, with consequent soil drifting in some areas. This reversal of the normal moisture relations continued during June and there was a general deterioration of the crops in the central and northern sections. Early in July heavy rains fell over most of the province from Edmonton south, but almost entirely missed the northern districts. Only light showers were received throughout the season in the Athabasca and Peace River districts, with the result that crops were very light and in many cases not worth harvesting. All the cultivated sections of the south received abundant rainfall, which was excessive at some points, including Pincher Creek and Cardston. Harvesting of the generally heavy, late maturing crop was completed under ideal conditions, since severe killing frosts did not come until early October. Heavy hail damage occurred in many sections of the province. Stem rust was usually abundant, but its spread was delayed by cool weather in early August and most of the crop escaped damage. Foliage diseases were

prevalent in the south and relatively scarce farther north, probably owing to the lack of moisture earlier in the season. (M.W. Cormack)

Spring weather conditions were unfavourable for early growth. Seeding started about April 18, but was delayed by more than a week of cold weather with snow and high winds. Moisture conditions were better, however, than they had been for several years. Growth during early May was slow due to cold backward weather and only a small proportion of seeded wheat was above ground on May 9. Moisture conditions continued favorable, as good general rains fell during the first few weeks of May, except in the north-eastern part of the province, so that about 45% of the seeded wheat was showing green on May 23. Germination was mostly good and weather conditions were favourable, for the development of a good root system. Slight damage was caused by soil drifting. The warmer weather in early June favoured rapid growth and, together with high winds, made heavy demands on soil moisture. Light rains failed to replenish this moisture and crops in the east-central and south-west portions were beginning to suffer. Browning root rot under these conditions, was fairly widespread and caused considerable injury, though good recovery followed heavy rains in some areas and good showers in others. Growing conditions during early July were fairly good in all areas except the north-east and extreme south-east. Severe grasshopper damage was widespread. The second week of July was dry and much damage from drought was becoming apparent in areas where previous moisture conditions had been poor. Traces of rust appeared at scattered points in western Sask. During the last half of July rust became prevalent on susceptible varieties in south-eastern Saskatchewan and eventually caused severe damage. The development of the rust was patchy, depending on the crop. In the drier areas the crop ripened quickly and escaped severe infection. In the west central area, however, cool weather and good growing conditions delayed the ripening of the crop, and rust became prevalent causing considerable damage. There was much variation in quality and grade in various districts and even on individual farms. Stem rust was more widespread this year than it has been for many years. This wide distribution may be accounted for by a similar distribution of occasional heavy crops of susceptible wheat and unfavourable ripening conditions in many areas. Common root rot was widespread but somewhat less severe than in 1937. The heaviest infestations were found in areas which suffered most from drought during maturation of the crop. The first frost at Saskatoon was on October 15. (H.W. Mead)

The influence of weather on the development of the rust epidemic in Manitoba is discussed in full under stem rust of wheat (p. 1).

The season was one of the most unfavourable in years in Eastern Quebec, especially for the potato crop. The following data are prepared from meteorological records at Ste. Anne de la Pocatiere and Quebec City, Que.:-

Month	Days of rain	Precipitation in inches	Temperature	
			Maximum	Minimum
June	12	2.73	90.3°F.	46.8°F.
July	15	5.33	87.4°F.	48.3°F.
August	18	11.87	89.0°F.	46.7°F.

In September rain fell on 14 days and the total precipitation exceeded 8 inches. The month of October was very fine. (C. Perrault)

The onset of winter conditions in New Brunswick for 1937-38 was somewhat delayed when compared to last year. The soil froze hard on November 23, and ploughing operations ceased after that date. Except for the last four days, December was comparatively mild. The Saint John River froze over December 11, the latest date since 1923. Light snowfall beginning December 9, covered the soil with a blanket of snow which was removed by a warm rain on January 25. Beginning February 3, snowfalls were again experienced, and although the depth of the snow never exceeded 16 inches, the fields were well covered until March 18. Warm weather after that date rapidly melted the snow and the fields were bare by March 22. Owing to the mild winter, frost did not penetrate the soil to any great depth and ploughing operations began at the Experimental Station, May 4. Frequent rains during the early part of June greatly retarded seeding operations. Over 26 inches of rain fell in the six months, April to September, inclusive. This was almost seven inches greater than the 25-year average. A corresponding reduction in sunlight also occurred, almost 100 hours less than the 25-year average. The month of October was warm and dry and very favourable for the harvesting of root and tuber crops. Little, if any, frost damage was found in potato tubers harvested as late as October 24.

Ascospores of the apple scab fungus were first liberated May 12, at which time the blossoms were in the pre-pink stage. Ascospore discharge was completed June 23. The first leaf infections were noted June 2. The weather during June and July was very favourable for the development of apple scab and in consequence, scab was severe in

poorly sprayed and non-sprayed orchards. The favourable weather conditions in September favoured late apple scab infection, and immoderately high temperatures in October caused a serious development of pin-point scab on apples held in common storage.

The aecial stage of oat stem rust was found on the barberry June 10. Urediniospores were trapped June 23, and stem rust was noted on Garnet July 16. Crown rust of oats was found on the buckthorn June 1, and infections noted on the oat plant July 16. Leaf rust of wheat was first detected July 6. Buckwheat yellows made its appearance July 25. The season was particularly favourable for the development of the late blight disease of potatoes which first appeared during the second week of July. The epidemic was equal in intensity to that of 1926 and occasioned a large reduction in yield and destruction of tubers. The worst epidemic of leaf roll in the history of New Brunswick potato production was also experienced this year. Of significance is the fact that the alleged vector of this disease, Myzus persicae Sulz. predominated in numbers above all other potato aphid species last year. The heavy rainfall during the summer months, coupled with high temperatures during October and November, favoured late growth and retention of foliage on many trees and shrubs, particularly the apple. In the event of severe conditions, much winter injury may be anticipated in apple orchards. (S.F. Clarkson)

Meteorological records show that climatic conditions from November 1937 to May 1938, in Nova Scotia approximated average conditions in the apple growing sections. The months of June, July, August, and September 1938, were exceptionally wet. The rainfall for those months was 19.86 inches compared to a 20-year mean of 12.34 inches. Sunshine was less than average. The months of October and November were bright and slightly warmer than usual.

General disease conditions were satisfactory until early July when the effects of wet weather began to be evident. Botrytis and Monilia blights spread rapidly and are reported in this survey from several host plants. Leaf spotting diseases increased rapidly as well as mildews. The summer was very favourable for the spread of disease and unfavourable to the practise of disease control measures. Root crops generally produced disappointing yields and much rot developed, both at harvest and in storage. (J.F. Hockey)

On account of a comparatively mild winter and warm clear weather during March, early planting and sowing were predicted in Prince Edward Island. Rain, however, in April and May delayed

getting on the land with the result that grain was sown about the usual time. Some potatoes were planted early, but many who normally plant around the middle of June were delayed until late in the month on account of wet weather. June as a whole, however, was warmer, and less rain fell than in the previous year, with the result that no outbreak of Botrytis rots was observed and diseases generally were much less apparent than in 1937. No discharge of apple scab or brown rot spores was noted until after the blooming period and these diseases were not as severe as usual.

July was wet and cloudy; there were 17 days in which 5.08 inches of rain fell, as compared to .79 inches, and 185.3 hrs. of sunshine against 306.8 hrs. for the same month last year. Late Blight appeared in mid-July in some sections, and on July 29 at Charlottetown. August continued wet, with the temperature below average; late blight spread rapidly and by the end of the month potato fields in some sections were practically dead. Crown rust of oats was general and in some cases severe. Early in the month the amount of leaf rust of wheat was high and stem rust was developing rapidly.

Rainfall during September was only slightly higher than last year and about average for a four-year period.

Control of brown heart of turnips by the use of borax was good, due undoubtedly to the generous amount of precipitation which would render the borax available to the plants. (E.H. Saunders)

Recording Phenological Data

R.C. Russell

Phenological data have been compiled for three years at the Dominion Laboratories of Plant Pathology, situated at Winnipeg, Saskatoon, and Edmonton. The 1938 records were collected by B. Peturson, R.C. Russell and M.W. Cormack.

The records concerning two dozen species, for the three-year period, 1936 to 1938 inclusive, are given in the following table. Other species were observed at one or more places, but as the records concerning them are less complete, they are not included in Table I.

We are now in a position to study the relative earliness of the three seasons by comparing the dates on which the same species

started to bloom in the seasons in question. From a careful examination of the data, it may be seen that an early spring does not necessarily mean that an early harvest is to follow. In this region a cold period around the first part of May frequently delays the development of plants while, on the other hand, dry hot weather in summer hastens their maturity. For instance, the season of 1938 at Saskatoon was well ahead of the other two seasons around the middle of April, but for the most of the growing season 1937 was the most advanced of the three.

It was decided last year to compile data concerning the development of early sown wheat at Winnipeg, Saskatoon and Edmonton. These data are arranged in the table below:-

	Winnipeg			Saskatoon			Edmonton		
	1936	1937	1938	1936	1937	1938	1936	1937	1938
Seeded			16/4	22/4	14/4	14/4	2/5	26/4	27/4
Emerged			4/5	9/5	1/5	3/5	14/5	4/5	13/5
Headed			21/6	26/6	23/6	28/6	4/7	30/6	29/6
Harvested			29/7	29/7	19/7	29/7	12/8	10/8	14/8

The work of collecting data at the three places is becoming somewhat standardized and will be more valuable from now on. As some of the species listed are not readily available for observation at all three places, the list of species under observation at each place is somewhat different, but a goodly proportion of the species is the same at two or more of the points. It is felt that great emphasis should be laid on the selection of species which are seen almost daily. Moreover the same species should be observed in the same situation every year, to avoid variations due to habitat. An attempt is being made in 1939 to fill in certain gaps of a week or more in this year's data with suitable species at each place.

Table I. Dates at which certain plants were first seen in flower at Winnipeg, Saskatoon and Edmonton, 1936-1938.

	Winnipeg			Saskatoon			Edmonton		
	1936	1937	1938	1936	1937	1938	1936	1937	1938
Pulsatilla ludoviciana	-	-	-	24/4	17/4	11/4	7/5	6/5	17/4
Populus tremuloides	1/5	30/4	17/4	27/4	20/4	14/4	10/5	13/4	11/4
Acer negundo	11/5	7/5	3/5	11/5	3/5	11/5	-	2/5	1/5
Betula papyrifera	12/5	15/5	12/5	13/5	4/5	15/5	12/5	30/5	10/5
Amelanchier alnifolia	19/5	15/5	16/5	17/5	7/5	15/5	18/5	9/5	15/5
Prunus americana	-	17/5	16/5	-	-	-	-	-	-
Prunus pennsylvanica	-	-	-	-	18/5	22/5	20/5	11/5	16/5
Hierochloë odorata	20/5	19/5	20/5	18/5	12/5	18/5	2/6?	-	-
Smilacina stellata	24/5	27/5	23/5	22/5	18/5	20/5	15/5	10/5	21/5
Svida sp. (Cornus sp.)	-	30/5	30/5	30/5	30/5	31/5	-	-	1/6
Elaeagnus commutata	4/6	-	4/6	30/5	28/5	2/6	1/6	-	30/5
Viburnum lentago	-	4/6	2/6	-	-	-	-	-	-
" opulus (trilobum)	-	13/6	11/6	-	-	-	-	-	10/6
Anemone canadensis	8/6	15/6	10/6	5/6	8/6	12/6	-	-	12/6
Achillea lanulosa	-	-	19/6	11/6	13/6	8/6	22/6	-	18/6
Rosa (alcea?)	-	-	-	18/6	15/6	21/6	-	-	-
Bromus inermis	17/6	24/6	20/6	23/6	21/6	19/6	20/6	18/6	18/6
Symphoricarpos occidentalis	-	23/6	24/6	-	-	-	-	-	28/6
Gaillardia aristata	-	-	25/6	-	20/6	20/6	-	-	-
Steironema ciliatum	-	1/7	7/7	4/7	-	-	-	-	5/7
Cirsium (lanceolatum?)	-	8/7	11/7	-	8/7	17/7	-	-	-
Grindelia perennis	-	-	-	26/7	14/7	20/7	-	-	-
Oligoneuron canescens	30/7	-	-	28/7	16/7	23/7	7/7?	-	-
Aster laevis (purple)	-	-	-	10/8	4/8	-	-	-	2/8

I. DISEASES OF CEREAL CROPS

WHEAT

STEM RUST (Puccinia graminis) was general on Reward, Red Bobs, and Marquis wheat in the Creston area, B.C., on newly reclaimed land at the southern end of Kootenay Lake. No rust was found on Thatcher.

Stem rust was first observed at Lacombe, Alta., on Aug. 3, but undoubtedly it was present earlier in the eastern sections of the province. Infection was moderate to severe on late stands of Marquis in eastern Alberta, including the Vegreville, Camrose, Stettler, and Lethbridge districts. Only a few scattered fields were seriously damaged since about 95% of the fields were sufficiently advanced to escape infection. Rust decreased progressively westward, infection averaging 10-20% in late fields between Edmonton and Cardston. Traces of rust were found west of Edmonton at Wildwood and Edson, where it has not been previously reported.

Stem rust made its appearance at Indian Head, Sask., on June 21 and at Saskatoon on July 7, almost two weeks earlier than normal. It spread throughout the whole of the agricultural area of Saskatchewan and was everywhere severe on late susceptible wheat varieties except where crops were prematurely ripened by dry weather. In general, however, heavy stem rust infection was confined largely to the eastern part of the province, where rainfall was more abundant, the westerly boundary being a line drawn through Assinboia, Moose Jaw and Melfort. Infection ranged as high as 90% in some late fields of susceptible varieties in the heavy rust area. West of the line described above, infection was mostly light and quite variable. Light early stands in that area showed only traces of rust, while some of the later heavier stands carried upwards of 20% infection. Thatcher, Apex, and Renown were all practically free from stem rust.

This year, stem rust of wheat made its appearance in Manitoba a week earlier than normal. On June 22, a trace of stem rust was found on both wheat and barley at Brandon and Winnipeg and the following day rust was observed on susceptible wheat varieties at Morden. Frequent heavy spore showers over Manitoba during late June and early July, and sufficient moisture, in the form of dew, for spore germination favoured the establishment and rapid spread of rust. By the end of the first week in July stem rust was general on susceptible wheat varieties throughout the province and in late July and early August when infections had reached their maximum the severity of infection on these varieties ranged from 70-100% on all stems. The susceptible wheat varieties were materially reduced in both yield and grade by rust. In some

cases late crops of Marquis, Ceres, and Reward were so badly damaged by rust that the fields were left unharvested. Fortunately, however, only about 14% of the wheat acreage of Manitoba was sown to susceptible varieties. Only slight traces of stem rust occurred on Thatcher and Renown. In some fields of these varieties occasional pustules occurred on a small percentage of the plants.

Durum wheat in general escaped rust injury. Mindum, the durum variety generally grown in Manitoba, bore stem rust infections ranging from 5-10% in severity of infection. However, a few fields of durum, tentatively identified as a strain of Kubanka, were heavily rusted and severely damaged. In these heavily rusted durum fields the severity of infection averaged over 60%.

Temperature conditions were quite favourable for rust development during most of the growing season, particularly so during July. During that month temperatures exceeded the normal by 4 or 5° F. throughout most of the agricultural area of Manitoba. Precipitation was not particularly favourable for rust development. Rainfall, except in the northern parts of the province and in some local areas in the extreme eastern and south-central districts, was 40 and 30% below normal for June and July respectively. Dew formation, however, was frequent and heavy and favoured the initiation of rust infection. (B. Peturson)

Stem rust usually varied from 10-30% on wheat in Oxford county, Ont., and apparently caused slight damage. In one field 80% of rust was present. Conditions were similar in Lanark county. (G.A. Scott)

Stem rust infection ranged from 40-100% on susceptible wheat varieties at Ste. Anne de la Pocatiere, Que., while not more than traces occurred on the rust resistant varieties, Coronation, R.L. 1005, R.L. 716.6, and Thatcher. Similar observations were made at Cap Rouge and Lennoxville.

Aecia were plentiful on a barberry hedge at Shediac, N.B. on June 10, where rust was severe on oats in August (J.L. Howitt & S.F. Clarkson). Stem rust was first observed at Fredericton, N.B. on July 16, and it began to be prevalent about Aug. 1 in the Maritime Provinces. Infection ranged from 30-100% in mid August on susceptible varieties and was causing moderate to severe damage in most fields. While the rust resistant varieties are only beginning to be grown, a group of them were examined at 14 widely

scattered Stations and were found to be free or to bear only traces of rust. Three fields of durum wheat in N.B. were lightly rusted. (I.L. Conners)

LEAF RUST (Puccinia triticina) was general on Reward, Red Bobs, Marquis, and Thatcher at Creston, B.C.

Leaf rust was general throughout Alberta, but in most fields the infection was not heavy. Its prevalence in 1938 is in marked contrast with 1937, when less leaf rust was present than usual.

Leaf rust was common throughout Saskatchewan in 1938. It was prevalent in the eastern part of the province, especially along the eastern border. Thatcher was very susceptible.

Leaf rust of wheat was first observed in Manitoba this year on June 20. From then on it increased very rapidly and by the end of July this rust had become epidemic throughout most of the agricultural area of Manitoba. The heaviest infections occurred in the regions of heavier rainfall, namely the eastern and northern areas of the province. Infections were lightest in the southwestern districts where rainfall was in general quite scanty. Of all the commercial wheat varieties, Thatcher, a new stem rust-resistant variety, was the most severely affected by leaf rust. Infections generally averaged upwards of 60% on this variety except in localities where rainfall was deficient. Renown, another new rust-resistant variety, was also attacked by leaf rust, but to a much less extent than Thatcher. Infections on Renown averaged about 30%. The old standard varieties, Marquis, Reward, and Ceres, bore infections averaging about 45%. The yields of all the varieties were materially reduced by this rust. Controlled experiments conducted at the Dominion Laboratory of Plant Pathology, Winnipeg, demonstrated that yields and grades of both Thatcher and Renown were reduced by leaf rust and in the case of Thatcher the reduction in yield was quite pronounced. Conservative estimates indicate that leaf rust, in some localities, reduced the yield of early-sown Thatcher by about 25% and in late sown fields the reduction in yield probably amounted to 35% or more. Only slight traces of leaf rust occurred on durum wheat varieties. (B. Peturson)

Leaf rust was prevalent in Que., N.B., N.S., and P.E.I. on Huron and other varieties commonly grown in these provinces. Several of the stem rust resistant varieties, however, were free of leaf rust or showed low percentages.

STRIPE RUST (Puccinia glumarum) was general in and was causing some damage to three fields of winter wheat at Sumas, B.C., on May 24. It was general on Bromus sitchensis at Hatzic and on Elymus glaucus at Dewdney (W. Jones). A slight infection was found on a wheat introduction at Castor, Alta., on Aug. 3 (K.W. Neatby). Stripe rust slightly to moderately infected Hordeum jubatum in southern Alberta in late August and it was collected on the same host at Edmonton, Vermillion, Wainwright, and elsewhere in early September.

BUNT (Tilletia caries and T. laevis). A summary of the bunt situation in Western Canada was prepared from the records of the Western Grain Inspection Division and kindly supplied by Dr. W.F. Hanna and W. Popp.

While 333 cars of wheat were graded smutty in the first quarter of the 1938-39 crop year, it represents only 0.3% of all the cars graded. In fact the percentage of cars graded smutty in the past seven years has been less than 1%. It should be noted that while bunt has been kept well under control in spring wheat, bunt is destructive in winter wheat in Alberta. This year 69 cars (22.3%) of Alberta Red Winter graded smutty out of 309 cars inspected and for a period of years the percentage of smutty cars has been from 10 to 25%.

Table 1. Wheat Bunt in Western Canada

Summary of Inspections from August 1 to October 31, 1938.

Class of Wheat	Cars Inspected	Cars Graded Smutty	Percentage Smutty
Hard Red Spring	86,687	221	0.2
Amber Durum	7,154	34	0.5
White Spring	7	0	0.0
Alberta Red Winter	309	69	22.3
All classes inspected	100,894	333	0.3

Losses from bunt were heavy in winter wheat at Armstrong, B.C., this season, about 15% of the heads being bunted. Bunt caused slight damage in three fields in southern Sask.; however 20% of the heads were affected in a field at Maple Creek. A trace was found at Collette Village, N.B. and in Huron wheat in Queens county, P.E.I.

LOOSE SMUT (Ustilago Tritici). In Alta. a trace of loose smut was found in 2 out of 80 fields examined. In Sask. loose smut was present in 33 out of 218 fields, average damage being a trace or a trace + . According to Prof. T.C. Vanterpool, many more enquiries were received from farmers than usual. Loose smut was very common this year on Reward wheat in Man. It was present in 7 out of 8 fields; average infection 7.5%; high infections were 25% at Oakville and 15% in certified Reward at Fort Garry. Loose smut affected 12 out of 13 fields of Ceres; average infection 2%; range, trace to 5%. No loose smut was recorded in Thatcher, Renown, Marquis, Garnet or durum wheat.

Loose smut infection varied from 1.1 to 1.8% in four fields of winter wheat, the seed of which was treated in 1936 in Kent county, Ont. In several fields, the seed of which was treated in 1937, no smut was present, while other fields of the same seed untreated, showed 5-10% of smut. (N.D. MacKenzie)

Loose smut was present in 39 out of 73 fields in N.B., N.S., and P.E.I. Usually only a trace was present, but in six infection ranged from 1-3% and in one field of Huron wheat at Gueguen, N.B., it was 6% (I.L. Conners). A trace was present in Huron at Lennoxville, Que.

BLACK CHAFF (Phytomonas translucens var. undulosa) slightly infected one field at Edmonton, Alta., and a trace was found in Apex and Renown at the Lacombe Station. A slight infection was observed at Winnipeg and Swan River, Man.

BASAL GLUME ROT (Phytomonas atrofaciens). A trace was found in 3 fields out of 80 examined and infection was a trace to moderate in the variety plots at Olds, Alta. A slight infection was recorded in a field at Winnipeg.

ERGOT (Claviceps purpurea). Traces of ergot were found at Okatoks, Alta., and at Charlottetown, Brackley and Stanhope, P.E.I. Seed from Thatcher grown in 1937 at Kipling, Sask. was not certified, due to excess ergot. The grower remarks: "In the past we have been growing large acreages of western rye grass and in the seed certificates the note, "trace of ergot" has been often present. Now ergot is showing to some extent in crested wheat grass (var. Fairway) we are growing and this month we had Thatcher wheat turned down as certified because of excess ergot." A trace of ergot was found in 5 fields near Lindsay, Ont.

GLUME BLOTCH (Septoria nodorum). A trace to slight infection was reported in 8 fields out of 80 examined in Alta. The disease was present in 50 out of 58 fields in the Maritime provinces as follows: traces in 28; slight in 14; moderate in 13, and severe in 1. Some of the new rust resistant strains, notably C-26-44.7, appeared to be more susceptible to glume blotch than others. Further observations are important, for the disease may become destructive with the control of the rusts in the East. (I.L. Conners)

SPECKLED LEAF BLOTCH (Septoria Tritici). A trace or a slight infection was recorded in 4 fields in Alta., and infection ranged from a trace to severe in the plots at Lacombe.

FOOT ROTS. Take All (Ophiobolus graminis) was found in 13 out of 80 fields visited in Alta.; most of the affected fields were in the Camrose and Vegreville districts. Infection was slight to moderate except in 3 fields, where the damage was estimated to be 10-15%. Common Root Rot (Helminthosporium sativum and Fusarium spp.) was present in 44 of the 80 fields examined. Infection was as follows: trace in 24 fields; slight in 7; moderate in 8 and severe in 5. The latter were located at Brooks, Pincher Creek, Innisfree, Lavoy, and Vegreville.

A trace of Take All was present in 8 second-crop fields in the Quill Lake and Naicam districts, Sask. Affected plants were also received from Invermere. Common Root Rot was found in 210 out of 218 fields examined; the average damage was moderate. A special study is under way of samples from 25 Experimental and Illustration Stations representing many types of rotation. Anthracnose (Colletotrichum sp.) was present on sickly plants in a diseased patch near Melfort. Wojnowicia graminis was found on stubble collected at Quill Lake and placed in moist soil outside until Oct. 26. A trace of Prematurity Blight (cause not fully known) was found in 3 fields. At Aberdeen about 1% of the plants were blighted in a small field surrounding some experimental plots. The plants bore at the base of the culm, numerous sporodochia which contained macroconidia of Fusarium.

A trace of Take All was found in a few fields between Garson and Beausejour, Man. Common Root Rot was again prevalent. The damage was severe over the south-western part of Manitoba, but it was medium to light elsewhere. Drought during late summer tended to accentuate the damage and the disease was particularly noticeable in highly saline soils (J.E. Machacek).

Common Root Rot was general in most fields surveyed near Lindsay and Peterborough, but it was not severe in any. (G.A. Scott)

A Stem Rot (Fusarium spp.), particularly as a decay of the nodes, was quite common this year in Que. in early maturing varieties grown in wet fields. (C. Perrault)

Root Rot (Cryptoascus sp.). The fungus was quite abundant on the roots of wheat growing on a clay loam soil in a good state of fertility at Roseville, P.E.I. Affected plants have been found both on rich and poor soils. The disease was observed on barley at the Charlottetown Station and on barley and wheat at Cornwall. (G.W. Ayers)

BROWNING ROOT ROT (Pythium spp.). The area surveyed for browning root rot in Sask., was largely the central and northern portions of the wheat-growing area, with the exception of the extreme north-west. The greatest damage was in a wedge-shaped zone beginning in the neighbourhood of Saskatoon and widening towards the east, the worst fields being mainly west and south-west of the Quill lakes. This was approximately 80 to 110 miles south of the 1937 zone of greatest damage, that is, from Prince Albert to Tisdale. This latter area was one of the driest in the province this year, and showed only a trace of browning root rot. There were also some severely diseased fields in an area extending from south of Rosthern to south of Hague.

Some of the most severely diseased individual fields ever encountered were observed this year, the Pythium lesioning on the roots being characteristic, common, and severe. It gives the impression, supported already by some evidence, that over a period of years the fields are becoming depleted in fertility, and succumb to the disease when conditions are favourable to it. This helps to explain the shift in location of diseased areas from year to year.

The sudden onset of browning symptoms, which is well known, was strikingly revealed this year when two trips were made to the Colonsay-Elstow district, one on June 7 and another on June 13. On June 7 no sign of browning was evident and in the ordinary course of survey the district would have been recorded as free from browning for the current year. Some rain fell about June 9. On June 13 when the district was again visited, browning was fairly common and in some instances severe.

The delay in maturity of wheat caused by browning root rot was shown to render the crop more liable to damage from stem rust and frost by Vanterpool and Simmonds (Sci. Agr. 19:81-82. 1938).

Isolations made from diseased roots during June yielded Pythium tardicrescens and P. arrhenomanes in the ratio of about 4:1; this is the reverse of the usual ratio. It may be explained by the fact that the cool temperatures of May and early June were more favourable to P. tardicrescens, whose optimum growth rate has been shown to be lower than that of P. arrhenomanes (Vanterpool, Ann. Appl. Biol. 25:528-543. 1938). (T.C. Vanterpool)

In southern Sask. in an area traversed by the Canadian Pacific Railway between Moose Jaw and Indian Head, browning root rot infections ranged from slight to moderate. The heaviest infections were found between Regina and Moose Jaw, where crops on summer fallow were more common than elsewhere. (H.W. Mead)

Scattered but light damage from browning root rot occurred over many parts of southern Man. Damage was most severe west of Morris and about Plum Coulee. A moderate infection was observed at Dugald, on June 15 (J.E. Machacek). According to Mr. E.T. Howe, who assisted Prof. Vanterpool in his survey work for several years and is now Agricultural Representative at Selkirk, Man., browning root rot was widespread in wheat on fallow about Selkirk.

HEAD BLIGHT (Fusarium spp.). A slight infection was seen at Edmonton, Alta.; F. culmorum was fruiting freely on the material (A.W. Henry). A mere trace of scab was found at Winnipeg, Man.; F. culmorum was isolated (W.L. Gordon). Head blight could be detected in most fields visited in Oxford county, Ont.; the Helminthosporium-Fusarium types seemed to predominate, (G.A. Scott). Traces of head blight were recorded in 15 out of 53 fields in N.B., N.S., and P.E.I. Isolations were made by Dr. W.L. Gordon from 9 head-blight samples from these provinces. Fusarium graminearum was isolated from 4 samples (3 from N.S. and 1 from P.E.I.), F. Poae from 4, F. avenaceum from 1, while Epicoccum purpurascens was also present in one sample. It should be noted that Fusarium graminearum, the imperfect stage of Gibberella Zeae (Schw.) Petch (G. Saubinetii Auth.), is rarely isolated in Canada, however abundant it may be elsewhere (I.L. Conners)

GLUME DISCOLORATION (Alternaria, Cladosporium, etc. associated). Discolored glumes of Apex yielded Alternaria sp. in every case. The heads were collected at Saskatoon, Sask.

Dr. Hagborg confirmed the results (R.C. Russell). The disease was severe in the experimental plots at the University Farm, Fort Garry, Man. A slight infection was noted at Homewood, Man. (T. Johnson and W.A.F. Hagborg). Glume discoloration was severe on R.L. 1005 at Lennoxville. Alternaria sp. was isolated by Dr. Johnson from material sent him. (H.N. Racicot)

POWDERY MILDEW (Erysiphe graminis). A slight infection was present at Edmonton, Alta.; it caused moderate damage at Macdonald College, Que.

WHEAT NEMATODE (Heterodera punctata) caused slight damage in a field in the Rosthern district, Sask.

OAT NEMATODE (Heterodera schachtii). L.J. Chapman (Sci. Agric. 18:527-528. 1938) reports that in 1937 three fields of obviously unhealthy winter wheat were found in the infested area in south Simcoe county, Ont. One of the fields was plowed up later in the season as a crop failure, while the diseased portions (about 75%) of the other two were not worth cutting. It is not clear why these particular fields were heavily damaged, but they were sown unusually early, Aug. 28-Sept. 1, which would permit a maximum of infestation to take place in early autumn. The intervening winter was mild.

LEAF BLIGHT (Fusarium Poae). The leaves on the lower two-thirds of every plant were heavily infected in a field of Kubanka (durum wheat) at Macdonald, Man. The leaves were covered with Fusarium spores and isolations yielded F. Poae. This is the first severe infection of the leaves of wheat by a species of Fusarium ever noted in Manitoba. (W.L. Gordon)

KINK (Non-parasitic). A small amount of kink or buckling of the culm just above a lower node was observed in wheat near Melfort, Sask.

WHITE TIP (Non-parasitic). In a dates-of-seeding plot at Saskatoon, Sask., early sown Marquis wheat and Hannchen barley showed moderate to severe white tip of the heads on July 6. The rains came too late to prevent its development in the early plots, but it was absent from the later sown plots. White-tip samples were received from Reynaud, Environ, and Strasbourg about June 15. (T.C. Vanterpool)

FLOODING caused very severe losses in the Creston reclaimed area, B.C. in May onwards when approximately 80% of the area was flooded. (W.R. Foster)

SPIKELET STERILITY (cause unknown) was estimated to have caused a 30% loss in 2,000 acres of wheat in the Creston area, B.C. Practically all heads were affected, varying from one or two kernels missing to completely empty heads. All varieties were about equally affected. (W.R. Foster)

OATS

STEM RUST (Puccinia graminis) was general in the Matsqui district, B.C., causing 10% damage. A trace of stem rust was first found on oats at Vegreville, Alta., on Aug. 24. A slight to moderate infection was present in late stands by Sept. 17 at Edmonton, Wainwright, Vegreville, Vermilion, and other points, but no appreciable damage was caused.

Only slight traces of stem rust occurred on oats in the western half of Sask. In many of the fields no rust was found. It was more prevalent in the eastern sections, the heaviest infections observed being 50% near Yorkton and Melville.

Although stem rust was general on oats in Man., it appeared much later and was less prevalent than the other cereal rusts. In late fields in eastern and northern Man., upwards of 30% of rust was present. In earlier fields infection was markedly less. In the areas of sub-normal precipitation infection ranged from a trace to 10%. Vanguard proved highly resistant to stem rust. (B. Peturson)

Stem rust was prevalent in Northern Ontario, some fields having 80% of the plants affected (J.E. Howitt). Infection varied from a trace to 50% averaging 15%, in Oxford county, Ont.

Stem rust caused some damage at Macdonald College, Que. It was moderate to severe at Lennoxville on susceptible varieties, but only a trace was recorded on Vanguard.

In the Maritime provinces stem rust seldom exceeded a trace. At a few points badly rusted spots were seen, but the infection was very much less than last year. Barberries are definitely known to occur at some of these centres (I.L. Conners). Stem rust was heavy in some late fields in September in P.E.I. (R.R. Hurst)

CROWN RUST (Puccinia coronata) was prevalent on oats in eastern Sask., and was present in all grain growing sections of the province. A heavy infection of this rust was reported on late

oats near Lloydminster, Sask. It was not definitely observed in Alta.

Crown rust was quite prevalent throughout Manitoba. Like leaf rust of wheat it was most severe in the areas of abundant precipitation. In northern Man., the Red River valley, and in some localized areas in the central section the average infection ranged from 40-75% on standard oat varieties. However, in the southern and south-western parts of the province infection was much lighter. None of the commercial varieties of oats grown in Man. showed any resistance to this rust. Crown rust caused considerable damage this year. (B. Peturson)

Crown rust was, in general, light in Oxford county, Ont., except in one late field where 90% of rust was observed. It was also destructive in a field at Carleton Place (G.A. Scott). Crown rust was heavy but variable in Quebec. Aecia were also common on the buckthorn (I.H. Crowell).

Crown rust was prevalent throughout the western half of N.S., the southern half of N.B. and in P.E.I. In the Caraquet peninsula and along much of the north and east shore of N.B., only a trace was present, while the crop was filling rapidly. Eastern N.S. was not surveyed. The damage was much less than in 1937, because the crop was much further advanced before rust became prevalent. As in the previous year severe outbreaks were directly traceable to buckthorn plantings or escapes from them. From Meteghen Centre to Yarmouth, N.S., crown rust was epidemic, but primary infection was due to one or more spore showers from a distance. Excessive rain and fog provided ideal conditions for rust development (I.L. Conners). Aecia of crown rust were abundant on stems, leaves and berries of a Rhamnus cathartica hedge at the Fredericton Station on June 1. (S.F. Clarkson)

SMUT (Loose Smut, Ustilago Avenae and Covered Smut, U. Kolleri). The oat smuts were reported from 25 out of 71 fields examined in Alta.; infection varied from a trace to 15% and averaged 2%. Covered smut was present in 12 fields out of 42 inspected in Sask. with an average infection of about 1%; in one field at St. Gregor 50% of the panicles were smutted. Loose smut was present in 13 fields; average infection was a trace. The oat smuts were recorded in 6 out of 23 fields in Man.; average infection 3.2%; highest, 26%.

Loose smut was very prevalent throughout Northern Ontario; fields were observed where over 20% of the panicles were destroyed (J.E. Howitt). Oat smut was also heavy in North Simcoe county.

Near Peterborough, in 10 fields, infection was 10-15% in 2; 2-3% in 3, and a trace in 5.

Out of 207 fields examined in the Maritime provinces smut was recorded in 167 fields or 81%. The highest infections observed were mixed infections: 12% of covered smut and 23% loose smut at Brookfield, P.E.I., 22% covered and 4% loose at South Victoria, N.S., and 2% covered and 21% loose smut at Portage, P.E.I. Over half the fields contained at least one per cent of smut and 25% of the fields showed 5% or more of smut. Smut was evidently more prevalent this year than last, but it appeared to be less common than in 1936. (I.L. Conners)

Smut was severe in P.E.I. in 1938, infection ranging from traces to 50%. In order to assist farmers in controlling smut three gravity seed treaters were constructed and were loaned to interested farmers after the method of operation was demonstrated. These treaters were built to specifications supplied by Chemical Industries Ltd. The treater consists of a large oil drum with a top funnel, a screen cone and bottom funnel, designed to mix the grain and dust as the grain falls through the treater, and an opening at the bottom for the discharge of the grain. The organic mercury dust, Ceresan, was used exclusively. Upwards of 100 farmers used this device to treat their grain. Without exception smut was completely controlled; Early Alaska, Victory, and Laurel were the varieties most commonly treated. (R.R. Hurst)

HALO BLIGHT (Phytomonas coronafaciens) was found in 38 out of 71 fields examined in Alta.; infection was a trace in 11, slight in 23 and moderate in 4. A bacterial blight was prevalent on oats near Sudbury, Ont., 30-40% of the plants being affected, while 50% of the plants in one field in Welland county were affected.

STRIPE BLIGHT (Phytomonas striaefaciens) infection was a trace to slight in 3 fields in Alta.

FOOT ROTS. Common Root Rot (Helminthosporium and Fusarium spp.) was found in 25 out of 42 fields examined in Sask.; damage was moderate.

ANTHRACNOSE (Colletotrichum graminicola) was severe in a small patch in a plot at Melfort, Sask.; the plants were dead or stunted. Heterosporium sp. was also found fruiting on these plants.

LEAF BLOTCH (Helminthosporium Avenae) severely damaged a field at Moreland, Sask. In the Maritime provinces the disease was

present in 213 out of 216 fields as follows: trace in 28, slight in 99, moderate in 63 and severe in 33. (I.L. Conners)

HEAD BLIGHT was found in 26 fields out of 157 examined in N.B., N.S., and P.E.I. Usually the damage was a trace, but in 3 fields it was slight. It was far more noticeable in early varieties at several Illustration Stations. The worst outbreak was at Chegoggin, near Yarmouth, N.S., where one or more spikelets were affected in half or more of the panicles in varieties such as Alaska, Gopher, and Mabel. Dr. W.L. Gordon made isolations from 13 collections. The fungi isolated in order of prevalence were: Alternaria spp., 44 isolations; Botrytis sp. of the cinerea type, 13; Fusarium Poae, 12; Epicoccum purpurascens, 3; and F. avenaceum, 1. While Botrytis has been found on a wide variety of plants, previous reports of its occurrence on oats have not been seen. (I.L. Conners)

POWDERY MILDEW (Erysiphe graminis). A slight infection was observed in the greenhouse at Edmonton. (A.W. Henry)

BLAST (Non-parasitic) was recorded as follows in Alta.: trace in 31 fields; 5% in 19; 10% in 13, and 20% in one out of 71 fields examined. Blast was present in every field inspected in Sask.; damage was slight to moderate. Blast was ordinarily slight, but in one field at Innisville, Ont., it reduced the yield. In the Maritime provinces the average amount of blast was 15%, but in one field 50% of the spikelets were destroyed.

THRIPS INJURY. It was noticeable on the leaves and also the spikelets in the Maritime provinces; usually the injury was a trace, but a few fields were slightly affected. Oat heads from one field near Martintown, Ont., were severely affected by thrips.

GREY SPECK (Manganese deficiency) is quite patchy in the fields of the College farm, Macdonald College, Que. It was severe in one block of Banner.

NEMATODES (Heterodera schachtii). No large areas have been found infested by nematodes outside the counties of Waterloo and Simcoe. A field of oats in Oxford county and another in Gray were found severely injured.

Mr. James Laughland, Agronomy Dept., O.A.C., reports that oat and barley plants infested by nematodes were sent in by Agricultural Representatives from 27 counties, but the nematodes have not been identified to species. However, it is suspected that

Heterodera schachtii was present in some fields for some of the samples were taken from fields where the crop was making poor growth. (J.E. Howitt)

BARLEY

STEM RUST (Puccinia graminis) was first observed in the eastern sections of Alta. on Aug. 24, when infection was a trace to slight. Infections up to 5% were present on late stands at Red Deer, Claresholm, and Lethbridge. Stem rust infections varied from 20-30% on heavy crops in moister sections of Sask.; a trace was present in the drier areas. The rust was heavy in one field in Oxford county, Ont. Most varieties showed at least a trace at Ste. Anne de la Pocatiere, Que., the highest infection being 15% on Pontiac.

Only traces of stem rust were found in the Maritime Provinces in 1938 (I.L. Conners). It was heavy in a late planting at Valleyfield, P.E.I., in Sept. (R.R. Hurst)

LEAF RUST (Puccinia anomala) was severe in a field of barley near Duncan, B.C. In 1937 Trebi barley on this Illustration Station yielded 65 bu.; in 1938 the yield was reduced to 28 bu. It is believed the reduction was due to leaf rust. A sprinkling of leaf rust was observed in many localities in Man. this year. A heavy infection occurred on barley varieties in the Winnipeg area. Infection ranged as high as 50% in some cases. Traces of rust occurred on a few varieties in the plots at Ste. Anne de la Pocatiere, Que., with 10% on Peatland. Leaf rust occurred sporadically in the Maritime provinces the highest infection being 20%.

LOOSE SMUT (Ustilago nuda) was recorded as follows: a trace in two fields out of 35 in Alta.; a trace in 4 fields out of 14 examined in Sask.; a trace and 5% in two fields in Oxford county, Ont. In the Fredericton Station plots, 25% of the heads of Newall were affected (J. McKenzie). In the Maritime provinces loose smut occurred in 22 out of 60 fields examined and the average infection was less than 0.5%. The highest infection was 5% at Kensington, P.E.I. In an independent survey of 50 fields in Kensington, P.E.I. In an independent survey of 50 fields in P.E.I., Mr. Hurst found an average infection of 0.5%. (I.L.Conners)

COVERED SMUT (Ustilago Hordei) was found in 12 fields in Alta. as follows: a trace in one field; 1-2% in 5; 5% in 4, and

10% in 2. A trace was recorded in one field in Sask. It was observed in 34 fields in the Maritime Provinces, the average infection being 1%. In two fields one at Collette Village, N.B., and another at Egmont Bay, P.E.I., infection was 10%.

STRIPE (Helminthosporium gramineum) was recorded as follows: slight infection in a field in Alta.; a trace at Estevan, Sask.; a trace to slight at Lindsay, Ont., and a trace near Pictou and at Brule, N.S. This appears to be the first authentic report of barley stripe in the field in the Maritime provinces. (I.L. Conners)

FALSE STRIPE (cause unknown). A trace was found at Neepawa, Man., and near Pictou, N.S.

NET BLOTCH (Helminthosporium teres) was present in 3 fields, infection being severe in one at Edmonton, Alta. A slight infection was found in 7 fields out of 18 examined in Man. Net blotch was recorded in 60 out of 61 fields in the Maritime Provinces and it was moderate to severe in 25. (I.L. Conners)

SPOT BLOTCH (Helminthosporium sativum). A trace was present on barley on July 7 at Windermere, B.C. A trace to slight infection occurred in 8 fields out of 35 examined in Alta. It was severe on Charlottetown 80 at the Charlottetown Station, P.E.I.

COMMON ROOT ROT (Helminthosporium sativum and Fusarium spp.) caused a trace to moderate damage in 5 fields in Alta. Damage was moderate in 11 fields in Sask. The disease was reported as severe in patches at Holland and Angusville, Man.

BROWNING ROOT ROT (Pythium spp.) was reported on June 17 as very severe on Mensury barley at Swan River, Man. The fungus was found in the infected roots. (F.J. Greaney)

HEAD BLIGHT (Helminthosporium sativum and Fusarium spp.) was present about Woodstock, Ont., but the damage was slight. Isolations made from kernels from diseased heads yielded Fusarium Poae in most cases. This was also true for isolations from wheat and oats (G.A. Scott and W.L. Gordon). A trace of head blight was present in 27 fields and it caused slight damage in 18 others out of 54 examined in N.B., N.S., and P.E.I. Isolations were made by Dr. W.L. Gordon from 24 samples as follows: Fusarium Poae, 91 isolations; Alternaria spp., 52; Helminthosporium sativum, 49; Epicoccum purpurascens, 9; H. teres, 8; F. avenaceum, 7; F. culmorum, 5; Sporotrichum sp., 1. The Fusarium spp. predominated

in 9 samples, Helminthosporium sativum in 5, and the infection was mixed and of little consequence in the others. (I.L. Conners)

ERGOT (Claviceps purpurea). A trace was found in Charlottetown 80 at Charlottetown, P.E.I.

POWDERY MILDEW (Erysiphe graminis) moderately infected barley in a greenhouse at Edmonton, Alta. It was found in 2 fields in Man.; infection was moderately severe at Ochre River. Powdery mildew was present in 4 fields in the Maritime Provinces; infection was moderate at Tatamagouche, N.S.

BACTERIAL BLIGHT (Phytomonas translucens) slightly infected one field at Edmonton, Alta., and one at Winnipeg, Man.

BASAL GLUME ROT (Phytomonas atrofaciens). A slight infection was found on barley at Winnipeg. (W.A.F. Hagborg)

SCALD (Rhynchosporium Secalis) was severe in one field, moderate in 3, and a trace in 4 out of 35 fields inspected in Alta.

RYE

STEM RUST (Puccinia graminis). Traces were observed in the winter rye plots at Lethbridge. Infection was slight in a field at Montmartre and another at Saskatoon, Sask. A trace of rust occurred at Ethelbert and Ashville, Man., and slight infection at Bowsman. Traces occurred in the plots at Ste. Anne de la Pocatiere and Lennoxville, Que., and small amounts of rust were present in 2 fields, one in N.B. and a second in N.S.

LEAF RUST (Puccinia secalina). Traces to slight amounts of rust were recorded at 5 places in Sask., 2 in Man., one in Que., and one in N.S.

ERGOT (Claviceps purpurea) was found as follows: a trace in 2 fields in southern Alta.; moderate infection in one at Edmonton; a trace at Indian Head, Sask., severe at the Kentville Station, N.S.; and a trace in one field in N.B.

II. DISEASES OF FORAGE AND FIBRE CROPS

ALFALFA

COMMON LEAF SPOT (Pseudopeziza Medicaginis) was general but caused slight damage on Vancouver island and at Agassiz, B.C. It was also quite general in all the alfalfa fields at the Summerland Station, particularly on the lower leaves. It slightly to moderately infected 4 out of 12 fields examined in Alta. A slight infection occurred on Grimm, Lodak and Medicago falcata at Morden, Man. This leaf spot caused quite a severe dropping of the lower leaves at Macdonald College and Senneville, Que. It was general but injury was slight at Cap Rouge and Ste. Anne de la Pocatiere. Infection was heavy near Newcastle and Bathurst, N.B. and moderate at the Fredericton Station. It was very common this season in P.E.I.

YELLOW LEAF BLOTCH (Pseudopeziza Jonesii) was severe in a 4-acre field at Hatzic, B.C. It was observed at Saskatoon, Sask.

DOWNY MILDEW (Peronospora aestivalis) caused moderate damage to Lytton and slight on Ontario Variegated and Lodak at Agassiz, B.C. (W. Jones). It was general, but damage was slight at Saanichton. It was rather heavy, stunting the tips of the shoots and preventing flowering at Senneville, Que. The loss was serious as the crop was being grown for seed.

STAGONOSPORA LEAF SPOT (Leptosphaeria pratensis Sacc. & Briard (Stagonospora Meliloti (Lasch) Petrak). F.R. Jones and J.L. Weimer (Jour. Agr. Res. 57:791-812. 1938) have shown recently that Stagonospora Meliloti is the cause of an important root rot of alfalfa and of a leaf spot and stem blight of sweet clover. It causes a seemingly unimportant leaf spot on several species of Medicago, Melilotus, and Trifolium. The leaf spot symptoms are similar on all the hosts and is described in detail on alfalfa. The root rot on alfalfa and the stem blight of sweet clover are also fully reported. Stem blight has been induced in alfalfa, but it has not been observed in the field.

Since this article appeared, Dr. Jones has kindly examined the specimens of fungi in our Herbarium on Medicago, Melilotus, and Trifolium, which might belong in this complex. The results of his examination will be reported under the respective hosts and fungi found. Stagonospora Meliloti was not found on any Medicago material. (I.L. Conners)

BLACK STEM (Ascochyta imperfecta Peck). According to Dr. A.W. Henry, black stem of alfalfa has been common at Edmonton, Alta. for several years. He isolated a fungus which fitted the description of Phoma Medicaginis Malbr. & Roum. (cfr. E.M. Johnson and W.D. Valleau, Ky. Agr. Exp. Sta. Bull. 339. 1933) fairly well. However, spetate spores were sometimes observed. Dr. M.W. Cormack reports that a slight to moderate infection was observed in 6 fields out of 12 examined in Alta. in 1938. He states this is the most common type of Ascochyta stem injury on alfalfa in Alta. The stems are blackened and bear few pycnidia. F.W. Toovey, J.M. Waterston and F.T. Brooks, who have studied the disease in Great Britain (Ann. Appl. Biol. 23:705-716. 1936) have concluded that Phoma Medicaginis is synonymous with Ascochyta imperfecta. They studied an isolation from alfalfa from Kelowna, B.C., identified by Sprague as A. imperfecta. Specimens on alfalfa in our Herbarium from Kentville, N.S., and Indian Head, Sask., were identified as A. imperfecta by Dr. F.R. Jones. These widely scattered collections indicate that the disease is probably more common than realized in Canada. (I.L. Conners)

ROOT ROT (Fusarium avenaceum, Plenodomus Meliloti, etc.) caused a trace to slight damage in 4 fields, moderate damage in 12, severe damage in 7 out of 30 examined in Alta. In the severely injured 20-25% of the plants were killed. This year Fusarium avenaceum and Plenodomus Meliloti were most frequently associated with early spring injury of alfalfa and sweet clover, but Cylindrocarpon Ehrenbergi and Sclerotinia sp. were also isolated from diseased roots. (M.W. Cormack)

YELLOWS (boron deficiency) was quite general at the Summerland Station, B.C., in areas where an application of boric acid has not been made to the soil. (G.E. Woolliams)

WITCHES' BROOM (cause undetermined) affected a few plants of the Lodak variety at the Agassiz Station, B.C. It is widely distributed in the interior of the province, principally in irrigated areas. (W. Jones)

COMMON CLOVER

COMMON LEAF SPOT (Pseudopeziza Trifolii) was general and severe on the lower leaves where clover was heavy at the Ste. Anne de la Pocatiere Station, Que. It was also reported as slight to severe on red clover in P.E.I.

POWDERY MILDEW (Erysiphe Polygoni) was recorded as follows: on an occasional red clover plant in the Summerland district,B.C.; trace to slight infection on red clover at Brooks and Olds, Alta.; slight infection at Macdonald College, Iberville, Ste. Anne de la Pocatiere and Cap Rouge, Que.; moderately heavy in York county, N.B. and at Charlottetown, P.E.I.

STAGONOSPORA LEAF SPOT (Leptosphaeria pratensis Sacc. & Briard (Stagonospora Meliloti (Lasch) Petrak) was found on Trifolium hybridum at Shirley Bay, Ont. in 1930. The identification was confirmed by Dr. F.R. Jones. (I.L. Conners)

Stagonospora leaf spot on red clover, Trifolium pratense, is due to a closely related species, Stagonospora recedens (C. Massal.) Jones & Weimer (syn. Gloeosporium Trifolii Peck) (Jour. Agr. Res. 57:791-812. 1938). It is represented in the herbarium by a specimen collected at London, Ont., by Dearness. (I.L. Conners)

GLOEOSPORIUM LEAF SPOT (Gloeosporium spadiceum Dearn. & Bisby) was described on T. pratense from material collected at Birds Hill, Man. A collection from the type locality is in the Herbarium. (I.L. Conners)

RUST (Uromyces Trifolii) was general on red clover, Saanichton, B.C.; infection was slight at Macdonald College, Que. and a trace at Cap Rouge and Ste. Anne de la Pocatiere; it was fairly heavy at the Fredericton Station, N.B. and slight to severe in all 3 counties of P.E.I.

WILT (Sclerotinia sclerotiorum) was severe in a half-acre field on Thetis Island, Chemainus, B.C. The sclerotia were cultured by Dr. Groves and the fungus was identified as S. sclerotiorum. According to the grower the field on which tomatoes were raised for several years, was plowed and sown to Mammoth Red clover with oats as a cover crop in 1937. A heavy crop of oats was cut green for hay and after the fall rains an excellent stand of clover developed. Then in December it began to fall out in spots, which enlarged until more than half of the tops had rotted away. However, a plant dug up about Feb. 1, possessed a sound root. New leaves began to appear on Mar. 14, and on May 4, the clover plants seemed to be coming up very well, but the old tops were still dying off. (I.L. Conners)

ROOT ROT (Sclerotinia Trifoliorum) appeared to be the most destructive disease affecting red clover at Macdonald College and Senneville, Que. From 3-5% of the plants were affected, practically all of which were killed. (I.H. Crowell)

SCOTY BLOTCH (Cymadothea Trifolii) was severe in York county, N.B. wherever the growth was heavy and aeration poor (S.F. Clarkson). Infection varied from a trace to heavy in P.E.I.

ANTHRACNOSE (Kabatiella caulivora). A few plants of Siberian Red clover were severely infected in the plots at Olds, Alta.

STEMPHYLIUM LEAF SPOT (Stemphylium sarcinaeforme (Cav.) Wiltsh.; syn. Macrosporium sarcinaeforme Cav.) was observed on red clover at Macdonald College. It is not a common disease in the fields and it apparently causes little damage, although individual leaves are killed (W.E. Sackston and I.H. Crowell). The disease has not been previously reported in Canada although a search has been made for it on several occasions by the writer. S.P. Wiltshire (Trans. Brit. Myc. Soc. 21: 211-239. 1938) has shown that this and other species of Macrosporium are more correctly referred to the genus Stemphylium. (I.L. Conners)

MOSAIC (virus). Clover mosaic was severe on about 3% of the red clover plants at Macdonald College, Que. Another unidentified virus disease of clovers distinct from the above was perhaps even more destructive. (I.H. Crowell)

SWEET CLOVER

STAGONOSPORA LEAF SPOT and STEM BLIGHT (Leptosphaeria pratensis Sacc. & Briard (Stagonospora Meliloti (Lasch) Petrak). The leaf spot has been noticed frequently on sweet clover, and specimens are in the Herbarium from B.C., Alta., Sask., Man., and Ont. These determinations appeared correct to Dr. Jones. The pathogen has not been observed causing stem blight (I.L. Conners).

A slight to moderate infection of the leaf spot was observed in 6 fields out of 8 examined in Alta. in 1938 (M.W. Cormack).

STEM CANKER (Ascochyta caulicola Laub.) F.R. Jones (Phytopath. 28:661-662. 1938) reports the finding of two species of Ascochyta on sweet cover. One species has for its perfect stage, Mycosphaerella lethalis Stone, and causes stem blackening. Its presence in Canada has not been established. The other is Ascochyta caulicola Laub. It has been observed in Alberta for many years by Dr. Henry and it was seen by Dr. Bisby and me in Manitoba. At present it is unrepresented in our Herbarium. (I.L. Conners)

ROOT ROT (Fusarium avenaceum, Plenodomus Meliloti, etc.). Several varieties were moderately to severely infected in the plots at Edmonton and Lethbridge, Alta.

DOWNY MILDEW (Peronospora Meliloti) was general in a plot at the Saanichton Station, B.C., but the damage was slight (W. Jones). It was reported in 1935 in Alta. (P.D.S. 15:17.)

LENTIL

LEAF SPOT (Septoria sp.). A trace of infection was found on a few plants at Morden, Man.; more material is required before the species can be determined.

YELLOW TREFOIL

MOSAIC (virus). A few affected plants were observed in a small plot at the Summerland Station, B.C.

BROOM-CORN MILLET

SMUT (Sorosporium Panici-miliacei). Several affected heads were found in the plots at Lethbridge, Alta. and a single smutted plant at Charlottetown, P.E.I.

BUCKWHEAT

YELLOWS (virus). In 18 varieties, representing 7 rough and 11 smooth sorts, yellows averaged 3.3% for the rough sorts and 0.6% for the smooth, in the plots at Fredericton, N.B. The average yield of the smooth sorts was about double that of the rough varieties. The disease appears to be common throughout the province. (J.L. Howatt & John McKenzie)

CORN

SMUT (Ustilago Zeae) affected 8% of the plants in a field at Medicine Hat, Alta. A trace was also present in Blue Snow pop corn at Brooks. Smut affected 2.5% of the plants in 4 fields out of 12 inspected in southern Sask.

Smut was general but not severe, in most fields visited in Western Ontario. In 2 fields near Ailsa Craig and two near Chatham, infection was heavy (G.A. Scott). Traces of smut occurred in one field in P.E.I. and in one field in Cumberland county, N.S.

RUST (Puccinia Sorghi) was common in the south and east of Sask.; damage was slight. A trace was recorded at Cap Rouge, Que., and a slight infection in Queens county, P.E.I.

FLAX

RUST (Melampsora Lini) slightly infected flax at Duchess, Sask., and a 4 points in Man. It was moderate at Poplar Point. At Morden it was severe on N.D.R. 114, but slight on Siberian.

WILT (Fusarium Lini). A trace to slight infection was found in two fields in southern Alta. Only a trace of wilt occurred at Saskatoon, Sask.; in fact flax was freer from diseases than usual. (T.C. Vanterpool)

WILT and ROOT ROT (Rhizoctonia Solani). Fusarium wilt-resistant and other varieties wilted in June at Brandon, Man. Isolations from the basal parts of the young plants showed them to be heavily infested by Rhizoctonia Solani almost exclusively. A few isolations only of Fusarium Scirpi var. acuminatum were obtained. The material was sent in by Mr. W.H. Johnston. (W.L. Gordon)

BROWNING (Polyspora Lini). Several plots in the Fibre Division, Central Experimental Farm, Ottawa, Ont., suffered browning injury in the cotyledon and early seedling stages. The organism was isolated from diseased material of the variety Stormont Cirrus and from the same seed lot, with which the plot was sown. (D.M. Simpson)

HEAT CANKER (Non-parasitic). One field was slightly affected at Duchess, Alta.

MANGEL

CERCOSPORA LEAF SPOT (C. beticola) was heavy in two fields at Chatham, Ont. It was general, but mostly light, at Cap Rouge, Que. To judge from specimens received from Halifax, N.S. this leaf spot caused a loss of half the foliage, with probably some reduction in yield.

BLACK LEG (Phoma Betae). An appreciable outbreak as a leaf spot occurred at Kentville, N.S.

CROWN GALL (Phytomonas tumefaciens). Traces occurred in a few fields in Queens county, P.E.I.

CROWN and DRY ROT (?boron deficiency). Traces only were present this season in Queens county, P.E.I.

STRANGLE (undetermined) affected severely 75% of the plants in a field in Queens county, P.E.I.; 15% of the affected plants recovered, following a light application of nitrate of soda. (R.R. Hurst)

SUGAR BEET

RHIZOCTONIA (Rhizoctonia Solani). Inspection of harvest beets at sugar beet factories at Picture Butte and Raymond, Alta. indicated that injury caused by R. Solani was practically absent. (G.B. Sanford)

SORGHUM

BACTERIAL LEAF SPOT (Phytomonas Holci). This leaf spot was slight to moderately severe on sorghum, proso millet, Japanese millet, broom corn and Sudan grass at Morden, Man. It was slight on sorghum at St. Agathe and general but slight at Brandon (W.L. Gordon). It caused slight damage on sorghum at Fredericton, N.B.

SOY BEAN

BACTERIAL BLIGHT (Phytomonas glycinea). All varieties were slightly to moderately affected in the plots at Lethbridge, Alta. It was severe at the University Farm, Fort Garry, Man. Infection was severe on Wisconsin Black, Kobott, Manitoba Brown, and Agate Edible at Morden, while Number 47 and Mandarin were almost free from infection. It was severe on Manitoba Brown growing in a low spot in the field, while a trace occurred on Kobott at Lennoxville, Que.

MOSAIC (virus). The variety Manitoba Brown was moderately affected at Olds, Alta.

SUNFLOWER

WILT (Sclerotinia sclerotiorum). Odd plants were infected at Morden, Man., while the crop was moderately affected at Brandon. An odd diseased plant was found here and there in a field at Ste. Anne de la Pocatiere, Que.

A head rot due to S. sclerotiorum was common and caused slight to moderate damage in September in the variety plot at the University, Saskatoon, Sask., after some late rains. The rot often extended several inches down the peduncle. Strangely enough no wilting of plants due to basal rot was observed. (T.C. Vanterpool)

RUST (Puccinia Helianthi) caused a trace to severe damage according to the variety in the University plot, Saskatoon, Sask. A moderate infection occurred at Indian Head. Infection was severe at Winnipeg, Foxwarren and Morden, Man., and the plots were ruined by rust at Brandon. Observations were made in late August.

CULTIVATED GRASSES

AWNLESS BROME GRASS (Bromus inermis)

Leaf Blotch (Septoria bromigena) caused moderate damage in 3 fields examined in Sask.

Ergot (Claviceps purpurea) was much less common on awnless brome grass, as well as on Agropyron, Elymus, wheat, barley, and rye at Winnipeg, Man., than in recent years. (A.M. Brown)

CRESTED WHEAT GRASS (Agropyron cristatum)

Heterosporium sp. was growing profusely on leaves and stems of sickly plants from a diseased patch in zone 3, Sask. Whether the fungus was parasitic or saprophytic is unknown.

ITALIAN RYE GRASS (Lolium italicum)

Stem rust (Puccinia graminis). A trace occurred in the plots at Morden, Man.

KENTUCKY BLUE GRASS (Poa compressa)

Rust (Puccinia Poae-sudeticae) was fairly general at Saanichton, B.C. in March.

ORCHARD GRASS (Dactylis glomerata)

Leaf Spot (Mastigosporium album) was general on all strains of orchard grass at Agassiz, B.C. on May 18. The spots occurred on

leaves, stems, and sheaths, with withering of the leaf tips in the more advanced stages.

Brown Stripe (Scoletotrichum graminis) was slight on all strains at Agassiz, B.C.

TIMOTHY (Phleum pratense)

Stem Rust (Puccinia graminis) was general on Waldron Early, Boon and Commercial 361 at Agassiz, B.C. Infection was severe in 3 fields at Picher Creek and on some strains in the plots at Edmonton, Alta. Stem rust was variable at Macdonald College, Que. It was also recorded at Cap Rouge. While stem rust is general in P.E.I., some strains of timothy under test at Charlottetown are highly resistant to rust. (R.R. Hurst)

Leaf Spot (Heterosporium Phlei). A trace was recorded at Agassiz, B.C., and a slight infection at Edmonton, Alta. It was quite prevalent in timothy stands in York county, N.B.

Powdery Mildew (Erysiphe graminis). A slight infection was found at Edmonton, Alta.

WESTERN RYE GRASS (Agropyron tenerum)

Smut (Ustilago bromivora) affected 40% of the heads in a field at Vermilion, Alta. A moderate infection was recorded at the Swift Current Station, Sask.

WILD RICE (Zizania aquatica)

Ergot (Claviceps purpurea) was collected at Lac du Bois, Man., on Oct. 2, 1938 by W. Williams. This is the first record on this host for Manitoba, although the sclerotia of the fungus are preserved in the Herbarium from Keene, Ont.; Shediac, N.B., and Amherst, N.S. Attention is drawn to an interesting account of ergot on wild rice published by Miss Faith Fyles, at one time a member of the Division, in Phytopathology 5:186-192. 1915. Dr. W.F. Hanna, who communicated the specimens wrote as follows on Oct. 7:

"Ergot on wild rice has become more or less of an agricultural problem in Manitoba this year and some concern is felt over the amount of ergot encountered. For years the Indians in northern Manitoba have collected wild rice for food, but the product has not had a great market value. However, this year it appears that the American crop of wild rice was a failure, due, I believe, to high flood waters which killed out the plants.

Consequently American buyers have come up to Manitoba seeking a supply of wild rice and are offering very good prices - up to about sixty cents a pound. This has created quite a boom in the wild rice district and both Indians and others are busily engaged in harvesting it. Aeroplanes are even being employed to freight the grain from northern lakes to the railroad."

LAWN GRASS

Snow Mould (Fusarium niveum) was quite severe in Washington bent grass at Summerland, B.C.

Stem Rust (Puccinia graminis Phlei-pratensis). A test plot of lawn grass (Poa sp.) was very severely infected by this rust at the University Farm, Fort Garry, Man. (A.M. Brown, M. Newton and T. Johnson)

III. DISEASES OF VEGETABLE AND FIELD CROPS

ASPARAGUS

RUST (Puccinia Asparagi) caused slight to moderate damage in the Horticultural plots, Saskatoon, Sask. It was worse than for several years (T.C. Vanterpool). It was severe at Davidson and Indian Head. Rust was general in the vicinity of Winnipeg, Man., and the infection was severe, but it was not observed in other parts of the province. Rust was severe on susceptible varieties in Lincoln county, Ont., the tops being practically dead by the middle of September. (J.K. Richardson)

WILT and CROWN ROT (Fusarium sp.). A trace was present in the Horticultural plots, Saskatoon, Sask.

YELLOWING and FOOT ROT (Fusarium spp. associated). Odd plants were severely affected at Morden, Man. The disease is striking as the whole plant turns prematurely yellow. Examination shows the presence of a severe foot rot. Odd plants were also found affected at Brandon and Fort Garry.

FASCIATION was rather common at Morden, Man. It was also noted at Ste. Anne de la Pocatiere, Que.

BEAN

MOSAIC (virus) affected 50% of the plants in a garden at Saskatoon, Sask., and a trace occurred at Scott. A slight infection was present in pole beans at Morden, Man.

ANTHRACNOSE (Colletotrichum Lindemuthianum). A trace to a slight infection was observed on several varieties at Olds, Alta. Fifty-one fields of Brittle Wax and Pencil Pod grown for seed were inspected twice in the growing season. They were located at St. Eustache, Lanoraie, Lacole and St. Valerien, Que. Seven fields were affected, infection varying from 5-10% (E. Lavallee). The disease was much more prevalent in the heavy sowing than in the light at Lennoxville, although only a trace occurred in either plot of Hudson Wax x Stringless Refugee Ott. 5017. Anthracnose was severe on some garden varieties at Ste. Anne de la Pocatiere, but not more than a trace was recorded in field beans. It was severe in York and Westmoreland counties, N.B., but not at the Fredericton Station. Anthracnose was general and quite severe in most fields and gardens about Kentville, N.S. In a few gardens the entire crop was destroyed. (J.A. Boyle)

BACTERIAL BLIGHT (Phytomonas Phaseoli). Several varieties were moderately to severely affected at Brooks, Olds, Medicine Hat, and Lethbridge, Alta. The Associated Seed Growers with headquarters at Brooks, are not able to grow beans successfully in Alberta on account of bacterial blight. It was estimated by an officer of the Association that the farmers lost $25,000 and the industry an equivalent amount on the 500 acres of beans planted in the irrigated areas of southern Alta. in 1938.

Bacterial blight was severe in a few cases in Saskatoon, but it was not as common as usual. Specimens were received from Fleming and Allan. The disease was severe in 7 and slight in 3 of the 10 fields visited. One variety was severely affected at Morden and a slight infection occurred at Brandon, Man. It was also severe on White Paris pole beans at Morden. Diseased plants were received from Kingston, Ont.

In Western Que. bacterial blight is a very troublesome disease. Out of 51 fields inspected, all but one were more or less infected. Infection was as follows: 1-10% in 11 fields; 10-25% in 20; 25-50% in 12, and 50% and over in 7. Fields with well spaced rows were the cleanest again this year; fields with seed sown in hills were less diseased than those where the seed was sown in rows, although some hills were severely attacked (E. Lavallee). It destroyed 25% of the pods in a garden at Pont Rouge and traces occurred on Burbank and Navy field beans. Bacterial blight was severe on Golden Wax and slight on Refugee at Port Elgin and Sackville, N.B., where beans are being grown for canning (S.F. Clarkson). Gardens at Kentville, N.S., showed less injury than in 1937, due to a slower spread from the original points of infection. Traces to 1% infection occurred in gardens at Charlottetown, P.E.I.

RUST (Uromyces appendiculatus) caused considerable damage to two plantings at Pitt Meadows, B.C. (J.W. Eastham). Three varieties of pole beans were very heavily infected after the crop was harvested at Kentville, N.S.

GREY MOULD (Botrytis cinerea). Leaf and pod infections were observed at Kentville, N.S. The disease in combination with anthracnose and sclerotial rot caused moderate defoliation. About 15% of the pods were also affected.

SCLEROTIAL ROT (Sclerotinia sclerotiorum) rotted about 5% of the pods in a garden at Kentville, N.S., where the plants were rank and closely planted.

BEET

CERCOSPORA LEAF SPOT (C. beticola) moderately infected beets in a garden near Winnipeg, Man. Other reports were: slight infection at Ste. Anne de la Pocatiere, Que.; moderate at Kentville, N.S., and heavy at Charlottetown, P.E.I. It was also noted at Souris.

BLACK LEG (Phoma Betae). A slight leaf infection was recorded at Morden, Man.

SCAB (Actinomyces scabies). Traces of scab were seen in gardens and on roots at the market at Charlottetown, P.E.I.

CROWN GALL (Phytomonas tumefaciens) was fairly general in a garden at Langley Prairie, B.C.

CANKER or DRY ROT (non-parasitic) was found this year at Courtenay and Milner, B.C. It was rather serious in the latter area for the roots were unmarketable. The condition was less at one grower's, who applied boron. The disease is considered physiological, but sometimes it is followed by Phoma infection. It has been observed from 1934 onwards. (W. Jones)

CABBAGE

CLUB ROOT (Plasmodiophora Brassicae) was very severe and destructive in many cabbage and cauliflower fields in Laval county, Que. Some crops were a total loss. Several home gardens were also affected (E. Lavallee). A small field of cabbages were almost a total loss at Charny (C. Perrault). Club root was reported from several gardens at Kentville, N.S.; infection ranged from a trace in some to 50% in one garden (J.A. Boyle). The disease was troublesome this year in Queens and Kings counties, P.E.I. Infection ranged from a trace to 40%.

SCLEROTIAL ROT (Sclerotinia sclerotiorum) affected a few heads at the Saanichton Station, B.C. It also rotted a few heads in a garden near Winnipeg, Man.

BLACK ROT (Phytomonas campestris). A single specimen was brought to the St. Catharines Laboratory by a grower from Middlesex county, who claims the disease is causing severe damage in his district (J.K. Richardson). A specimen was received from Cap Rouge, Que.

FUMIGATION INJURY was considerable on seedling plants on Mar. 2, at a greenhouse in Lincoln county, Ont.

CARROT

YELLOWS (virus). About 5% of the plants were affected with yellows in a 10-acre field in Queens county, N.B. According to the owner infected carrots do not keep well and are useless for seed production. Yellows seems to be on the increase and occurs also in York and Sunbury counties. (J.L. Howatt). Yellows affected 10% of plants in a garden plot at Auburn, N.S.

LEAF BLIGHT (Macrosporium Carotae) caused considerable loss of foliage in some commercial fields in Annapolis county, N.S. It was also found at Kentville, but it caused no appreciable damage. This is the first report of the disease in Nova Scotia. (J.F. Hockey)

BACTERIAL BLIGHT (Phytomonas Carotae Kendr.). A slight infection of bacterial blight (Kendrick, J.B. Bacterial blight of carrot. Jour. Agr. Res. 49:493-510. 1934) was present at Brandon, Man., on varieties Chantenay and Touchon; a trace was also observed in East St. Paul. The pathogen was identified by Dr. W.A.F. Hagborg. The disease was first found at Brandon in 1935. This is the first Canadian report of the disease. (W.L. Gordon)

WILT and ROOT ROT (Fusarium spp.). Odd plants particularly of the variety Chantenay (Ottawa strain) were affected at Brandon, Man. A few plants were also injured in a garden at St. Vital. Fusarium spp., incompletely identified, were isolated from the Brandon specimens. (W.L. Gordon)

SCLEROTIAL ROT (Sclerotinia sclerotiorum) caused considerable damage in storage at Cotton Wood, B.C. It was reported by a University extension officer to have caused severe rotting of carrots in storage in two farms in Brooksby district, Sask. It was severe in 1937 also. This disease is usually uncommon as a severe storage rot in Sask. (T.C. Vanterpool). It destroyed 10% of the carrots in a 5-barrel lot from a garden at Kentville, N.S. (J.A. Boyle)

CAULIFLOWER

CLUB ROOT (Plasmodiophora Brassicae)completely destroyed the cauliflowers in a garden at Charny, Que. (C. Perrault). It destroyed 50% of the plants in one garden at Kentville, N.S., and it was also observed in several other gardens (J.A. Boyle). Club root affected a trace to 10% of the plants in gardens at Charlottetown, P.E.I.

WIRE STEM (Rhizoctonia Solani) has become a serious disease in the cauliflower seed beds in the Montreal district, Que. Cauliflower seems to be more susceptible than cabbage. (E. Lavallee)

WHIPTAIL (non-parasitic). Although this trouble can be found in most cauliflower fields of the Montreal district, Que., a few fields at Ste. Dorothee were particularly affected (E. Lavallee)

SOFT ROT. During July and early August cauliflowers were severely affected by a soft rot in the Montreal district, Que. The trouble was attributed to excessive heat and high air humidity. (E. Lavallee)

BLACK ROT (Phytomonas campestris) severely affected 50% of the plants in a five-acre field at St. Laurent, Que. (E. Lavallee)

CELERY

LATE BLIGHT (Septoria Apii). A slight to moderate infection was recorded at Lethbridge, Alta. Late blight was severe in patches in one garden and moderate in another in East St. Paul, Man. It was moderate in a garden in St. Vital.

Late blight (S. Apii-graveolentis) was moderately severe in hotbeds and traces already occurred in the field on June 15 at Cyrville, Ont. (H.N. Racicot). Early and late blight developed very heavily on early celery which had not been sprayed at Vineland Experimental Station (D.L. Bailey). The disease appeared to be more severe this year in Lincoln county than in 1937 and more difficult to control when established. (J.K. Richardson)

Through improved spraying methods, commercial celery fields were less infected in the Montreal district, Que., than last year. However, small plantings, where no spraying was done, were heavily

infected (E. Lavallee). It was severe in a field at Lennoxville, Que., where spraying began only after the celery had been transplanted for a week (H.N. Racicot). A moderate infection developed at Charlottetown, P.E.I.

EARLY BLIGHT (Cercospora Apii) was severe at Middlechurch, Man.; moderate at Morden, and slight at Fort Garry. The development of the two blights appeared to be simultaneous and was heavy at Vineland Experimental Station (D.L. Bailey). In the Montreal district, Que., the only field heavily infected with early blight was at Ste. Dorothee. For the third successive year this field has been severely attacked. Traces were observed in 6 other fields (E. Lavallee). A slight infection occurred on sprayed plants which had been boarded for early blanching at Kentville, N.S. (J.F. Hockey)

SOFT ROT (Erwinia carotovora). Several samples were received from Middlesex county, Ont., but no mention of its prevalence was made. (J.K. Richardson)

STEM CRACKING (boron deficiency). Quite a quantity of heads were so severely affected in Middlesex county, Ont., as to be unsaleable (J.K. Richardson). It was observed in a few fields in Laval county, Que. Some growers did not apply boron as a preventative measure. (E. Lavallee)

HEART ROT (unknown) was very severe in all celery fields of the Montreal district, Que. Losses varied from 50% to a total loss. This trouble is attributed by some to bad water relations and by some entomologists, to tarnished plant bug injury. The population of this insect was high in the diseased fields and in the one field that was free from heart rot the bug was absent. (E. Lavallee)

CRESS

WHITE RUST (Cystopus candidus) was collected once at Saskatoon, Sask., on garden cress, Lepidium sativum.

CUCUMBER

BACTERIAL WILT (Erwinia tracheiphila) was not severe this year in the Montreal district, Que., although it was found in a few fields. (E. Lavallee)

WILT. About 1% of the plants wilted in a garden; a few plants were affected in a greenhouse in St. Vital, Man. Odd plants of the varieties Davis Perfect and National Pickle also wilted at Brandon. Fusarium spp. were associated with the Brandon material. (W.L. Gordon)

VERTICILLIUM WILT. Concerning the possible occurrence of Verticillium wilt in cucumbers in Ontario, Dr. G.H. Berkeley wrote: "I have observed Verticillium wilt on cucumbers in a greenhouse where cucumbers were used to fill in where tomato plants had been removed because of wilt or streak in the tomato plants. Also in one other case a crop of tomatoes was put in a new section of a greenhouse in soil that had grown cucumbers just before the erection of the greenhouse. There was a high percentage of Verticillium wilt in the tomatoes in that part only of the greenhouse where the cucumbers had been grown.

FRUIT ROT. Pythium sp., Fusarium Scirpi and F. Scirpi var. acuminatum were isolated from decayed fruits from Morden, Man., and were able to induce decay separately when inoculated through wounds. Most rapid decay was caused by the Pythium sp. The fruit rot followed damage due to hail. (W.L. Gordon)

SCAB (Cladosporium cucumerinum). Two fields were heavily infected at St. Laurent, Que. (E. Lavallee). Scab was severe on 25% of the fruit and present on another 50% of the crop in a greenhouse at Halifax, N.S. The foliage was also moderately spotted (J.F. Hockey). It was reported in several gardens at Charlottetown, P.E.I.

SCLEROTIAL ROT (Sclerotinia sclerotiorum). Diseased material was received from Mr. G.R. Thorpe, in charge of the Creston Sub-Station, B.C. The disease appeared on plants in the greenhouse (G.E. Woolliams). A slight infection was found in a greenhouse at Medicine Hat, Alta.

MOSAIC (virus). A slight infection was found on wild cucumber, Echinocystis lobata, at Edmonton, Alta. (A.W. Henry)

EGGPLANT

BLIGHT (Phomopsis vexans). Diseased specimens were brought in by a grower at Fenwick, Ont. He reported that 5 acres of crop were almost a total loss. At the Vineland Experimental Station the disease was present as scattered leaf infections as well as

on the fruit (D.L. Bailey). It affected 80% of the fruits at Macdonald College, Que. (J.G. Coulson)

WILT (Fusarium sp.) In one garden in Fort Garry, Man., 15% of the plants wilted and in another in St. Vital, 35% were affected. Fusarium Scirpi was isolated from the latter material. (W.L. Gordon)

DOWNY MILDEW (Pseudoperonospora Humuli). Some basal spike infection was found during the early growing period at Sardis, Sumas, and Agassiz, B.C. Dry weather inhibited development during the season and damage was only slight. Mr. J.W. Eastham found some diseased spikes on escaped hops along the roadside near Nelson. This is the first record from the Kootenay district. A few basal spikes were located in the spring in a newly established yard near Kamloops. (W. Jones)

CHLOROSIS (virus) is present on the Golding variety in the commercial hop yards of B.C. Plants are being continually rogued out. Symptoms of the disease have been found on varieties introduced from England. In Sardis it was observed on Brewers Favourite, Brewers Gold, and East Kent Golding. (W. Jones)

HORSE RADISH

LEAF SPOT (Ramularia Armoraciae). One patch was severely infected at Edmonton, Alta.

LETTUCE

DROP (Sclerotinia sclerotiorum) was moderate to severe in gardens at Edmonton, Lacombe and Olds, Alta. It was severe in plantings gone to seed in one garden and on the early crop in another in St. Vital, Man.

TIP BURN (non-parasitic) was severe in a crop of Big Boston in Lincoln county, Ont.

MELON

BACTERIAL WILT (Erwinia tracheiphila) caused slight damage in Essex county, Ont. (L.W. Koch). In two fields at St. Angele, Que., wilt caused at least 30% damage. A few fields were slightly infected in Laval county. (E. Lavallee)

LEAF BLIGHT (Macrosporium cucumerinum). A field of about 6 acres was virtually defoliated in Wentworth county, Ont. The chief damage was in the premature ripening resulting in poor flavour. Other fields in the immediate vicinity were much less heavily infected with practically no defoliation. (D.L. Bailey)

ANTHRACNOSE (Colletotrichum lagenarium) occurred in epidemic proportions in nearly all melon plantings in the Leamington district, Ont. The disease was present to a lesser extent in all plantings examined in other districts. (L.W. Koch)

WILT (Fusarium sp.) Citrons were moderately damaged by F. bulbigenum var. niveum in a market garden near Edmonton, Alta.

A wilt of muskmelons was more or less destructive at Morden, Man. A number of Fusarium spp. were isolated, but are not fully identified as yet. (W.L. Gordon)

Wilt (F. bulbigenum var. niveum) affected 5% of the vines in a field in Wentworth county, Ont. The trouble was reported by the grower at picking as a stem-end rot. Fusarium was fruiting abundantly on the stem end of the fruits and they were found attached to wilted vines. (D.L. Bailey)

STEM-END ROT. A rot of cantaloupe originating at the stem end was found on the market at Winnipeg, Man., in Oct. 1938. Isolations yielded primarily, a fungus as yet unidentified, Fusarium Scirpi, and F. sambucinum. (W.L. Gordon)

FRUIT ROT developed at Morden, Man., on odd fruits of honey dew melons following hail injury. Isolations from diseased fruit yield at bacterium, two apparently different Alternaria spp., and Pythium sp. All were pathogenic when inoculated separately, particularly the bacterium and Pythium. (W.L. Gordon)

ONION

DOWNY MILDEW (Peronospora Schleideniana) appeared suddenly the first week in July in a field of Yellow Globe in Kent county, Ont., and in a very few days the leaves were severely blighted. The plants recovered to some extent, but the yield was seriously reduced (J.K. Richardson). It caused considerable damage to onions grown from sets on the Pelee marshes. (J.E. Howitt)

BLACK MOULD (Aspergillus niger) caused severe damage to onions placed in storage in Essex and Kent counties, Ont. (L.W. Koch)

NECK ROT (Botrytis Allii) was injurious in a seed planting on part of a field previously planted to onions in St. Vital, Man. One per cent of neck rot was noted in a lot at Charlottetown, P.E.I.

LEAF SPOT. Some stalks of shallots were severely infected at Morden, Man. An associated Alternaria sp. appeared to be the cause.

SOFT ROT (Erwinia carotovora). Some loss from soft rot was reported in Essex and Kent counties, Ont., after onions had been in storage for a time (L.W. Koch). A carload of onions from Leamington, Ont., showed 8% of the onions affected on arrival at New Glasgow, N.S. (D.B.O. Savile)

BRITTLE (Fusarium sp.). A trace was found by Prof. J.E. Howitt in a planting in the Humberstone marsh, Port Colborne, Ont. The symptoms agree with the description given by Chupp, (C. Chupp. Manual Veg. -Garden Diseases, p. 304, 1925) and a Fusarium sp. was isolated from the affected plants (J.K. Richardson)

PARSNIP

MOSAIC (virus). A few plants apparently affected by mosaic were seen in a field at Middlechurch, Man.

LEAF SPOT (Cylindrosporium crescentum) was severe in a field at Middlechurch, Man. The parasite apparently hibernated in escaped plants at the edge of the field. A slight infection was also present at East St. Paul and St. Vital.

WILT and ROOT ROT. A small patch of plants were definitely wilted with the lateral roots rotted in a field at Middlechurch, Man. Fusarium spp. were isolated, but are not yet identified. (W.L. Gordon)

PEA

POWDERY MILDEW (Erysiphe Polygoni) was severe in one small patch sown earlier and thicker than the rest at the Windermere Station, B.C. It was severe at Rosedale, Alta., and slight to moderate at Edmonton. Powdery mildew was severe at Gonor, East St. Paul, St. Vital and St. Norbert, Man., during August.

Powdery mildew was reported by L. Verret, inspector, to be the most destructive disease in the Gaspe pea district, Que., this year (E. Lavallee). Trace to heavy infection was reported at Ste. Anne de la Pocatiere, Que., and Charlottetown, P.E.I.

LEAF and POD SPOT (Ascochyta Pisi) was moderate to severe in several gardens at Edmonton, Alta. It was rather severe in field peas at Olds. A trace to slight infection occurred on late peas in gardens at Saskatoon, Sask.

About 30 fields were examined in the Gaspe area, Que., in August. At that time the disease was observed in every field, but in none had it caused any damage as yet (C. Perrault). In an acre field near Kentville, N.S., 10% of the pods were unmarketable and 25% were affected on July 2 (J.A. Boyle). It was also noted at Charlottetown, P.E.I.

RUST (Uromyces Fabae) slightly infected many canning pea fields about Ste. Martine, Que. (E. Lavallee). It was recorded at Ste. Clothilde, Abbotsford, Cap Rouge, Ste. Anne de la Pocatiere, and at New Carlisle. There appeared to be some difference in varietal behaviour. Traces of rust were seen in Prince county, P.E.I.

BACTERIAL BLIGHT (Phytomonas Pisi). A slight infection was found at Brooks, Alta.

ROOT ROT. Traces of root rot (?Fusarium sp.) were present in 3 out of 16 varieties of field peas at Ste. Anne de la Pocatiere, Que. Root rot (Rhizoctonia Solani) was severe in Ryders Universal at Charlottetown, P.E.I.

WILT (cause unknown) was severe in one garden at Gonor, Man., August 19.

DOWNY MILDEW (Peronospora Pisi) was fairly general and caused slight damage at the Sidney Station, B.C. (W. Jones)

LEAF BLOTCH (Septoria Pisi) was prevalent on garden peas at the Abbotsford Station, Que. A trace occurred at Cap Rouge. It caused some reduction in yield in one garden at Charlottetown, P.E.I.

PEPPER

MOSAIC (virus) was found affecting plants in patches at St. Vital, Man.; infection was moderate.

WILT (Fusarium Scirpi associated) affected a few plants in low spots in a field in St. Vital, Man.

FRUIT ROT. A few fruits were rotted at Morden, Man. An Alternaria sp. was isolated (W.L. Gordon).

POTATO

Mr. John Tucker, Chief Potato Inspector, Plant Inspection Division, Production Service, has provided the usual tabulations on the extent of the seed potato industry, the acreages of the leading varieties passing inspection, the extent that fields failed to pass inspection, and the average percentage of the three diseases: black leg, leaf roll, and mosaic. All fields entered for certification are planted with certified seed.

Table 2 - Seed Potato Certification: Number of Fields and Acres Inspected, 1938.

Province	Number of Fields		Fields Passed %	Number of Acres		Acres Passed %
	Entered	Passed		Entered	Passed	
P.E.I.	4,354	3,418	78.5	17,656	14,120	80.0
N.S.	627	478	76.2	1,311	1,065	81.2
N.B.	3,188	1,842	57.8	15,054	9,374	62.3
Que.	1,035	506	48.9	1,540	600	38.9
Ont.	937	751	80.1	1,899	1,533	80.7
Man.	121	109	90.1	273	221	80.9
Sask.	191	177	92.6	258	230	89.1
Alta.	261	212	81.2	355	268	75.3
B.C.	291	242	83.1	479	406	84.7
TOTAL	11,005	7,735	70.3	38,825	27,817	71.7

Acres Entered		Acres Passed	
1937	30,378	1937	25,711
1938	38,825	1938	27,817

Increase of 8,447 acres or 27.8%

Increase of 2,106 acres or 8.2%

Table 3 - Seed Potato Certification: Acreages passed by Varieties, 1938.

Variety	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.-B.C.	Total
Green Mountain	5,540	107	6,984	519	129	66	13,345
Irish Cobbler	8,181	207	264	47	261	58	8,998
Bliss Triumph	292	583	1,452			7	2,334
Katahdin	111	121	463	21	638	1	1,355
Netted Gem					4	497	501
Rural New Yorker				1	356		357
Warba		1	1		63	131	196
Spaulding Rose	11		184				195
Early Ohio						167	167
Chippewa		2	13		71	36	122
Gold Nugget					6	33	39
President		16	10				26
Garnet Chile		26					26
Early Rose		1		4		6	11
Others	5	1	3	8	5	123	145
TOTAL	14,120	1,065	9,374	600	1,533	1,125	27,817

The acreage planted for certification was substantially enlarged for the second successive year. It has increased from 20,083 acres in 1936 to 30,378 acres in 1937 and 38,825 acres in 1938. The acreage passing inspection has not kept pace due to severe outbreaks of disease, chiefly in Que. and N.B. Bacterial wilt and rot has been prevalent in Que. for several years, while the presence of other diseases, particularly mosaic, has caused the rejection of more fields than in the other provinces. Leaf roll was epidemic in N.B. in 1938 and accounted for three-quarters of the rejections in the province (Table 4). Its incidence was also very high since upon first inspection the average leaf roll infection was 4.4%. In the other provinces mosaic continued to be the major cause of rejection, so that for the Dominion as a whole, the presence of mosaic and leaf roll in excess of the amounts permitted, caused the rejection of over 1,000 fields for each disease, or the two virus diseases combined, caused 63.1% of all the rejections. The acreage of Green Mountain passing inspection was again increased, but more important was the increase in Katahdin, which would have been much larger but for bacterial wilt and rot.

Table 4 - Seed Potato Certification: Fields Rejected, 1938

Province	Mosaic	Leaf Roll	Black Leg	Bacterial Wilt & Rot	Foreign Varieties	Adjacent Diseased Fields	Misc.	Total
P.E.I.	597	8	11	7	79	114	120	936
N.S.	69	22	2	0	14	19	23	149
N.B.	178	935	8	81	8	71	65	1,346
Que.	195	13	15	187	4	34	81	529
Ont.	8	12	19	4	34	8	101	186
Man.	0	0	4	0	2	1	5	12
Sask.	1	2	2	0	4	1	4	14
Alta.	0	6	15	4	7	7	10	49
B.C.	10	6	1	0	5	16	11	49
TOTAL	1,058	1,004	77	283	157	271	420	3,270
Rejections as a percentage of fields:								
Entered	9.6	9.1	0.7	2.6	1.4	2.5	3.8	29.7%
Rejected	32.4	30.7	2.4	8.6	4.8	8.3	12.8	100.0%

Table 5 - Seed Potato Certification: Average Percentage of Disease found in the Fields, 1938

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	.09	.02	.3	.06	.15	.24	.15	.30	.05
Leaf Roll	.06	.50	4.4	.20	.12	.01	.07	.14	.42
Mosaic	1.11	1.37	1.2	1.26	.09	.04	.15	.01	.52
Fields passed (final inspection)									
Black Leg	.03	.01	.1	.04	.09	.10	.02	.06	.01
Leaf Roll	.02	.37	.2	.28	.08	.01	.01	.01	.11
Mosaic	.14	.49	.1	.48	.04	.04	.03	.01	.06

LATE BLIGHT (Phytophthora infestans) was found in most of the potato areas in the Fraser valley, B.C., this year and also in several districts on Vancouver island. It did not appear as early in the season nor was it as severe or widespread as in 1936 and 1937. It was first observed on July 26, the latest date in the 3 years. Moreover, rainfall was less in the 1938 season than in the other two years. Late blight damage to the foliage caused an estimated reduction in yield of marketable potatoes of 4% as compared to a 15% loss in 1937.

Most of the potatoes were harvested while the weather was fine and the soil dry. In a few late fields late blight was severe and affected up to 10% of the tubers. In general late blight rot did not cause a loss of over 1.5% of the tubers in B.C.

Spraying potatoes for late blight is not yet general in B.C. as many growers think the loss is insufficient to justify the trouble and expense. However, the number who spray following our recommendations are increasing and where spray is applied properly with an efficient machine, good results are obtained. In our spraying experiment on Lulu island this year, the sprayed plots yielded an average increase of 15% in marketable potatoes over that of the unsprayed check plots, while late blight rot in the tubers was 0 and 1%, respectively. Bordeaux gave the best results, although several other sprays were fairly satisfactory, while copper lime dust was about half as effective as Bordeaux. (H.S. MacLeod)

Late blight was found in practically all sections of Ont., where late potatoes are grown. Damage this year was comparable to that suffered from the general infection in 1928 (O.W. Lachaine). To judge from samples received at Ottawa, the loss wass considerable and extended well into Northern Ont. (H.N. Racicot)

Late blight was found in all potato areas in Que. It was recorded in the Three Rivers district on July 16, the earliest date on record. In some parts of the province, it spread very rapidly and many fields were severely attacked. Defoliation in some cases caused 40% reduction in yield of marketable potatoes. In the lower St. Lawrence district late blight was first observed about August 15, but it was of little consequence until September, when an outbreak developed to cause considerable loss, the worst ever experienced in that section. Tuber infection for the province ranged from a trace to 90%, the average loss being about 12%.

In a trial to determine the behaviour of a number of potato varieties to late blight at St. Arsene, the potatoes were planted on good, well fertilized soil and were sprayed twice for insects, but no fungicide was applied. Of 17 varieties under trial, Arran Consul, Garnet Chile, Conard, Arran Chief, and Prolific were but slightly affected by late blight, while Green Mountain, Chippewa, Dunbar Yeoman, and Bally Doon were some of the worst affected. It may be noted that Dunbar Yeoman and Bally Doon are as susceptible to late blight in Que. as they are in Ireland, while Arran Consul, Arran Chief and Donard are fairly resistant in both, if the Que. results are comparable with those published by W.D. Davidson, Dublin, Ireland, in his book, "Potato Growing for Seed Purposes".

Spraying for late blight in Que. is not a general practice, but many growers agree that spraying is desirable. Very good results were obtained in Matane, Rimouski, Temiscouata, L'Islet, Chicoutimi, and other counties, where the spraying was properly done with a good machine. (B. Baribeau)

Late blight was present in all fields in N.B. It was first observed about July 15 and became severe as the season advanced. In some fields a loss of half the crop was reported, and a high percentage of rot was found in the tubers from fields that were not properly sprayed. The highest percentage on record was 65%. From tuber inspection reports on 500 bins of certified seed in Carleton and Victoria counties an average of 2% of rot was recorded. (C.H. Godwin)

Late blight was found in Colchester county, N.S. on July 28, and in Kings county on July 30. By August 15 it had become general and more or less severe in all potato growing sections of the province.

In spite of heavy and frequent rains, which kept the ground sodden and hindered spraying, good yields were produced, but there were heavy losses from rot. Fields in which 60% of the tubers rotted were not uncommon in Cumberland, Colchester, and Pictou counties. Green Mountain, Irish Cobbler, and Bliss Triumph were all severely affected, but late blight was not found in Katahdin before Aug. 10 and rot was slight. Tuber rot averaged 1.2% in certified seed, but in Bliss Triumph the loss was 10% due to rot aggravated by premature handling.

The effects of thorough spraying were more evident than usual. Many large fields sprayed seven times were practically free from rot. (W.K. McCulloch)

Late blight was general in P.E.I. and losses ranged from a little or no decrease in yield in well sprayed fields to a 30-40% reduction in fields that had not been sprayed. Late blight first appeared at Charlottetown on July 29, more than a month earlier than in 1937. Reports indicate that it reached the western end of the Island sometime earlier and the eastern portion somewhat later than this date. In August the mean temperature was 67°F., rain fell on 12 days and many others were overcast. Thus conditions were favourable for the rapid development and spread of the fungus. By August 15 severe leaf infection was general and before August 31, many fields were dead in western P.E.I. This early killing of the tops coupled with the fact that planting had been delayed in many instances until late in June due to rainy weather resulted in a marked reduction in the yield of marketable tubers.

It was estimated that the average loss from tuber rot was not less than 10% of the total yield. Due to rot being prevalent in seed stocks upon bin inspection, many growers were forced to delay shipment to allow time for the development of decay and subsequent sorting and grading.

Results from spraying were disappointing due in most instances to poor machinery or inefficient spraying methods. In seasons, such as 1938, infrequent spraying and poor equipment have proven to be a false economy and more competent methods of applying Bordeaux will have to be adopted. (E.H. Saunders)

RHIZOCTONIA (Corticium Solani (Rhizoctonia Solani) was quite prevalent on the plants in B.C., but it was less severe than usual. Sclerotial development on the tubers also appears to be less than usual. No conclusive results were obtained in our seed treatment experiment (H.S. MacLeod). Rhizoctonia was fairly prevalent in Sask. and Man.; tubers were freer of sclerotia than usual, probably because the vines were not frozen down before the potatoes were harvested. (J.W. Scannell)

A slight infection of rhizoctonia was common in the field in Que., while tuber infection ranged from a trace to 90% (in St. Maurice county). The average infection was 4% (B. Baribeau). Inspection reports of 500 bins in Carleton and Victoria counties, N.B., gave an average tuber infection of 4.6% for rhizoctonia (C.H. Godwin). The disease was more severe than usual in N.S. All varieties were affected, but it was most severe on Katahdin. An average of 8% of the Katahdin plants showed aerial tuber symptoms by August 20, and were almost a complete loss. The

average percentage of tubers showing sclerotia was Colchester county, 7.5%; Kings, 6.3%; Cumberland, 4.0% and Pictou, 1.4%. (W.K. McCulloch). Practically every field showed up to 5% of the plants affected by rhizoctonia in July in P.E.I., and in several fields every plant was affected. The leaves were often severely rolled and a purplish colour and aerial tubers were abundant. Stolons and underground parts showed severe lesioning. Sclerotia were less common than usual on the tubers, although an occasional bin showed 50% of the tubers affected. (R.R. Hurst and S.G. Peppin)

BLACK LEG (Erwinia phytophthora) was found in only 18 fields out of 284 fields of certified seed in B.C.; the percentages present were low (H.S. MacLeod). Climatic conditions were ideal for the development of black leg in the black soils from Lacombe to Edmonton, Alta. Of the fields inspected in the area, 40% showed the presence of black leg and 9 of the 15 fields that failed to pass on account of the disease in Alta. were located here (J.W. Marritt). Black leg was not common in Man. and Sask., but it was severe in 2 fields in Man. (J.W. Scannell)

Black leg is present in Ont., but it appears to be on the decrease (O.W. Lachaine). The disease was found in 212 fields out of 1035 inspected in Que. and resulted in the rejection of 15. In general the percentage of plants affected was small, the highest infection recorded being 5%. The disease was most prevalent in Northern Que. (B. Baribeau). Black leg was particularly noticeable in Katahdin in N.B. In all 8 fields were rejected on account of the disease; 11% was the highest infection recorded (C.H. Godwin). Black leg was less common in N.S. than last year. It was present in 3.5% of the fields this year as compared with 9% in 1937. Bliss Triumph, which comprised about 50% of the total acreage, was again practically free. The highest infection was 6% in a field of Garnet Chile, which was often under water during the growing season. The disease occurred most frequently in Irish Cobbler, but it was not present in fields where the seed had been efficiently treated (W.K. McCulloch). Black leg was more prevalent in P.E.I. than in 1937, probably because of the wet season and the lack of seed treatment. In all, 11 fields were rejected out of 4,354 inspected. (S.G. Peppin)

EARLY BLIGHT (Alternaria Solani) was quite prevalent again in 1938 in B.C., especially in areas near the coast, but it was not nearly as severe nor caused as much damage as in 1937 (H.S. MacLeod). Early blight was a trace to moderate in the variety plots at Olds, Alta. It was present to a limited extent in Sask. and Man. (J.W. Scannell). A trace was present at St. Vital, and a moderate infection occurred at Shoal Lake, Man.

Early blight was widespread in Que. and caused some reduction in yield in certain localities, but in general the infection was slight (B. Baribeau). Early blight was found in a few fields in early July in N.B. (C.H. Godwin). Early blight was first reported on July 19 in Kings county, N.S. A moderate infection occurred in mid-August in all potato districts. Ketahdin was apparently less affected than other varieties. Yields were little reduced due apparently to an abundance of moisture and only a trace of Alternaria rot was seen (W.K. McCulloch). Early blight developed rapidly the first week in August on Irish Cobbler in P.E.I. and caused the premature death of the plants in some sections in early September. On Green Mountain the effects of early blight were showing in late September. A few tubers of Bliss Triumph were sent in showing Alternaria rot (R.R. Hurst). Alternaria rot affected 25% of the tubers in April in a lot of Warba grown in 1937 at Spencerville, Ont. (H.N. Racicot)

BACTERIAL WILT and ROT (Phytomonas sepedonica (Spieckermann & Kotthoff) Magrou). Recently W.H. Burkholder (Am. Pot. Jour. 15:243-245. 1938) studied the disease in and isolated the pathogen from tubers collected in Maine. He concluded that the disease was identical with the bacterial ring rot caused by Bacterium sepedonicum, "which has been known to occur for some time in Europe, especially in Germany". Savile and Racicot (Sci. Agric. 17:518-522. 1937) have already pointed out the close resemblance of the bacterial wilt and rot organism to P. sepedonica, and since the disease in Canada is identical with that in the United States, I have decided to follow Burkholder. The combination Phytomonas sepedonica appears to have been made first by Magrou in Hauduroy et al. Dictionnaire des bactéries pathogènes, p. 411. 1937.

In the United States (Plant Dis. Reporter 22:444-445. Dec. 1, 1938) bacterial wilt and rot has been found in Maine, Florida, Pennsylvania, and Wyoming and it may be present in Colorado. No doubt its occurrence in Maine is the most important.

Bacterial wilt and rot has not been found in B.C., although a sharp look-out has been kept for it (H.S. MacLeod). The disease was found in 4 fields entered for certification and in 19 fields for table stock comprising 87 acres. All were in the Lethbridge district, Alta., and all except one were planted with Netted Gem variety. The latter stock had all originated from a single source. The disease was also found in 1937 in stored tubers. (J.W. Marritt and H.N. Racicot)

Bacterial wilt and rot was found in one lot of Netted Gem at Swift Current, Sask. The seed had been obtained from Lethbridge. It was also observed near Selkirk, Man., by Mr. E.T. Howe, Agricultural Representative, in a small plot planted with seed of Irish Cobbler, that originally came from P.E.I. in 1937. The presence of the disease in the tubers was confirmed at Ottawa. (J.W. Scannell)

The disease was located on 5 farms in Simcoe county, and 4 farms in Dufferin county, Ont. The disease was apparently introduced in Katahdin potatoes in 1936 from N.B., although Irish Cobbler, Green Mountain and Dooley were also found infected. (O. W. Lachaine and H.N. Racicot)

Bacterial wilt and rot is widely distributed in Que., but it appears to be more prevalent in the eastern part of the province. It was found in 187 fields out of 1,035 entered for certification. First symptoms of the disease were observed on many plants in a 2-acre field of Green Mountain on July 6, which was but 42 days after planting. The disease has appeared in some old stocks grown for many years on the same farms; how it has gained entrance into these stocks is unknown. It was observed in President grown as table stock. (B. Baribeau)

Bacterial wilt and rot was found in more fields in N.B. this year than in 1937. Most of the Katadhin variety imported from Maine this season developed the disease. During field inspection the disease was found in 11 fields in Restigouche county, one in York, 48 in Madawaska and Victoria, and 21 in Carleton, a total of 81 fields out of 3,188 entered for inspection. Since field inspections were completed the disease has been reported found on 63 farms in Carleton, Victoria, and Madawaska counties. (C.H. Godwin)

Although suspicious looking specimens have been examined by Mr. J. Tucker and by the Kentville Laboratory, no trace of the disease has been found in N.S. (W.K. McCulloch)

Bacterial wilt and rot was found on 7 farms in a limited area in the Monticello district, P.E.I., but nowhere else. On all the farms it occurred on Irish Cobbler seed stock, except on one farm where it occurred in addition in a field of Green Mountain table stock. (S.G. Peppin and R.R. Hurst)

Bacterial wilt and rot is here reported for the first time in Alta., Sask., Man., Ont., and P.E.I., although it was detected in Alta. in tubers of the 1937 crop.

FUSARIUM WILT (F. sp.). A trace was found in a few fields in Alta. It was quite prevalent in Man., and Sask., although it was not as severe as in 1937. Wilt seems to be on the increase in Ont., being especially noticeable in varieties of the Rural group.

VERTICILLIUM WILT (V. sp.) was not nearly so evident this year in P.E.I. as in the preceding season. Last year 40 fields were rejected, while only 17 were turned down in 1938. Because the summer of 1938 was very wet, symptoms of wilt were not readily detectable and late blight was so severe that most fields of Irish Cobbler were dead by the end of August. It is believed that wilt is on the increase, because considerable wilt infected stock passes inspection, due to the symptoms being undeveloped or masked at the time of inspection and thus it is being spread more and more (G.W. Ayers). Verticillium albo-atrum was isolated from a plant from a garden at Saskatoon, Sask., and the isolate was identified by Dr. G.R. Bisby.

WILT (cause undetermined) affected 5% of the plants in a field at St. Vital, Man. It was reported in small amounts in Cumberland county, N.S. Tubers from affected plants were collected and will be grown next season.

JELLY-END ROT (Fusarium sp.) was found in shipments of potatoes from the interior of B.C., mostly from where the crop was grown under irrigation. The loss was estimated at 1%.

COMMON SCAB (Actinomyces scabies) is not serious on potatoes in B.C., although in some areas it may develop to an appreciable extent. Netted Gem, the main variety in B.C., is highly resistant (H.S. MacLeod). Common scab was slightly more prevalent than usual in Man., and Sask. In the Red River valley, Man., the disease was found in almost every field, although usually it is prevalent only on bush soils. In Sask. the disease occurred in every field, 1 to 75% of the tubers being affected. (J.W. Scannell)

Common scab is most prevalent in Temiscouata and Montcalm counties, Que., although it is present in many counties. Tuber infection ranged from a trace to 60% and averaged 2%. Tuber infection averaged also about 2% in N.B., N.S., and P.E.I. In N.S. it was prevalent on Bliss Triumph and Irish Cobbler, and was less common on Green Mountain and Katahdin.

POWDERY SCAB (Spongospora subterranea) was observed in Gaspe, Megantic, Chicoutimi and Temiscouata counties, Que. It was

most prevalent in Temiscouata. Infection ranged from a trace to 10% and averaged 0.6%. It was noticed in a few lots of seed potatoes in Carleton, Victoria, and Madawaska counties, N.B. Powdery scab was reported only in Kings county, N.S., but it was more prevalent than usual. It was found in 17 fields, mostly Bliss Triumph, out of 150 inspected. Infection ranged from a trace to 15% and averaged 4%. Up to 75% of the tubers were affected in certain parts of a field at West Glenmount, and 5% were unfit for table stock. The disease was reported only once or twice this year in P.E.I.

SILVER SCURF (Spondylocladium atrovirens) was reported a few times last spring in Que., on Irish Cobbler, Green Mountain, and Katahdin. It was present in N.S. to a slight extent last spring. By Nov. 30, a very slight infection was seen particularly on Irish Cobbler.

PHOMA ROT (Phoma tuberosa) caused slight to moderate damage in a bin in the Edmonton district, Alta. The fungus was identified by Dr. G.R. Bisby (G.B. Sanford). Phoma rot was severe in 5 lots of Green Mountain kept at the Charlottetown Laboratory, P.E.I. until April. (R.R. Hurst)

MOSAIC (virus) was found in 95 fields out of 284 inspected in B.C. and was responsible for the rejection of 10. Mosaic was prevalent only in and about Calgary and Edmonton, Alta. A severe infection was reported in a field at St. Norbert, Man. Mosaic was responsible for the rejection of 195 fields or 18% of the total rejections in Que. This figure is about double that for the Dominion. Infection varied in the individual fields from a trace to 20%. In N.B. 178 fields, a slight increase over last year, were refused certification on account of mosaic. Mosaic was found in 68% of the fields inspected in N.S. and caused the rejection of 11%. While mosaic was formerly most severe in Bliss Triumph and Green Mountain, Irish Cobbler was also severely affected this year. It appears with the acreage of Bliss Triumph increasing, that mosaic is gradually increasing in Irish Cobbler. In P.E.I. 597 fields were rejected on account of mosaic in 1938 as compared with 286 in 1937. Better growth, more moisture, and less sunshine than in the dry season of 1937 probably made it easier to detect. Some allowance must also be made for increased acreages.

LEAF ROLL (virus) was present in 126 fields out of 284 inspected in B.C. and was responsible for the rejection of 6. Leaf roll, like mosaic, was prevalent only about Calgary and Edmonton, Alta. Leaf roll was not found to any extent in Sask. and Man. Leaf roll caused the rejection of 13 fields in Que. Infection ranged from a trace to 8%.

A severe outbreak of leaf roll occurred in York, Carleton, and Victoria counties, N.B. Indeed it is the severest outbreak on record. It was responsible for the rejection of 935 fields out of 3,188 entered for inspection. (C.H. Godwin)

Leaf roll was found in 59% of the fields inspected in N.S., and caused the rejection of 22. In one commercial field 90% of the plants were severely affected and the crop was later found to be not worth digging. (W.K. McCulloch)

While only 8 fields were rejected on account of leaf roll in P.E.I., there was a decided increase in the number of leaf-roll infected plants. (S.G. Peppin)

GIANT HILL (virus) was present in 50% of the fields inspected in B.C., but the percentage of affected plants was always small. The odd plant was affected in a few fields in Alta. It was reported in a few fields of Green Mountain in Carleton and Victoria counties, N.B. and in P.E.I. Core grafts using Green Mountain failed to transmit the trouble at Charlottetown, P.E.I. (R.R.Hurst)

SPINDLE TUBER (virus) was found in a few fields in Alta., and generally only a trace was present. It occurred in 13 fields out of 119 in Man. and one field was rejected on account of the disease. A mere trace was found in Sask. It was noted in a few fields in Que. and one was rejected. Spindle tuber was particularly common in Irish Cobbler and some fields of Katahdin in N.B. Fields were found where 5% of the plants were affected and 26 fields were rejected on account of the disease (C.H. Godwin). In P.E.I. 4 fields of Irish Cobbler were rejected due to spindle tuber, and while tuber type was generally poor this year, it is believed that the disease is not on the increase. A number of off-type tubers have been retained for planting in 1939 (S.G. Peppin). In table stock the disease is general and the percentage of affected plants varied from a trace to 25%. (R.R. Hurst)

WITCHES' BROOM (virus) was found in 8 fields in B.C., but the percentage of plants affected was low. A trace was present in a few fields in Alta. A single affected plant was found in a field in Man. A trace was recorded in P.E.I.

YELLOW DWARF (virus) has made its appearance in Ont., in the last few years, but as yet, it has been of little economic importance (O.W. Lachaine). A single affected plant was observed in a 3-acre field of Green Mountain at L'Annonciation, Que. This is the first time it has been found in Que. (B. Baribeau and H.N. Racicot)

PSYLLID YELLOWS. What appears to have been this trouble has been observed in central Alberta with more or less regularity since 1919 (G.B. Sanford, Sci. Agric. 15: 46-48. 1934). He found that the plants were usually widely scattered in the field and did not show the advanced symptoms characterized by pronounced axillary shoots and aerial tubers. In 1932, however, a severe outbreak occurred at Medicine Hat, where the crop was a total failure on over 100 acres.

Since 1935 the disease has been reported regularly to the Survey by Mr. J.W. Marritt (see P.D.S. Reports 15:37, 16:36, and 17:38). It has been more or less severe at Medicine Hat, Calgary, Edmonton, Drumheller, and the Experimental Station, Lethbridge in these three years. Its occurrence was closely associated in 1936, according to him, with the growing of tomatoes in greenhouses. In 1938, he found psyllid yellows severe early in the season on potatoes in the vicinity of psyllid-infested greenhouses in the Riverside area, Calgary, and elsewhere. "For the first time psyllids were found to be general in potato fields in southern and central Alberta, and as far north as Edmonton. Definite symptoms of psyllid yellows did not develop in these fields until after second inspection of the crop. In September, however, severe symptoms were general in the Taber, Barnwell, and White School districts of southern Alberta. Mild symptoms were also found at Edmonton in October".

Mr. G.F. Manson has kindly summarized the observations made by members of the Entomological Laboratory, Lethbridge, Alta., as follows:

"Psyllid yellows has existed in Alberta in varying degrees of severity since 1932. Loss during the years 1932 to 1938 has been limited to greenhouse tomatoes and susceptible crops in the areas immediately adjacent to greenhouses producing favourable host plants throughout the winter months. The loss in greenhouse tomatoes is evident in reduced yield and quality. In potatoes the loss was greatest in late varieties.

"In 1938 the association between injury and greenhouse areas was not apparent. The infestation spread far beyond the former limits to include most of Alberta south of Edmonton and in Saskatchewan south of Prince Albert. Infestation was also observed in eastern British Columbia.

"The insect associated with psyllid yellows was definitely determined as Paratrioza cockerelli Sulc. but much remains to be determined as to the nature of the disease".

Psyllid yellows was found near Swift Current, the first record of its occurrence in Sask. Psyllids were found in a number of other fields, but no evidence of yellows was noted. (J.W. Scannell)

It would appear that the epidemic of psyllid yellows in Canada was only the northern extension of a much larger epidemic centering in the States to the south. It was unusually severe and widespread in 1938; in Montana it was estimated that it caused a loss of 25% of the potato crop. (Pl. Dis. Reporter 23:1-4, 18, 35. 1939).

PURPLE TOP (cause unknown) was found in 20% of the fields in Alta. and northwestern Sask., while it was present in most fields in Sask., Man. and north-western Ont. Usually the percentage of affected plants did not exceed a trace to one per cent. (J.W. Marritt and J.W. Scannell)

DR. G.B. Sanford has described the symptoms of the trouble as follows:

"External symptoms, vine: General distortion from normal shape, with strong tendency to swollen nodes, short internodes, zig-zag direction of stem, abnormal axilliary shoots with aerial tubers in several cases, and similar to what is often associated with extreme case of Rhizoctonia stem canker. Distorted shape of vine is the outstanding diagnostic feature.

"Pigmentation (reddish to purple) on upper parts of vines and sometimes pigment on leaves at and toward the top usually appears in those varieties which carry a genetic factor for pigment, and is absent on those in which the factor is weak or lacking. In severe cases the terminal leaves may be colored. In general, the expression of vine distortion for each variety is more or less characteristic, as might be expected, and naturally there are all gradations of expression. It would appear that the degree of pigmentation of vine or leaf depends on light intensity, in addition to the primary cause. Judging from present knowledge, the size of plant and yield of tubers do not appear to be greatly affected.

"Internal symptoms, vine: Yellowish vascular strands in lower sections of vine, in contrast to the normal greenish color. This is most marked in the strands at the lower end of the stalk, and may or may not wholly disappear toward the top. The pith appears normal.

"Tubers and stolons: Outwardly sound, yellowish vascular strands of stem tend to decrease in stolon, and usually disappear in the tuber. Tubers usually normal. I would expect considerable variability in this connection."

The distortion of the vine is very similar to that found in psyllid yellows, so that it is not always possible to tell the two troubles apart from individual plants. As a result of field experiments in 1938, Leach considers that the wilt of potato plants produced in the greenhouse by the tarnish plant bug is not identical with the prevalent "purple-top wilt". (J.G. Leach. Further experiments on the cause of "purple-top wilt" of potatoes. Abstract. Phytopathology 29:14. 1939). Instead he found that typical symptoms were produced in 6 of 8 cages into which were introduced aster leaf hoppers (Macrosteles divisa) taken from a variety of plants in nature. From this and other experiments reported, together with circumstantial evidence, he concludes that the disease may be aster yellows, although there is no evidence of its transmission through the tubers.

NET NECROSIS (cause unknown) was quite prevalent this year in B.C. (H.S. MacLeod). The trouble was unusually severe at Lethbridge, Medicine Hat and intermediate points in Alta. Besides severel reports of its occurrence from Calgary and Edmonton, it is believed there were many unreported cases. It was economically important for much of the crop was unsaleable. Although necrosis of tubers may be associated with purple top, the two troubles are considered distinct. Mr. H. Lyons, potato buyer, Lethbridge, who examined about 4,000 of the 6,000 acres under irrigation, estimated the occurrence as follows: in 1,970 acres, 0-2% tubers affected; 712 acres, 2-4%; 969 acres, 4-10%; 400 acres, 10-15% (G.B. Sanford). In two fields of certified seed in the Lethbridge area, 15% of the tubers were showing severe net necrosis on second inspection. In other fields in the same district a trace to 2% of the tubers were showing severe net necrosis on second inspection. In other fields in the same district, a trace to 2% of the tubers were affected (J.W. Marritt). Tubers from two lots of certified Green Mountain seed, which showed 4% stem-end browning and net necrosis in 1937, were planted at St. Anne de la Pocatiere, Que. The resulting plants were all weak and small, with typical symptoms of leaf roll. It was estimated that the yield was reduced 65%. Only 2% of the tubers from the affected plants showed stem-end browning and necrosis (B. Baribeau). Net necrosis was quite severe in several lots of Green Mountains in Carleton and York counties, N.B., during the spring shipping season (C.H. Godwin). A trace to 5% of the Green Mountain tubers were reported affected by net necrosis in the Northern district, P.E.I. Some strains of Green

Mountain in the Laboratory plots, Charlottetown, P.E.I., showed up to 75% of the tubers affected. (R.R. Hurst)

INTERNAL DISCOLORATION. Some 7% of the tubers in a field of the Irish Cobbler in Colchester county, N.S., were affected. Laboratory tests suggested the trouble was physiological. Weeds and wild grasses formed only a scanty cover on the field the previous year. (W.K. McCulloch)

INTERNAL BROWN SPOT (cause unknown) is prevalent in potatoes in many areas in B.C., especially in the Fraser valley. Frequently the trouble is confined to tubers from certain parts of a field, while those from other parts of the same field are normal. Its greater prevalence this year is believed to be due to the soil being much drier during the growing season than usual. This defect is very objectionable when the tubers are for table use. (H.S.MacLeod)

INTERNAL SOFT ROT (Fusarium ?radicicola). On several occasions a slimy soft internal rot has been found in B.C., although they look sound or only slightly affected on the outside. This season a few tubers were received from Smithers, and sent to Mr. J.W. Eastham. He states this condition is fairly common in the Interior and generally associated with immaturity of the tubers at digging time. The fungus apparently enters through wounds, followed by secondary bacterial saprophytes. (H.S. MacLeod)

DEEP STEM-END BROWNING (cause unknown) was found to affect up to 15% of the tubers in some lots in Queens county, P.E.I. It was also reported from Souris, St. Peters, and Freetown, (R.R.Hurst)

HOLLOW HEART (Non-parasitic) was more prevalent in the 1938 crop in B.C. than in that of the previous year. In some carloads from the Interior 20% of the tubers were affected. Ten per cent of the tubers showed hollow heart in one field in P.E.I.

TIP BURN (?leaf hoppers) was severe in many districts of Que. and caused the death of many plants and a reduction in yields.

BLACK HEART (Non-parasitic) affected 75% of the tubers in a few bags of Katahdin, which had been under water for several days at Merrickville, Ont.

FROST INJURY was very small in P.E.I. in 1938, but one bag from Prince county showed 75% of tubers injured. (R.R. Hurst)

FLEA BEETLE INJURY was reported once in P.E.I.

SKIN SPOT (Oospora pustulans). Traces were found in Irish Cobbler on the market at Charlottetown, P.E.I.

ROOT KNOT (Heterodera marioni). About 60% of the tubers in storage from a ½-acre field of Early St. George at Sooke, B.C., were affected. Volunteer plants in the spring were also diseased. It is considered that the eelworm was carried to the field on tomato plants from an infested greenhouse. (W.R. Foster)

STEM ROT (Sclerotinia sclerotiorum). One plant was slightly infected at Edmonton, Alta. (G.B. Sanford)

JELLY-END ROT (Fusarium sp.) was found in shipments from the Interior of B.C. this year, mostly from areas where potatoes are grown under irrigation. The loss was about 1%.

LEAK (Pythium sp.) was prevalent in the August-September shipments from the Ashcroft and Kamloops districts, B.C.

Leak and Soft Rot separately or in combination were present in about 10% of the bins inspected in Man. Infection ranged from a trace to 10%. These diseases were also present in many lots of table stock. (J.W. Scannell)

SPINDLING SPROUT (cause unknown) occurs commonly in P.E.I. Infection ranged from 0.5 to 12% in several varieties. (R.R. Hurst)

SEED-PIECE DECAY affected 75% of the sets in 15 fields. The trouble appears when sets are planted directly from a cool storage. If the sets are held for a time in a warm place before planting, the trouble is corrected. (R.R. Hurst)

MAGNESIUM DEFICIENCY severely affected half the plants in a field in Kings county, P.E.I.

POTASH DEFICIENCY was severe in one field of Irish Cobbler at Murray River, P.E.I.

LIGHTNING INJURY was reported to have severely affected Irish Cobbler plants in an area 50 feet square in a field in P.E.I.

PUMPKIN

POWDERY MILDEW (Erysiphe Cichoracearum) caused a little damage to pumpkins at the Ste. Anne de la Pocatiere Station, Que., although the vines became infected late.

RADISH

CLUB ROOT (Plasmodiophora Brassicae). A few diseased plants were found at several places in Laval county, Que. (E. Lavallee). Only a few radish plants were affected in a garden, where half the other crucifers were destroyed, at Kentville, N.S. (J.A. Boyle)

WHITE RUST (Cystopus candidus) was severe in a field at Winnipeg, Man.

BLACK ROOT (Aphanomyces Raphani Kendrick). About 2% of the plants were affected and rendered unsalable at Macdonald College, Que. (I.H. Crowell). This disease has not been previously reported in Canada.

RHUBARB

CROWN ROT (unknown) destroyed several plants in the University gardens, Saskatoon, Sask.

A crown rot (?bacterial origin) was reported from Birds Hill and Middlechurch, Man. Infection was moderate.

STREAK (probably virus) caused slight damage in the University garden, Saskatoon, Sask.

LEAF SPOT (Phyllosticta straminella) caused severe infection at Middlechurch, Man.

GREY MOULD (Botrytis sp.). Some of the growers of forcing rhubarb near Islington, Ont., lost a large percentage of their crop because the leaves became disfigured by a Botrytis sp., which developed very rapidly owing to the high temperature and excess moisture of the forcing house. (J.E. Howitt)

SALSIFY

WHITE RUST (Cystopus cubicus) moderately infected 2 fields in Jacques Cartier county, Que. (E. Lavallee)

SPINACH

DOWNY MILDEW (Peronospora Spinaciae) caused serious damage to spinach being grown for canning purposes at Vancouver, B.C. (J.W.

Eastham). It was general in a field at Port Dalhousie, Ont., on May 18, and it was reported affecting a fall crop on September 21, near Vineland. (D.L. Bailey)

WILT (Fusarium sp.) was destructive on all varieties of spinach at Grand Forks, B.C. Infection varied from 10-100% depending on location. It appeared to be less destructive at the higher elevations, where lower soil temperatures may be the deciding factor. (G.E. Woolliams)

MOSAIC (virus). Diseased plants were received in November from the London district, Ont. (G.H. Berkeley). Two plants in a garden at Charlottetown, P.E.I., were affected.

SQUASH

STORAGE ROT (Alternaria sp. and Fusarium Scirpi var. acuminatum). A rot was found on the Winnipeg Market during the winter months of 1936-37, and again during 1937-38. Isolations and inoculations each year showed Alternaria sp. to be the primary cause and the Fusarium, a contributory cause. The Alternaria "pitted" the fruit, which later cracked, allowing entrance of the Fusarium. The latter produced a slow dry rot when inoculated alone through wounds. (W.L. Gordon)

SWEET CORN

SMUT (Ustilago Zeae). A trace to slight damage occurred in gardens at Saskatoon, Sask. A trace to 2% of the plants of the garden varieties were also smutty at Indian Head. Smut was severe and destructive in 7 out of the 8 gardens examined in Man. Gills Golden, Early Market, and Pickaninny were the varieties most severely affected at Brandon. Traces of smut were found in many plantings in Laval and Jacques Cartier counties, Que.; 2 ears were found in a 2-acre field in Kamouraska county. Traces of smut were present in plantings in Charlotte, Saint John, Carleton, and York counties, N.B. The disease was more widespread than usual, but the damage was slight. (J.L. Howatt)

RUST (Puccinia Sorghi). Traces were present at Indian Head, Sask. Rust was present in all 8 fields examined in Man. as follows: severe in 2, moderate in 2, slight in 3, trace in one. Rust was unusually heavy this season on the sweet corn hybrids at the Vineland Station, Ont., although it occurs each year (D.L. Bailey). Rust was found in a garden planting at Kentville, N.S. Rust infection was a trace to heavy in Queens county, P.E.I.

TOBACCO

The "Tobacco Disease Survey, 1938" which is presented below was prepared by Dr. G.H. Berkeley from notes gathered by himself or supplied to him by Dr. N.T. Nelson, Ottawa, Ont.; Mr. P.G. Newell, St. Catharines; Dr. L.W. Koch and Mr. P.J. Haslam, Harrow, Ont.; Mr. F.A. Stinson, Delhi, Ont; Mr. R.J. Stallwood, Tillsonsburg, Ont.; Mr. G.E. Turcotte, L'Assomption, Que., and Mr. R. Bordeleau, Farnham, Que.

MOSAIC (virus) was about as widely distributed as last year in Ont., except in the old belt, where it was less prevalent. In the new belt, the average infection was estimated at 3.5-5%. In the northern district in Quebec the average infection on flue-cured was slightly above 2%, while on the air-cured types it was not above 1%. In the southern district in Quebec, the average infection was estimated at 2-5%. In all districts, however, individual fields were observed where the infection ranged from 50-75%. As in the past seasons, so again this year, mosaic was more general and severe in fields which were cropped to tobacco the previous year.

RING SPOT (virus) was common in both Essex and Kent counties, particularly on burley tobacco. Two cases of ring spot were observed in the new belt on flue-cured tobacco.

A VIRUS DISEASE NEW TO ONTARIO. An unusual diseased condition of tobacco plants was reported from the old belt in Ontario, (L.W. Koch) and what appears to be the same disease, was observed in experimental plots at St. Catharines in 1937 as well as 1938, (P.G. Newell). In the old belt the disease was limited almost entirely to the Kelley variety, whereas it was observed on yellow mammoth at St. Catharines. In two fields near Blenheim and Woodslee, Dr. Koch reports that "60% and 40% of the plants, respectively, were affected". The outstanding symptoms are necrosis of the stem tissue, fine dot and line necrosis of leaf tissue, with distortion of the top of the plant. Innoculation tests carried out at St. Catharines, indicate that this is a virus disease, (G.H. Berkeley). It has been successfully transferred to tobacco, N. rustica, N. glutinosa and tomato by patch grafting, and to N. rustica and tobacco by means of juice transfer. The sumptoms of this "new" disease are in some respects similar to those associated with "tobacco streak", as described by James Johnson, or "crooked top", as it occurs in Brazil. There are also some points of similarity between this new disease and "spotted wilt", though the symptoms it produces on tomato under

our conditions, are quite different from those associated with "spotted wilt". Under green-house conditions the symptoms observed to date, take the form mainly of top necrosis, affecting either foliage or stem or both.

BLACK ROOT ROT (Thielaviopsis basicola) caused more damage than any other disease in the old belt in Ont. in 1938. While damage was most severe in fields where tobacco followed tobacco, some was also found in longer rotations. A few fields in the vicinity of Woodslee and Essex were ploughed under because of root rot infection. In comparison, black root rot was unimportant in the new belt since only a few mild infections were observed. In the northern district in Quebec, black root rot was more general than in 1937, when it was conspicuous by its absence. Root rot developed on old tobacco soils early in June, but because of favourable growing conditions later in the season, much of the infected tobacco recovered, so that by the end of the season the damage was not important. In the southern Quebec district black root rot was prevalent at the beginning of the season in poorly drained areas, but its progress was also checked by favourable growing conditions later in the season.

BROWN ROOT ROT (non-parasitic) was again prevalent in the old belt of Ontario but was less severe than in 1937. Fourteen out of thirty-seven cases observed occurred where tobacco followed either a crop of corn or corn added with the manure. Tobacco was not harvested from some fields because of this disease. Harrow Velvet and Yellow Mammoth again manifested a high degree of susceptibility. In the new belt brown root rot was found in only a few fields, and infection was mild in all but two cases. In Quebec brown root rot was not observed or reported.

FRENCHING (non-parasitic) was unusually prevalent in the new belt of Ontario this season. A survey indicated that this disease was widespread, with 22% of the fields visited containing frenching, which varied from a trace to one case where 100% of the plants were affected with a severe type which rendered the plants useless. Though the most general type of frenching was confined to the tip leaves and suckers, nevertheless, numerous cases were observed where the plants were severely stunted and distorted. In the old belt of Ontario several cases of frenching were observed, but the symptoms largely disappeared by the time the plants were harvested. In the two districts of Quebec only a few cases of frenching were observed.

LEAF SPOTS (non-parasitic) were prevalent in the new belt in Ontario, ranging from a trace to severe spotting of the lower four

or five leaves. In the old belt and the two districts in Quebec, non-parasitic leaf spots were scarce and unimportant.

ANGULAR LEAF SPOT (Phytomonas angulata) was observed in a few fields in the new belt of Ontario, but infection was mild. Late infections also occurred in the two districts in Quebec, but no appreciable damage resulted. In the old belt in Ontario, angular leaf spot was more prevalent than last year, but caused little damage.

WILDFIRE (Phytomonas Tabacum) was not observed or reported in 1938.

HOLLOW STALK (?Erwinia carotovora) was observed both in Quebec and Ontario though in only a few fields. It was of no importance.

LIGHTNING INJURY was observed in both the old and new districts of Ontario.

HAIL DAMAGE was more widely distributed than in 1937. The damage caused by one storm was estimated at $250,000.

MINERAL DEFICIENCIES. Potash and magnesium deficiencies were noticed in many fields, particularly in the new belt.

Diseases of the Seedbed

DAMPING-OFF (Rhizoctonia and Pythium) was the most common disease encountered in the seedbed. In the majority of cases, damage was limited to small patches of a bed, and satisfactory control was obtained by adequate ventilation and care in watering. In a few cases, however, damping-off was responsible for considerable loss of stand. In the old belt this disease was responsible for considerable thinning out of the seedlings in the early stages of germination. Damping-off, though commonly found in both the tobacco growing districts of Quebec, did not cause a great deal of damage.

YELLOW PATCH (cause undetermined), a condition, the cause of which has not yet been definitely ascertained, was the most important seedbed trouble in both the old and new belts in Ontario. Though Yellow Patch was widespread and considerable loss of seedlings was observed in individual cases, its gross effect on seedling production for the district as a whole, was comparatively unimportant. Only a few cases of yellow patch were observed in Quebec.

DOWNY MILDEW or BLUE MOULD (Peronospora tabacina Adam) was reported for the first time in Canada, when it was found in the old belt in Ontario by Dr. L.W. Koch. It was observed in eight seedbeds and in four fields. The seedlings in the infected seedbeds were destroyed.

BLACK ROOT-ROT (Thielaviopsis basicola) was possibly the most troublesome disease in seedbeds in Quebec, and though present, it was of no particular consequence in the old belt in Ontario. One case of black root-rot in the seedbed was observed in the new belt.

BLACK LEG (?Erwinia Aroideae) caused some damage in seedbeds at the transplanting season in the old belt.

In addition to the report on tobacco diseases covering the tobacco areas in Ontario and Quebec, a report on a special survey in the New Belt of Ontario made by Dr. Berkeley, Mr. Stallwood and Mr. Newell is presented below.

Special Survey of Tobacco Diseases in Norfolk, Elgin, and Oxford Counties, 1938

G.H. Berkeley, R.J. Stallwood, and P.G. Newell

This year an attempt was made to ascertain the prevalence of disease in the seedbed and in the field. Seedbeds on 137 farms were carefully inspected and the prevalence of disease estimated. In the field survey 100 fields were carefully inspected and percentage counts were made in four or more sections of each field. It should be pointed out that the fields were not specially selected, but were taken in order as we drove through the different sections of the new belt. The area covered extended from Tillsonburg westward to south and west of St. Thomas, and from Tillsonburg eastward through the Teeterville and Windham sections, then to the Delhi and Simcoe districts and finally south and west of Delhi to Houghton and Bayham townships. Thus a fairly comprehensive survey was made.

Seedbed Survey

DAMPING-OFF, due mainly to Rhizoctonia sp. and to some extent to Pythium sp., was the most prevalent seedbed disease occurring on 44.5% of the farms visited, but was of importance on less than 10%. Usually the disease was limited to small patches in the beds and satisfactory control was obtained by adequate ventilation and care in

watering. However, on 3 farms, the disease was general in the bed, so that the grower had to purchase plants to meet his own needs.

YELLOW PATCH. The stunting and yellowing of seedlings in patches, or generally throughout the bed, caused loss of plants in 26% of the beds inspected. Plant beds so affected could be divided according to the complete symptomatological picture of the diseased plants into three classes.

1. In many cases the root systems showed a brown discoloration, similar to that of the brown root-rot disease. An abundance of adventitious roots from the hypocotyledonary area were being formed, and were being similarly affected. Factors which appeared to have some significance in the production of this type of retardation of growth and chlorosis, were: (a) Poor drainage and too compact a condition of the muck. (b) Mixing quantities of cow, pig, or sheep manure in with the muck before seeding. (c) Heavy applications of sheep manure or liquid cow manure shortly after the seed had germinated.

2. In certain other beds, though the foliage of the plants was yellowed, the root systems were well developed. However, dark brown lesions on the roots and lower hypocotyl were in evidence. Microscopic examination of the lesioned tissues revealed the presence of fungus mycelium and nematodes. Weeds were generally quite prevalent in these beds, and in most cases it was evident that the soil had been poorly steamed.

3. Several other beds were inspected in which the yellowed and stunted plants had well-developed, normal white roots in which no parasitic organisms could be observed.

The abnormal growth of plants in a particular bed, apparently as a result of a previous application of weed-killer (sodium chlorate), was of special interest. The grower had been troubled for the past few years by bindweed, Convolvulus sp., which he was unable to kill by steaming. In the fall he had removed the soil to a depth of eighteen inches, applied the weed-killer and put in fresh soil. The seedlings growing in this soil were stunted and had an upright type of growth. Their leaves had a pale whitish cast and were unusually hairy, reminding one of mullein leaves. The root systems of the plants appeared to be normal. An analysis of the seedbed muck showed a chlorine content of 150 p.p.m. which could be highly toxic to the plants. However, these plants did not show symptoms of excess of chlorine. Plants from this bed were later transplanted to the field, outgrew the condition, and produced a good crop of tobacco.

Out of 137 beds examined, damping off, yellow patch, or both, were found in 61 beds or 44.5%. Therefore, it is of interest to note that the 61 affected beds, 24 had received sheep manure or manure in some form after steaming, while only 14 received no manure after steaming. For the other 23 affected beds no information on their manurial treatment was obtained.[1]

MOSAIC (virus). One case of mosaic infection was observed in a bed where the workmen had been smoking.

Field Survey

MOSAIC (virus) was found in 57% of the fields visited, and infection ranged in the diseased fields from a trace to 56%. From Table 6 it can be readily seen that the incidence of mosaic was greatly influenced by crop rotation.

Table 6 - Incidence of mosaic as influenced by crop rotation.

Rotation	Mosaic		Total	Amount of mosaic in affected fields	
	Present	Absent		Highest	Average
	fields	fields	fields	%	%
Tobacco after tobacco	31	2	33	56	5.9
Tobacco after other crops	11	29	40	14	1.1
Unknown	15	12	27	10.7	1.0
	57	43	100		3.5

[1] The Author's observations appear to bear out the recommendation of the Standing Committee on Fertilizers that if 125 lb. of 2-10-8 tobacco fertilizer to 1,000 sq. feet of bed is mixed with the muck before seeding, no additional fertilizers or manures are usually required. (Tobacco Fertilizer Recommendations for 1939, prepared Dec. 7, 1938). However, no mention of the manurial treatment of healthy beds is made, so a real comparison between manure vs. no manure is impossible. - I.L.C.

Mosaic is not only present in more fields where tobacco follows tobacco than where it follows other crops, but the percentage of affected plants is often very much higher. The average infection in the 100 fields examined was 2.1%.

NON-PARASITIC LEAF SPOT. A small brown spotting, which later may turn white was observed in 44% of the fields visited. Spotting ranged from a trace to general and severe with the loss of from four to five lower leaves. In seven fields white speck was present on every plant, being very severe on the lower leaves. In eight additional fields, though infection was general, it was of a milder type. It was observed that frenching and white speck often occurred in the same field. White speck caused appreciable loss in many fields.

FRENCHING. This disease was unusually prevalent throughout the new belt with 22% of all fields visited containing it. In most fields the percentage was low, though infection ranged from a trace to 100%. Though the top leaf and sucker type of frenching was most general, numerous cases were observed where the plants were severely stunted and distorted. The records of a few specific cases may be of interest. In field A, frenching was so severe that only a few leaves were harvested. In field B, frenching was confined in the lighter higher areas, in which 60% of the plants were affected. In field C frenching occurred on a high knoll only, whereas in field D it was confined to the lower section of the field. In two other fields frenching occurred mainly on the lower areas. These and other observations would suggest that frenching may occur on either high or low areas of a field. Frenching was of economic importance in 1938.

ROOT ROTS. Eleven per cent of the fields visited were mildly affected with root rots. With two exceptions, there were no instances in 1938 where root rots caused severe stunting over widespread areas. In one case, brown root rot was responsible for the loss of one quarter of a five acre field, while in a 3-acre field near Vienna, brown root rot was general and severe. In five additional fields brown root rot occurred in comparatively limited areas. In one instance it was localized to that part of the field which had been planted to corn the previous season, while in another case a mild attack of brown root rot occurred on land planted to timothy in 1937.

In 5 fields black root rot was confined to small, low areas. In another field 12 adjacent rows were observed which were evidently recovering from a severe attack of black root rot.

ANGULAR LEAF SPOT (Phytomonas angulata). Only a few mild cases of this bacterial disease were observed.

UNEVEN RIPENING. This condition was observed as early as July, and became widespread throughout the flue-cured district by harvest time. Areas in the leaf remained in a green, active condition, while the rest of the leaf matured normally. These green areas had no definite shape, were variable in size, and appeared anywhere on the leaf. In the first curings of affected leaves, the green areas remained green or greenish brown, while in later curings the green areas sometimes seemed to cure normally, like the remainder of the leaf. No particular sets of conditions appeared to be conducive to the development of this disorder, though it was observed that it occurred independent of fertilizer treatments.

In addition to the above diseases, several cases of ring spot, sore shin, potash and magnesium deficiencies were encountered.

At the Central Experimental Farm, Ottawa, Ont., Mr. E.T. McEvoy reported the occurrence of the following diseases.

BLACK ROOT ROT occurred in a few poorly-drained areas planted to susceptible varieties; however, a partial recovery was noted and the loss of yield was not great. It was about as severe as in 1937.

MOSAIC was quite general but not severe, the infection ranging from 1-2%, which was about half what it was in 1937.

JOHN WILLIAMS LEAF SPOT (cause unknown) was present to a moderate degree only on broadleaf varieties.

TOMATO

BLOSSOM-END ROT (non-parasitic) caused slight damage in a market garden at Medicine Hat, Alta. It was moderate in gardens at Saskatoon, Sask. The disease was very severe on Best of All in East St. Paul, Man. It affected 30% of the fruit in a planting in Lincoln county, Ont.

Blossom-end rot was often observed in the Montreal district, Que., but it was not generally serious. However, at Ste. Julie on a gray sandy soil, losses ranged from 5 to 10% (E. Lavallee). Only a trace was seen at Kentville, N.S., where heavy rains supplied abundant moisture. The trouble was seen or reported from several points in P.E.I.

MOSAIC (virus). Mosaic and streak was less prevalent on Vancouver island, B.C., than in past years due, it is believed, to more growers now steaming their soil (W.R. Foster). The disease was severe in one greenhouse at Edmonton and another at Medicine Hat, Alta. Fern-Leaf Mosaic affected 5 and 25% of the plants, respectively, in two greenhouses at Medicine Hat. Mosaic was moderate at the Indian Head Station, Sask., and a trace was recorded in a planting at Fort Garry, Man. While damage from mosaic was, in general, slight in Essex and Kent counties, Ont., 50-80% of the plants were affected and resulted in appreciable loss in several plantings in the Leamington district (L.W. Koch). Mosaic was prevalent and causing the plants to be stunted in a fall greenhouse planting near Byron. The variety was unknown, but was supposedly resistant to Cladosporium. Mosaic was observed in other greenhouse and field crops, but the damage was slight (G.C. Chamberlain). About 20% of the plants were affected with mosaic in two gardens at St. Thomas de Joliette, Que. About 50% of the plants were affected in a garden at Charlottetown, P.E.I., but damage was not apparent.

STREAK (virus) affected 25% and 50% of the plants, respectively in two greenhouses in Lincoln county, Ont.; it was causing severe necrosis and loss in growth. (G.C. Chamberlain)

SPOTTED WILT (virus) caused slight to severe losses in greenhouses at Medicine Hat and Lethbridge, Alta. It was also found in gardens at Edmonton and Lethbridge. Mr. W.H. Fairfield, Superintendent of the Lethbridge Station, stated that disease was quite serious there this year. It was also observed in the field near Montreal, Que., and diseased fruit were received from a grower in Toronto, Ont., who stated the trouble had been serious for several years. (H.N. Racicot)

YELLOWS (virus) affected 25% of the plants in an isolated block of plants at the Summerland Station.

LEAF MOULD (Cladosporium fulvum) was prevalent in many greenhouses about Victoria, B.C., and on the mainland. It caused slight to moderate damage. Weekly sulphur vaporization beginning about three weeks before the disease normally appears has proved effective with one large grower at Victoria. Leaf mould infection was slight on greenhouse tomatoes at Edmonton, Alta., moderate at St. Norbert, Man., and severe at St. Vital. The disease became quite general in the field in Essex and Kent counties, Ont., in September and resulted in considerable defoliation (L.W. Koch). Leaf mould caused noticeable damage to several plantings at Ste.

Anne de Bellevue, Que. The disease was severe in commercial greenhouses at Dartmouth, N.S., and caused 25% damage. It was present, but to a lesser extent, in greenhouses in Halifax and Falmouth (J.F. Hockey). Leaf mould was present to some extent in gardens in Charlottetown, P.E.I.

EARLY BLIGHT (Alternaria Solani) was moderate in East St. Paul, Man., and severe on the lower leaves in gardens in Fort Garry. The disease was prevalent but not serious on some varieties in a planting in Northumberland county, Ont., while John Baer and Chalks Jewel were relatively free. It was reported to have caused severe loss for several years by a grower at Sudbury. It was severe on some varieties at Ste. Anne de la Pocatiere, Que., while other varieties were slightly infected or clean. Early blight caused severe defoliation in a garden at Kentville, N.S.; the fruit ripened unevenly and were of poor quality. The disease was rather heavy and caused some injury to the fruit in gardens at Charlottetown, P.E.I.

LATE BLIGHT (Phytophthora infestans) was severe in several gardens at Charlottetown, P.E.I.

SEPTORIA LEAF SPOT (S. Lycopersici) was slight at Morden, Man. The disease occurred in epidemic proportions in the Leamington district, Ont., again this year. The damage was usually not as severe as in 1937, because infection came later in the season (L.W. Koch). At the Vineland Experiment Station this leaf spot was particularly widespread and destructive this year as compared with recent years (D.L. Bailey). The disease was severe in a home garden in Huntingdon county, Que. (E. Lavallee)

VERTICILLIUM WILT (V. sp.) was present in 50% of the greenhouses in the Victoria district, B.C.; the maximum damage in any establishment was 5%. (W.R. Foster)

FUSARIUM WILT was reported as severe at Melita, Man., on June 27. Isolations from the diseased plants yielded a Fusarium sp. (Elegans section), but doubtfully F. Lycopersici. Wilt also occurred in a few plants in St. Vital, but the cause was undetermined. (W.L. Gordon)

DAMPING OFF and ROOT ROT. A root rot of seedlings, sometimes accompanied by damping off, became quite severe in Essex and Kent counties, Ont., when the plants were 6-8 inches high. The roots were found in most cases to be filled with bacteria. Rhizoctonia Solani was present and caused damage in some instances. (L.W.Koch)

Damping off caused slight damage in two greenhouses during periods of dull weather this spring in Lincoln county, Ont. (G.C. Chamberlain). The cause in the one greenhouse was attributed to Pythium and in the second to Rhizoctonia.

GREY MOULD (Botrytis sp.). Specimens of a stem rot were received from the Ridgetown Farm, Ont. (G.C. Chamberlain)

NAILHEAD (Macrosporium tomato) was not generally severe this year in Essex and Kent counties, Ont., although a moderate loss was observed or reported in a number of individual cases. (L.W. Koch)

ANTHRACNOSE (Colletotrichum phomoides) became epidemic in Essex and Kent counties, Ont., and all the canning companies refused numerous loads of tomatoes on account of the fruit being severely infected. Growers reported individual losses as high as $1,000. (L.W. Koch)

BACTERIAL CANKER (Phytomonas michiganensis) was reported by Mr. H.H. Evans, Provincial Field Inspector, as severe on Earliana in a field at Vernon, B.C., while no disease was seen on John Baer, which was growing adjacent to the Earliana in the same field. However, a slight infection was seen on John Baer at Osoyoos. (G.E. Woolliams)

BACTERIAL SPOT (Phytomonas vesicatoria). A mild infection was observed in numerous plantings towards the end of the early crop in Essex and Kent counties, Ont. Only one instance was reported, where the grower complained of inability to market his crop due to the disease (L.W. Koch). Bacterial spot heavily infected a 5-acre field at St. Cesaire, Que. The grower estimated the loss at 50% of the crop. The disease was identified by Dr. G.H. Berkeley. This is the first of its occurrence in Quebec. (E. Lavallee)

OEDEMA (non-parasitic) was general on seedling plants at Brampton, Ont., and caused some checking of the growth. (G.C. Chamberlain)

BLOTCHY RIPENING (non-parasitic) was observed in the Victoria district, B.C. Blotchy, light-coloured areas occur on the fruits, which reduces their market value (W.R. Foster). The trouble has been observed in both field and greenhouse tomatoes in Lincoln county, Ont. The fruits ripen unevenly with the immature areas varying in size up to 40-50% of the entire fruit. These areas have

a glossy appearance and are quite distinctly pitted. It is thought that it is similar to the trouble described in England (W.F. Bewley and H.L. White. Ann. Appl. Biol. 13:323-338, pl. 6, 1923). Its physiological nature is still being investigated. (H.L. White. Ann. Appl. Biol. 25:544-557. 1938). (G.C. Chamberlain)

POTASH HUNGER (non-parasitic). Specimens from a field at St. Laurent showed definite symptoms of the lack of potash. The loss was said to be considerable. (F. Godbout)

LIGHTNING INJURY. About 20 plants in a small area were variously affected in a field in Haldimand county, Ont.

TURNIP

CLUB ROOT (Plasmodiophora Brassicae) is widespread and destructive in N.B. The so-called resistant varieties, Wilhelmsburger and Bangholm, differ widely in their behaviour to club root from field to field, varying from complete resistance to complete susceptibility. (J.L. Howatt)

Conditions were particularly favourable for club root development in P.E.I. in 1938. On the club root area at the Experimental Station, Charlottetown, most of the susceptible varieties were killed in the seedling stage or shortly after, while resistant varieties such as Bangholm and Wilhelmsburger showed considerable club root infection. Heavy precipitation, no doubt, favoured increased infection. Traces of club root were found in the brown heart plots on an elevated area at York, where turnips had not been planted for 9 years. (G.W. Ayers)

BROWN HEART (non-parasitic) was fairly general on one farm at Campbell River, B.C. It affected 10-75% of the roots of several varieties at Macdonald College, Que. Despite the ease of control of brown heart by borax applications, this disorder is still commonly seen in N.B., where most of the soils appear low in boron. In general only growers of turnips for table use practice control. Almost complete control of brown heart was obtained by the use of boron at the Kentville Station, N.S.

BORAX INJURY was severe at one end of a field in Prince county, P.E.I., where the farmer reported that he had "thrown on" an extra amount of borax to finish out a few rows.

BLACK LEG (Phoma lingam) caused severe damage to Swedes in storage at Macdonald College, Que. (J.G. Coulson). It is also causing heavy losses along La Riviere des Prairies on Montreal island, some farmers losing between 2,000 and 4,000 bags each in the fall of 1937. The seed was sown in beds and the young plants transplanted to the field. When the seeds were sown directly in the field, the rot appears later. Usually at harvest time, only small soft spots are visible on the upper half of the root (F.S. Thatcher). Black leg appeared to be widespread in P.E.I. as a result of counts made in September and October. It caused severe damage in many cases. The average infection of all fields examined was Ditmar, 1.0%; Bangholm, 1.5%; and Wilhelmsburger, 3.1%. The variety Laurentian may be resistant, for it was clean when it was sown in a field beside Ditmar, which was showing 20% of roots affected in localized areas. (R.R. Hurst and G.W. Ayers)

COMMON SCAB (Actinomyces scabies). Traces were seen in an acre block at the Charlottetown Station, P.E.I.

SOFT ROT (Erwinia carotovora). A trace of soft rot developed in a carload of turnips, which had been waxed in York county, N.B. (J.L. Howatt). Soft rot was noticeable in the plots receiving no boron treatment at the Kentville Station, N.S. Soft rot was reported to have caused the loss of 50% of the crop in fields in Cape Breton (K.A. Harrison). Soft rot destroyed 29% of the roots growing in a very rich, excessively manured soil in a field near Charlottetown, P.E.I. The organism gained entrance through growth cracks (G.W. Ayers). It also followed black leg and destroyed 3% of the roots in a bin in March in Queens county.

LEAF SPOT (Cercosporella albomaculans). Specimens of the disease were brought in by Mr. Whiteside from Victoria Harbour, Ont. (F.S. Thatcher). A slight infection was observed at the Cap Rouge Station, Que. (C. Perrault)

VEGETABLE MARROW

WILT. Odd plants affected by wilt were found at Brandon, Man. Fusarium spp. were isolated. (W.L. Gordon)

WATERMELON

WILT (Fusarium spp.). Several varieties of watermelon were severely wilted at the Lethbridge Station, Alta.

FRUIT ROT (Pythium sp. and Fusarium Scirpi) was rather common at Morden, Man., due to previous hail damage. A Pythium was isolated which was capable of producing a rapid decay on inoculation. Fusarium Scirpi was also isolated, but it produced a slower decay. (W.L. Gordon)

LEAF SPOT (Cladosporium cucumerinum). A 5-acre field of watermelons in Lincoln county, Ont., was so severely affected by leaf spot that the vines were entirely withered and killed on August 25. The crop will be a total loss. (J.K. Richardson)

SCLEROTIAL ROT (Sclerotinia sclerotiorum) destroyed a single fruit in a garden at Kentville, N.S. (J.A. Boyle)

IV. DISEASES OF FRUIT CROPS

APPLE

SCAB (Venturia inaequalis) was fairly general at the Sidney Station, B.C., but the damage was slight (W. Jones). Owing to an exceptionally dry spring and summer, practically no apple scab developed in the Salmon Arm, Vernon, and Lavington districts. Less than 5% of the fruit were scabby in the unsprayed check trees in the spray plots at Salmon Arm, and no scabby fruit were found on any of the trees sprayed with lime sulphur or colloidal sulphur. At Lavington no scab was found on the fruits of the unsprayed trees, where normally 75% of the fruit of the check trees would be scabby (G.E. Woolloams). Scab was severe on some trees at the Morden Station, Man.

Weather conditions were favourable for primary infection, particularly between the pre-pink and calyx stages in Lincoln county, Ont. Primary ascospore discharge began on April 9, and primary infection began to show on May 27. Secondary foliage infection was apparent on June 7. In the Laboratory orchard, St. Catharines there was very little further development of apple scab, except on late terminal growth. Scab was of very minor importance on the fruit of the sprayed trees. Percentage of scabby fruit on the unsprayed and sprayed trees was as follows: Melba, unsprayed 41%, sprayed, trace; Joyce, 20%, trace; Hume, 19%, trace; Cortland, 19%, 1.5%; Fameuse, 12%, 1.5%; Delicious, 24%, none; Baldwin, 7.0%, none; Greening, 9%, trace; McIntosh, 42%, 1%. In a number of neighbouring orchards scab was a serious factor and the cause of considerable loss, due to delay in the application of the critical pre-pink and pink sprays (G.C. Chamberlain). Scab was very prevalent on unsprayed trees of McIntosh and Fameuse. About Guelph, 50-60% of the fruit were affacted on unsprayed McIntosh trees (J.E. Howitt). Storage scab was severe on Baldwin fruit received on March 19, 1938 from Burlington, Ont. (G.C. Chamberlain).

In western Quebec there was much less scab on the apple crop than in 1937. Ancospore discharge was considerable and moisture was not lacking, but the prevailing high temperatures during the early part of the season appeared detrimental. In general primary infection was abundant, but most of the lesions failed to survive the hot weather. The first spots also were more easily burned by lime sulphur under these conditions (F. Godbout). In eastern Quebec, ascospore discharge began on

May 17, although the spores were mature on April 12. Spore discharge occurred on rather few occasions, but continued until July 4. Scab infection was first noted on July 11 in the Experimental orchard, Ste. Anne de la Pocatiere. Among the commercial varieties, the most susceptible were North Star, Baldwin, Shiawassee, McIntosh, Wealthy, Fameuse, and Alexander. On the other hand Keetosh and Northwest Greening showed traces and Golden Russet was clean. Scab is fairly general throughout the district and difficult to control even with frequent sprayings. At the Cap Rouge Station lime sulphur and lime sulphur-iron sulphate spray gave excellent control of apple scab, while in the check, 85% of the fruit was scabby.

Ascospores were mature on April 20, at Fredericton, N.B.; ascopore discharge began on May 12 and ended on June 23. The first infection was found on June 2. Apple scab was severe on the foliage of unsprayed trees. Severe late scab developed on the fruit in September and November. (S.F. Clarkson)

The first ascospore discharge occurred in favourable locations at Kentville, N.S. on April 21. The first heavy liberation occurred during the period May 14-17, with subsequent moderate discharges on May 28, June 6, and June 12. The final discharge occurred on June 20, at which date the perithecia were found to be empty. The first conidial infection was observed on May 26, and by June 17, when observations were made on foliage scab in the spray plots, 45% of the foliage was affected on some unsprayed trees. Less than 1% foliage infection was present on trees sprayed with the standard spray materials.

An intensive extension programme by means of press and radio bulletins throughout the Annapolis valley was carried on urging frequent spray applications. In spite of much adverse weather in the latter part of the spraying season, splendid control of scab was obtained. Many orchards reported that the percentage of fruit of No. 1 grade was the highest in many years. Unsprayed fruit was worthless from scab alone. The autumn season was favourable for the normal defoliation of the trees and hence the early conditions have been good for perithecial initiation. (J.F. Hockey).

Scab infection was much less in P.E.I. this year than in the previous season. No ascopores were discharged till after the blossoming period, due to the very dry weather during June. Scab did nto cause trouble to any extent in the

Charlottetown district, where the trees were sprayed. Orchards that were not sprayed developed considerable scab towards the end of the season for July and August were very wet. Growers complained of some spread of scab in storage A warm open fall probably favoured its development in storage. (G.W. Ayers)

FIRE BLIGHT (Erwinia amylovora). Practically no fire blight developed this year in the Okanagan valley, B.C. A slight infection was observed on apple at Shoal Lake, Man., near Lake of the Woods. Twig blight was slight in an orchard of Greening and McIntosh in Lincoln county, Ont. The inoculum apparently came from a bordering woodlet, where blight was heavy on many wild hawthorns. The disease has also spread in to neighbouring pear trees (G.C. Chamberlain). Fire blight specimens were received from Milford Bay, Toronto, and Chesterville (H.N. Racicot). Fire blight infection was more prevalent and severe on the Island of Montreal and vicinity this year than last. Several mountain ash trees were also affected, especially in Outremont and Cote des Neiges (F. Godbout). Besides heavy damage to apple at Ste. Anne de Bellevue, many ornamental plants were also severely injured or killed outright. (I.H. Crowell)

Fire blight was found affecting 10% of the Wagner trees in one nursery in N.S. A trace was also found on McIntosh, Cortland, Delicious, and Gravenstein. The organism isolated from material from several points in Annapolis and Kings counties produced a rot on inoculation into green pears. (J.F. Hockey) Fire blight was severe on single trees of Tolman Sweet and Bishop Pippin in Queens county, P.E.I. It was also common in several uncared-for orchards.

RUST (Gymnosporangium clavipes) is gaining in importance as its spread becomes more general in Que. Among the commercial varieties at Ste. Anne de la Pocatiere, the most seriously affected this year were Alexander, Northwest Greening, North Star, Fameuse, Duchess, and Wealthy. In Alexander 37% of the fruit were affected. Several other varieties are entirely free. A few petiole and twig infections were found on Antonowka in a nursery at St. Roch des Aulnaies.

BLACK ROT (Physalospora obtusa) was fairly common in York and Queens county, N.B. The leaves were severely infected in an orchard at French Lake on June 2 and 75% had fallen. The fruit was also severely damaged. The disease is not controlled in N.B. by either the Bordeaux or lime sulphur sprays. It is

most severe in areas of high humidity. Crimson Beauty is the variety most susceptible to foliage infection, while Alexander suffers severe fruit infection (S.F. Clarkson). Black rot was found on Winton, Formac, and North Star at Ste. Anne de la Pocatiere, Que., and was heavy on Duchess in an orchard in Kings county, P.E.I.

POWDERY MILDEW (Podosphaera leucotricha) was observed only on the occasional leaf at Summerland, B.C. It was even scarce on apple seedlings, which are usually affected (G. E. Woolliams). A scattered infection was present in an orchard in Lincoln county, Ont. Traces of powdery mildew were observed on 3 young trees at Cap Rouge, Que. A few one year-old seedlings were moderately infected in a greenhouse at Kentville, N.S.

ANTHRACNOSE (Neofabraea malicorticis) was general on Vancouver island and in the Fraser valley, B.C. It is more severe in the latter area largely because control measures have not been adopted. Spraying with copper sprays before the fall rains begin, is more generally practiced on Vancouver island. (W. Jones)

EUROPEAN CANKER (Nectria galligena) caused severe injury to many limbs in a small orchard at Waterville, N.S. (K.A. Harrison)

CANKER (Cytospora leucostoma). One tree was half dead at Saskatoon, Sask. Canker (Cytospora sp.) is common on trees, which suffered winter injury in N.B. (S.F. Clarkson)

Daldinia grandis was common at Gull Lake, Sask., on apple and it was collected also at Saskatoon.

SILVER LEAF (Stereum purpureum). Two per cent of the apple seedlings at the Fredericton Station, N.B., were affected. The fungus was fruiting on frost weakened trees. The cankers increase but slowly (S.F. Clarkson). A trace of silver leaf was seen in Queens county, P.E.I., in an orchard of McIntosh, where the disease has been abundant in recent years. The marked decrease of the disease may be due to the higher summer temperature. (R.R. Hurst)

DROUGHT SPOT or CORKY CORE (boron deficiency) was virtually absent in any treated orchard in the Okanagan valley, B.C. The soil treatments with boric acid made two years ago, seem still to be 100% effective (R. Fitzpatrick)

Corky core affected about 1% of the fruit in an orchard in Queens county, N.B.

YELLOWS or CHLOROSIS (unknown) is a disease which occurs in the Okanagan valley, B.C., on certain soil types characterized by a high carbonate content. Although this chlorosis is similar to lime-induced (iron) chlorosis, the trouble is not corrected by iron salt applications. (R. Fitzpatrick)

BITTER PIT (non-parasitic) affected up to 20% of the fruit in a few orchards on Vancouver island, B.C. The varieties chiefly affected were King, Cox Orange, and Grimes Golden (W. Jones). Bitter pit was quite prevalent in the Okanagan valley this year, possibly on account of the peculiarly dry, hot summer (R. Fitzpatrick). Traces of bitter pit were found in Wealthy, Shiawassee and McSweet at the Ste. Anne de la Pocatiere Station, Que. Bitter pit affected 1-100% of the fruit of Baxter and Wealthy in orchards in York and Queens county, N.B. On August 30, bitter pit was noted on Baxter in the orchard. In a survey made on September 26, of six orchards in the Annapolis and Kings counties under observation for bitter pit, the average percentage of bitter pit was 2.3% and the highest was 4.6%. This is the lowest percentage of bitter pit recorded in these orchards since the study began (K.A. Harrison). Bitter pit was noted on Wealthy apples on the market at Charlottetown, P.E.I.

MOSAIC (virus) was found affecting a single tree in an orchard at Penticton, B.C. Its transmission by budding is being attempted (T.B. Lott). Mosaic was present in the varieties, Blenheim, Cox Orange, Ribston Pippin, King, Gravenstein, Talman Sweet, Delicious, Baldwin and Homestead, in the Annapolis valley, N.S. Suckers from the stocks of affected tubers also showed the disease and it has been transmitted by budding and grafting. (J.F. Hockey)

FLAT LIMB (scion-stock incompatibility) is appearing on increasing numbers of 2- and 3-year old grafts of this variety in the Annapolis valley, N.S. The trouble is decreasing in older trees as they are usually cut out when seriously affected. In one orchard half the trees are affected. The condition has been known in the province for over 40 years and was first seen by the writer in 1923 (J.F. Hockey). Flat limb is also known on Vancouver island, B.C. (W.C. Foster). The trouble is illustrated by McAlpine (D. McAlpine. Bitter pit investigations, first progress report, p. 98, figs. 126-128. 1911-12)

CROWN GALL (Phytomonas tumefaciens). A number of small galls occurred on several young trees interplanted in an old orchard at Waterville, N.S. (K.A. Harrison)

WATER CORE (non-parasitic). A trace was seen in York county, N.B.

TWIG BLIGHT (Nectria cinnabarina). A trace was observed on several trees in orchards which had suffered winter injury in York and Queens counties, N.B. Extensive cankers caused the death of two limbs in an orchard in Kings county, N.S.

Twig blight (Gonatobotrys simplex) caused a trace of damage on Fameuse in York county, N.B. The fungus was fruiting (J.L. Howatt and S.F. Clarkson). A Phomopsis sp. was found associated with twig blight caused by winter injury in Carleton and York counties, N.B.

WOOD ROT (Schizophyllum commune) was present in apple orchards in N.B., where the trees suffered winter injury. The fungus is a week parasite and apparently causes little damage to uninjured, vigorously growing trees (S.F. Clarkson). The fungus was fruiting profusely at every stub left in pruning in a tree of Blushed Caville in the University orchard, Saskatoon, Sask. (T.C. Vanterpool)

HEART ROT (Fomes applanatus). Sporophores of the fungus were found on the roots at the base of a Delicious tree, which was partially dead, at Summerland, B.C. (G.E. Woolliams). A heart rot canker was moderate in 5 Rome Beauty trees and severe on one McIntosh at Penticton, B.C. (T.B. Lott)

CROWN ROT (cause unknown). It is estimated that about 1% of all apple trees in the Okanagan valley, B.C., are suffering from crown rot. (R. Fitzpatrick)

ROT (Botrytis cinerea) affected an occasional fruit of Red Siberian Crab, at Kentville, N.S. A few fruits of King were also rotting following insect injury. (J.F. Hockey)

ROT (Sclerotinia americana) affected a few clusters of fruit on unsprayed trees at Kentville, N.S.

PINK ROT (Tricothecium roseum) was present in orchards where scab was severe in York county, N.B. (S.F. Clarkson). An occasional fruit was affected in the orchard, but it was fairly common in storage at Kentville, N.S. (J.F. Hockey)

BITTER PIT (Glomerella cingulata) caused slight to severe damage to the Dudley, Alexander, and Fameuse apples at the

Fredericton Station, N.B. It caused moderate to severe damage in storage to apples from an orchard in York county, which had been sprayed but once during the growing season. (S.F. Clarkson and J.L. Howatt)

STORAGE ROTS. Alternaria Mali caused a rot of 6% of the Dudley apples in storage in Feb. 1938 at the Fredericton Station, N.B. Other varieties were much less affected. Gloeosporium album was found on apples in storage on Jan. 3, 1938 and in April, 45% of Northwest Greening apples were affected (S.F. Clarkson and J.L. Howatt). Some apples of Dudley and Alexander in storage were affected by Botrytis sp. in Nov. 1938 in York county, N.B.

FLY SPECK (Leptothyrium Pomi) was common on Dudley apples in September and November at the Fredericton Station, N.B. A trace was also observed on August 21, at Gagetown. (S.F. Clarkson)

SOOTY BLOTCH (Gloeodes pomigena). A trace was seen on Fameuse at the N.B. apple exchange in November. (S.F. Clarkson)

HAIL INJURY. A strong wind and hail storm damaged 75% of the No. 1 fruit in the Quebec district, Que., in August. (C. Perrault)

FOLIAGE INJURY (nitrogen burn). An unusual foliage injury characterized by a cupping and greyish speckling of the leaves was observed in an orchard in Lincoln county, Ont. The trouble was apparently due to the application of cyanide to a neighbouring asparagus bed during a wind as the trouble was severe on the side next the bed and diminished rapidly in the more distant rows. (G.C. Chamberlain)

SPRAY INJURIES. A trace of russetting was observed in N.B. apple orchards; Bordeaux mixture for the pre-pink and pink sprays caused no more russetting than lime sulphur. A trace of lime sulphur injury occurred in a few orchards. (S.F. Clarkson)

Severe burning of the foliage occurred in the orchard spray plots at Kentville, N.S., where lime sulphur was applied under extremely humid conditions. Some wettable sulphurs produced severe burning under similar conditions. Russetting was general on the fruit where copper containing sprays were applied at the pink and calyx applications. On Cox Orange these sprays caused severe russetting and rendered much of the fruit unmarketable. They also caused a flecking on the fruit of Wagner, Ben Davis, Northern Spy, where the trees were sprayed very late in the season or the spray came from the bottom of the tank. (J.F. Hockey)

LEAF SPOT (Phyllosticta sp.) affected 40% of the foliage of Blenheim in an orchard in Kings county, N.S. The spotting probably followed slight spray injury. The trouble is common, but seldom to the extent observed in this orchard. (J.F. Hockey)

SCORCH (potash deficiency) was moderate in an orchard in Lincoln county, Ont.

FROST caused slight to moderate damage to McIntosh and other varieties in York county, N.B., on May 19, when the temperature dropped to 29°F. The varieties were in the pre-pink stage. (S.F. Clarkson)

APRICOT

HEART ROT (Polyporus hirsutus). Fruiting bodies of the polypore were found on several of the main branches on a large living tree at Naramata, B.C. (G.E. Woolliams)

BLACKBERRY

MOSAIC (virus). A few plants were affected at South Berwick, N.S. The mottling took the form of an interveinal clearing with puckering along the veins and dark areas in the leaves. (J.F. Hockey)

BLUEBERRY

RUST (Calyptospora Goeppertiana) affected about 1.0% of the plants in a small barren in Charlotte county, N.B. (J.L. Howatt)

GREY MOULD (Botrytis cinerea). Specimens showing twig blight and decay of immature fruit were received from Pennfield Ridge, N.B. (J.F. Hockey)

CHERRY

SHOT HOLE (Higginsia hiemalis (Cylindrosporium hiemalis). A severe infection was observed at Morden, Man. While very little of this disease appeared this year in commercial orchards in the Niagara peninsula, Ont., it was a problem at the Vineland Experimental Station in seedling stocks and in nursery rows, for early

leaf fall makes budding much more difficult and definitely less successful (D.L. Bailey). Shot hole was general and caused moderate damage on unsprayed trees in N.B. (S.F. Clarkson). Shot hole was very severe on seedlings at Kentville, N.S. (J.F. Hockey) The disease caused little trouble this year in P.E.I. A slight infection was present at Southport, where it was severe in 1937 (G.W. Ayers).

BLACK KNOT (Dibotryon morbosum). Specimens were received from St. Anselme, Que., and Maccan, N.S. It was slight to severe on wild cherries in parts of N.B. and P.E.I.

BROWN ROT (Sclerotinia americana) was found on fruit submitted by F. Dian, Dominion Fruit Inspector, who reported the disease general about Needles, B.C. (G.E. Woolliams). It caused severe damage to unsprayed sour cherries in Gloucester county, N.B. In a Bordeaux spray plot in the Station orchard, Kentville, N.S., 50% of the fruit of the sweet cherries, Windsor and Black Tartarian, were rotted, while the sour cherry, Montmorency, was comparatively free (J.A. Boyle). Brown rot destroyed half the crop in an orchard at Deep Brook, N.S.; some twig blight was also present (J.F. Hockey).

POWDERY MILDEW (Podosphaera Oxyacanthae) was fairly general, but caused slight damage in North Saanich area, B.C. (W. Jones). Infection was moderate in a nursery of mixed varieties at Kelowna. A trace was seen at Willson Landing. (T.B. Lott)

CRINKLE (genetic weakness). During a survey for virus diseases in the Okanagan valley, in 1938, cherry mottle leaf was not definitely observed. Instead, out of 2,963 trees examined, crinkle was found affecting 7% of the Bing trees and 24% of the Black Tartarian, while other varieties were practically free. In all 183 trees were affected. The symptoms of the trouble varies with the variety, age, and vigour of the tree. The crop of marketable fruit is often only a third to a half of that of a normal tree. Individual fruits are smaller, of poorer quality, and less attractive in appearance. In the Bing affected fruits show a pronounced groove down one side, while in the Black Tartarian the fruit has a lumpy or pimply appearance. Affected leaves, particularly on the spurs, are smaller with very irregular margins and vary greatly in size and shape, some being ten times as long as broad. The leaf surface is crinkled or puckered, with small raised areas between the veins, a symptom which has suggested the name "crinkle" for the trouble. In late summer or when the

soil is dry, the leaves exhibit a more pronounced rolling parallel to the midrib. In many trees crinkle occurs throughout the tree, while in others typical crinkle is found on but one or more limbs, branches or spurs. The cause of crinkle is unknown, but the condition corresponds closely to the bud sports observed in many plants. Healthy grafts on to crinkle trees have given normal branches, while crinkle grafts on a normal tree have produced crinkle branches, but there is no transfer of the trouble to the healthy parts. (cfr. C.F. Kinman. Jour. Agr. Res. 41:327-335. 1930)

Besides crinkle some abnormality of the foliage was seen in 1,059 trees in the Okanagan valley; typical examples of the abnormalities have been selected for further study. (T.B. Lott)

GREY MOULD (Botrytis cinerea). An occasional fruit was affected in the orchard at Kentville, N.S.

YELLOW LEAF (undetermined) moderately affected several orchards in Lincoln county, Ont. (G.C. Chamberlain)

SILVER LEAF (Stereum purpureum) is affecting a few bushes of the Oka cherry at Rosthern, Sask.

HEART ROT (Fomes applanatus). A sporophore was found on a root of a living tree at Summerland, B.C., by T.B. Lott. (G.E. Woolliams)

CRANBERRY

RED GALL (Synchytrium Vaccinii) severely infected the leaves, stems, and flowers of cranberry in a bog at Port Mouton, N.S. The damage was severe, most of the buds being killed. In addition red gall was moderate but conspicuous on the stems of Gaylussacia baccata and slight on Chamaedaphne calyculata, both of which were in the affected bog. It was also common on Myrica gale at the edges of the bog. A few moderate leaf infections of Synchytrium aureum on Lysmachia terrestris were collected in the same bog by R.J. Baylis. (J.F. Hockey)

HARD ROT (Sclerotinia Oxycocci) was present in 2 bogs comprising about 20 acres in Kent county, N.B. In one bog in an area of one acre, practically all the berries were destroyed. In another bog in Westmoreland county, 35% of the berries were damaged. (J.L. Howatt and S.F. Clarkson)

STORAGE ROTS. Fusicoccum putrefaciens was isolated from berries in storage from Sunbury county, N.B., and Gloeosporium minor from berries from Gloucester county. (J.L. Howatt)

Gibbera compacta was found on only a few leaves of cranberry from Port Mouton, N.S. (J.F. Hockey)

RED LEAF (Exobasidium Vaccinii) caused heavy defoliation in a small bog at Lower Caraquet, N.B. Traces were present at St. Peters, P.E.I.

CURRANT

WHITE PINE BLISTER RUST (Cronartium ribicola) was less severe than usual in the variety plots of the Horticultural Division, Central Experimental Farm, Ottawa, Ont. Susceptible varieties of currants were slightly affected, while all varieties free from rust in the previous 3 years were again clean. No rust whatever was observed on the gooseberry varieties (H.J. Read). The rust caused complete defoliation of a planting of Black Giant by Sept. 30 in Lincoln county. Although the rust is common, its prevalence varies with spraying practises (G.C. Chamberlain). Infection was heavy, but the damage was slight at Macdonald College, Que. (I.H. Crowell). Rust was heavy on black currants in two home gardens near Campbellton, N.B., in late August (I.L. Conners). This rust was very prevalent on black currants in Kings, Annapolis, and Halifax counties, N.S. Mature aecia on the white pine were seen about May 15 (J.F. Hockey). Red currants were slightly to severely infected at Charlottetown, P.E.I. (R.R. Hurst)

POWDERY MILDEW (Sphaerotheca mors-uvae) was severe on the young leaves of black currants at Saskatoon, Sask. A small planting of currants were moderately infected at St. Amable, Que. (F. Godbout)

GOOSEBERRY

POWDERY MILDEW (Sphaerotheca mors-uvae) was severe on the fruit and slight on the terminal leaves at Saskatoon, Sask. It was severe on the leaves and was causing the fruit to drop in specimens from St. Gregor. It was moderately severe on the berries at Victoria Beach, Man. A specimen was received from Hastings, Ont. It destroyed half the crop in a heavily infected gooseberry

planting at St. Amable, Que. A very severe outbreak occurred at Aldershot, N.S., practically destroying the crop. The disease was slight to moderate in Queens county, P.E.I.

SEPTORIA LEAF SPOT (Mycosphaerella Ribis (Septoria Ribis) was severe on gooseberry at Morden, Man.

GREY MOULD (Botrytis cinerea) as a twig and stem blight killed a few plants at Sidney, B.C. (J. Bosher)

TWIG CANKER (Nectria cinnabarina) affected one plant at Waterville, N.S. (K.A. Harrison)

GRAPE

DOWNY MILDEW (Plasmopara viticola) was reported from Britannia Heights, Ont. A slight infection was noted at Macdonald College, Que. The disease was heavy on a few vines in a garden at Yarmouth, N.S.

POWDERY MILDEW (Uncinula necator) was heavy causing shelling of the fruit of Fredonia, a very susceptible variety in Lincoln county, Ont. (G.C. Chamberlain)

SHELLING (excess moisture) affected about 1% of a vineyard of the Lincoln variety in Lincoln county, Ont. The trouble showed up on vines along water courses and in low areas, where the land was flooded during heavy mid-season rains. The affected vines possessed a deficient root system and the wood was slow in maturing. The variety is a vinifera type and is apparently susceptible to excess moisture. The vines were healthy in well drained areas of the vineyard. The trouble is similar to that described by F.E. Gladwin. (Non-parasitic malady of the vine. N.Y. (Geneva) Bull. 449. 1918) (G.C. Chamberlain).

LOGANBERRY

DRY BERRY (Haplosphaeria deformans)is fairly general on Vancouver island in low areas with high humidity and where the plantings are close to the susceptible wild thimble berry. (W.R. Foster.

PEACH

LEAF CURL (Taphrina deformans) was more general than usual this year at Summerland, B.C. Infection was slight on most trees, although it was sometimes conspicuous. However, it was insufficient to warrant spraying (R.E. Fitzpatrick and G.E. Woolliams). While leaf curl was not prevalent in well sprayed orchards in the Niagara peninsula, Ont., the disease was spotty in the district and infections ranging from 10 to 50% were seen in scattered orchards. (G.C. Chamberlain)

BROWN ROT (Sclerotinia americana) was the cause of considerable loss in both early and late maturing varieties in the Niagara peninsula, Ont., particularly in unsprayed orchards. (G.C. Chamberlain)

SCAB (Cladosporium carpophilium) disfigured a considerable part of the fruit in orchards of the Ruthven district, Ont. (L.W. Koch). A heavy fruit and foliage infection was noted in one orchard in Lincoln county. (G.C. Chamberlain)

BACTERIAL SPOT (Phytomonas Pruni) was present in several orchards near Cedar Springs, Ont. In one orchard some trees were half defoliated. (L.W. Koch)

CORYNEUM BLIGHT (C. Beijerinckii) was severe on a few trees at North Saanich, B.C. (W. Jones). It caused appreciable damage to peaches in Essex county, Ont., especially in the Leamington district (L.W. Koch). This is the first report to the Survey from Ontario.

POWDERY MILDEW (Sphaerotheca pannosa) was found on the occasional tree at Summerland, B.C. It affected both foliage and fruit (G.E. Woolliams). A slight infection was noted in one orchard in Lincoln county, Ont. (G.E. Chamberlain)

VERTICILLIUM WILT (V. sp.). A slight infection was seen on scattered trees in an orchard in Lincoln county, Ont.

YELLOWS and LITTLE PEACH (virus). The Survey of the Ontario Department of Agriculture indicates a reduction in the number of trees affected in the Niagara peninsula, Ont., as follows:-

Township	1937	1938
Niagara	670	334
Louth	496	185
Stanford	88	76
Clinton	560	515
Grantham	244	42
TOTAL	2,058	1,152

(R.S. Willison and G. Dustan)

POTASH DEFICIENCY was noted in one orchard of Valiant and Vidette varieties in Lincoln county, Ont.

WINTER INJURY complicated by canker girdled 50-60% of the trees, which were planted in heavy soil in a Welland county planting, Ont. Injury varied from a flecking of the cortical bark tissues to a killing of the bark just above the ground level. The damage was incurred in early winter. The trees had been "mounded up" in the fall, thus covering the sensitive bark developed just above soil level. (R.S. Willison)

PEAR

SCAB (Venturia pyrina) was general on the twigs of the Anjou variety in February at the Sidney Station, B.C. Later scab was general throughout the season on Vancouver island and the lower mainland. Twig lesions may initiate early spring infection before the asci are shot (W. Jones). Scab affected 75-90% of the fruit of Barlett and Keiffer in an orchard of 2,500 trees in Welland county, Ont., which had been badly neglected for over 10 years. The wild scrubby growth and the lack of spray had permitted a marked increase in the inoculum. Ordinarily these varieties are rarely affected (G.C. Chamberlain). It was severe on a single tree at Kingston, Ont. (H.N. Racicot). Scab was slight to severe on unsprayed trees in York and Sunbury counties, N.B. (S.F. Clarkson). Infection was heavy on Flemish Beauty at Charlottetown, P.E.I. (R.R. Hurst)

FIRE BLIGHT (Erwinia amylovora) was practically absent in the Okanagan valley, B.C., this year (G.E. Woolliams). About 25% of the twigs including a few extensive areas involving the larger limbs and branches were blighted in an orchard of Barlett and Kiefer in Lincoln county, Ont. In another block of Barlett infection was extensive in one corner. (G.C. Chamberlain)

DROUGHT SPOT (mainly boron deficiency). Growers report a 75% improvement following boric acid applications in orchards at Summerland, Penticton, and Naramata, B.C., but complete cures have not been effected. It is probable that two or more separate disorders are being included under the single term, Drought Spot. (R. Fitzpatrick)

POWDERY MILDEW (Podosphaera Oxyacanthae) was quite severe on much of the fruit on unsprayed check trees in the experimental spray plots at Summerland, B.C. (G.E. Woolliams)

SOOTY BLOTCH (Leptothyrium Pomi) was general and causing a serious blemish to Kieffer fruit in an orchard in Lincoln county, Ont. (G.C. Chamberlain)

SPRAY INJURY. Severe burning of the foliage resulted in an orchard in Lincoln county, Ont., when an arsenical spray was applied from a spray tank that had been used previously for applying sodium chlorate as a herbicide. (G.C. Chamberlain)

PLUM

PLUM POCKETS (Taphrina communis or T. Pruni) was moderately common on certain varieties at Indian Head, Sask. It was also moderate at Winnipeg, Man. Plum pockets was very prevalent on wild plums in Northern Ontario. In many small plum orchards in western Que., infection varied from 10 to nearly 100%. It was also heavy on Ile Bizzard and at Defoy. It was severe at Bass River, N.B. A few fruit were found on one tree in a sprayed orchard at Kentville, N.S. A slight outbreak was observed at Charlottetown, P.E.I., but where the orchards are sprayed the disease is not important.

BROWN ROT (Sclerotinia americana) a few rotten fruit were seen at Morden, Man., on August 29. The disease was severe in small orchard plantings at Eganville and London, Ont. Brown rot was quite severe in some orchards in P.E.I. although it was not epidemic as it was in 1937. It was especially noticeable in two orchards at Charlottetown, on the variety Krakenbaus. (G.W. Ayers)

SHOT HOLE (Higginsia prunophorae (Cylindrosporium prunophorae). Infection was slight to moderate on several trees in the University orchard, Sask., and throughout the orchard at Brandon, Man. It was severe on Waneta, but slight on the other varieties at St. Anne de la Pocatiere, Que. Shot hole was severe on several unsprayed trees in York county, N.B.

LEAF SPOT (Phyllosticta circumscissa) was general and severe at Morden, Man.

BLACK KNOT (Dibotryon morbosum) was genral and unusually severe in several orchards in one district in Lincoln county, Ont. (G.C. Chamberlain). Specimens were received from London, Ont. A slight infection occurred in a small orchard in Kamouraska, Que. Black knot was quite severe on all unsprayed old plum trees in N.B. About 30 small trees were riddled with black knot in a home garden at Douglastown, N.B.; very few could be salvaged by pruning out the knots. The disease was found on Magnum Bonum, Green Gage and Lombard at widely scattered points in P.E.I.

BACTERIAL SPOT (Phytomonas Pruni) caused a loss of 25% of fruit of Shiro in two orchards in Lincoln county, Ont. (G.C. Chamberlain)

PRUNE

VIRUS DISEASE. One prune tree, which showed symptoms similar to that described by H.E. Thomas and E.M. Hildebrand (Phytopathology 26:1145-1148. 1936) was observed in the Okanagan valley, B.C., but its identity has not yet been checked by experiment. (T.B. Lott)

HEART ROT (Polyporus versicolor) was found as a wound parasite on one tree and Fomes applanatus was fruiting on another at Hatzic, B.C. (W. Jones)

RASPBERRY

ANTHRACNOSE (Elsinoe veneta) was general on the Newman variety with lesions in May on the young, current season's canes at Sumas, B.C. (W. Jones). The disease was prevalent in two plantings in Lambton and Elgin counties, Ont. The variety, Taylor, like its parent, Lloyd George, appears very susceptible to anthracnose (G.C. Chamberlain). Anthracnose was slight to moderate, particularly on Newman in Que. (H.N. Racicot). Traces were present on Lloyd George at Charlottetown, P.E.I.

SPUR BLIGHT (Didymella applanata). Traces of spur blight were reported in Ont. It was common causing slight to moderate damage in N.B. It was prevalent in P.E.I. this year, particularly in small garden patches.

MOSAIC (virus). About 30% of the plants were affected with mosaic in 2 plantings at Burnaby, B.C. Mosaic was severe in one planting at Bird's Hill, Man. Mosaic occurred in Ont. in varying amounts in all plantings of Cuthbert, Viking, and Latham, particularly of the first two. Percentage of plants affected ranged from a trace to 20% (G.C. Chamberlain). Mosaic was severe on Latham, Viking, Chief, in 2 plantings at Navan, while Cuthbert showed only a trace. Mosaic was present in most nursery plantings in Que.; it was severe in a few plantings of Latham. A low percentage of plants were affected in the varietal plots at Ste. Anne de la Pocatiere and Cap Rouge. One planting was infected 100% at Charny. Mosaic affected 50% of the Viking and 35% of the Newman in one planting in York county, N.B.; in general mosaic was slight to moderate. Mosaic was noted on several varieties in P.E.I.

LEAF CURL (virus) was rarely encountered in Ont., except at scattered points and only on Cuthbert (G.C. Chamberlain). Leaf curl affected 10% of the Newman plants in one nursery and small percentages were present on this and other varieties in Que. One per cent of leaf curl was present in one planting and a trace in several others in York county, N.B. A single affected plant was seen in a small nursery at Waterville, N.S.

YELLOW BLOTCH CURL (virus) was found affecting 15% of the plants in a commercial nursery planting in Wentworth county, Ont. (G.C. Chamberlain)

CROWN GALL (Phytomonas tumefaciens) affected 50-60% of the plants in a 5-year old planting of Cuthbert, which has been destroyed in Lincoln county, Ont. It is also common in nursery raspberry plantings (G.C. Chamberlain). A diseased plant was seen at St. Jean Port Joli, Que., and traces were present in Viking and Herbert in P.E.I.

VERTICILLIUM WILT (V. sp.) affected a trace of the plants in a Cuthbert planting in Waterloo county, and 1% of the plants of a Cumberland planting in Lambton county, Ont. (G.C. Chamberlain)

YELLOW RUST (Phragmidium Rubi-idaei) was general on Cuthbert and Viking on the lower mainland and Vancouver island, B.C. It caused less damage than in 1937, due to the dry season. Lesions on the new canes appear to develop into cankers on the fruiting canes which resemble somewhat cane blight. Telia are found in such cankers. (W. Jones)

LATE RUST (Pucciniastrum americanum) is common in central Ontario. The Viking variety is most susceptible, although commonly found on Chief and Latham; Cuthbert and Newburgh appear more resistant. This year the disease appeared late in the season, but became very prevalent (G.C. Chamberlain). This rust caused severe damage to the fruits of Viking and Newman in one plantation in York county, N.B. It was particularly severe on Viking. The variety was sprayed on June 30 and July 11 with Bordeaux mixture. A trace of spray injury was apparent on the berries on July 25; slight to moderate control of the rust resulted (S.F. Clarkson and J.L. Howatt). It was severe on the berries of Viking at Jacquet River. Rust was heavy on Viking and Lloyd George in a planting near blue spruce in Queens county, P.E.I.

CANE BLIGHT (Leptosphaeria Coniothyrium (Coniothyrium Fuckelii). About 25% of the bearing canes were blighted in a ¼-acre planting of Lloyd George at Rock Creek, B.C.; occasionally all the canes in a stool were affected (G.E. Woolliams). A moderate general infection was present in a planting at Bird's Hill, Man. The disease was moderate in a garden at St. Jean Port Joli and severe in a second in Levis county, Que. (C. Perrault)

POWDERY MILDEW (Sphaerotheca Humuli) was rather severe on a few rows of Latham on Vancouver island, B.C. It was severe in a garden at Edmonton, Alta. Powdery mildew was common in nursery plantings of Latham in several counties of Ont. The cane growth was stunted and the tips spindly. However, in most cases, the stunting was of little importance. (G.C. Chamberlain). It was also slight to severe in several plantations in Ont. Powdery mildew was severe in a planting at St. Jean Port Joli; the development of the fruit and the growth of the canes were affected (R.O. Lachance). It was heavy in several Latham nursery plantings in Que.

SEPTORIA LEAF SPOT (S. Rubi) was recorded from Howick, Que. It was also heavy on Herbert in nursery plantings.

SCORCH (Potash deficiency) was slight in a nursery planting of Brighton at Port Burwell, Ont.

DIE BACK (Armillaria mellea). Numerous plants were attacked and a few killed by die back in 2 plantings at Hatzic, B.C. (W. Jones)

Polyporus versicolor was found growing on the crowns of a few unthrifty plants at Hatzic, B.C. (W. Jones)

SANDCHERRY

SILVER LEAF (Stereum purpureum) was found affecting sand-cherry at Rosthern, Sask.

POWDERY MILDEW (Podosphaera Oxyacanthae) lightly infected the leaves at Saskatoon, Rosthern, and Makwa, Sask. The disease was severe at Selkirk, Man.

BROWN ROT (Sclerotinia americana) caused a very severe twig and fruit blight in a small planting at Kentville, N.S. (J.F. Hockey)

STRAWBERRY

LEAF SCORCH (Diplocarpon Earliana (Marssonina Fragariae) was general on British Sovereign, but the damage was slight on the lower mainland and Vancouver island, B.C. (W. Jones). A slight but well scattered infection occurred in the University plots, Saskatoon, Sask. (T.C. Vanterpool). Leaf scorch was present on 7 varieties at Ste. Anne de la Pocatiere, Que. and a slight to moderate infection occurred at Cap Rouge.

LEAF SPOT (Mycosphaerella Fragariae) was severe on plants from Keene, Ont.; otherwise the disease was light. It was a trace to slight on most varieties at Cap Rouge and Ste. Anne de la Pocatiere, Que., but infection was moderate to severe on a few varieties. Leaf spot was common throughout N.B. and severe in plantations at Springhill, Keswick Ridge, and Douglas.

POWDERY MILDEW (Sphaerotheca Humuli) slightly infected a new seedling at the Sidney Station, B.C., but it was not observed in commercial plantings. Scattered infections were recorded on Premier in Lincoln county, Ont. The disease was severe on Cartier, Abbott, McGee, King, and Dick at Cap Rouge, Que., while it was a trace or absent on the remaining 37 varieties. Powdery mildew was of little importance in P.E.I.

ROOT ROT or BLACK ROOT (cause unknown) was severe at the Creston Substation, B.C. Mr. G. Thorpe, the Superintendent, reported "It occurs on plants of all ages. Some fields have been completely wiped out. Also some varieties appear to be more susceptible than others". (G.E. Woolliams) Root rot infection was slight in one planting and severe in patches in another near St. Norbert, Man.

During 1938, root rot occurred in a severe and typical form in the Niagara peninsula and the Clarkson-Oakville district, Ont. In most plantations at cropping time, more or less extensive patches of dead plants were present. Its greater severity this season was probably due to the limited precipitation during the critical period for strawberries. In 1937, from April 26 to June 30, there were 8.72 inches of rain, which was so well distributed that the soil remained continually moist throughout. During the corresponding period this year, the precipitation was only 4.14 inches or less than half of 1937. Moreover with a rainfall of 2.29 inches for May, there were two periods, each of 8 days' duration when practically no rain fell. Thus during the most critical period in the current season, drought conditions aggravated the disease situation and the combined effect was the failure of more than the usual number of plants. (A.A. Hildebrand)

About 1% of the plants showed black root in 6 out of 30 representative plantations, surveyed in N.B. (S.F. Clarkson)

Armillaria mellea was found causing a crown and a root rot in plantings at Sidney and Whonnock, B.C.; some plants were killed. (W. Jones)

SCORCH (Potash deficiency). What appeared to be a potash deficiency was found affecting 1.5% of the plants in 4 plantations of Senator Dunlop at Charlottetown, P.E.I.(R.R. Hurst)

LEAK (Rhizopus sp. and Botrytis sp.). Several cars of strawberries, mostly British Sovereign, shipped from New Westminster were almost a total loss on arrival at their destination on the Prairies. It was found that over ripe berries had been shipped from fields where the fruit were already affected (W. Jones). There was a slight scattered infection of Botrytis in many commercial plantations in Kings county, N.S.; the fruit were very soft and decayed easily. (J.F. Hockey)

GREY MOULD (Botrytis sp.) was causing slight to severe blighting to the lower leaves of the plants at Grand Lake, N.B., on May 11. (S.F. Clarkson and J.L. Howatt)

V. DISEASES OF FOREST AND SHADE TREES

ABIES BALSAMEA - Balsam Fir

Witches' Broom (Melampsorella Caryophyllacearum) was observed at Tufts Lake, N.B. A few reports were received from Kings and Queens counties, P.E.I.

ARBUTUS MENZIESII

Tar Spot (Rhytisma Arbuti) was very general in the southern part of Vancouver island, B.C., and caused severe defoliation.

Red Leaf (Exobasidium Vaccinii) was found on a few trees on the new growth where the trees had been cut down in North Saanich, B.C.

ACER - Maple

Tar Spot (Rhytisma acerinum). A slight infection was observed on A. saccharinum and A. rubrum in P.E.I. It was general on A. sp. in a bush near Contrecoeur, Que.

Leaf spot (Septoria acerina) was general and quite severe on A. pennsylvanicum in Queens county, P.E.I.

Leaf spot (Gloeosporium apocryptum) severely infected a few trees on an estate in St. John county, N.B.

Wilt (Verticillium sp.). Several branches were killed on a number of A. platanoides at Macdonald College, Que. It was severe on one maple tree in Queens county, P.E.I.

Twig Blight. Coryneum septosporioides Sacc. & Syd. was discovered on dead shoots of A. negundo at Saskatoon and the Sutherland Forestry Station, Sask. Det. by G.R. Bisby. A small amount of Sphaeropsis albescens as well as Tubercularia vulgaris, and Macrophoma negundinis Ell. & Ev. were also found on dead shoots in the district. (R.C. Russell)

Canker (Nectria sp.). Two trees were severely cankered and practically dead due to canker at Macdonald College, Que. (I.H. Crowell)

AESCULUS - Horse Chestnut

Leaf Blight (Guignardia Aesculi) was heavy on most trees at Charlottetown, P.E.I.

Wood Rot (apparently Collybia sp.) was severe in one tree at Charlottetown, P.E.I.

ALNUS - Alder

Leaf spot (Septoria alnifolia) was general on a clump of A. incana at Morden, Man.

BETULA - Birch

Melanconium bicolor was collected on dying B. papyrifera at Saskatoon, Sask. (R.C. Russell)

CATALPA

Leaf spot (Alternaria sp.). An isolated tree in Welland county, Ont., was rather severely affected, the lesions covering half the leaf surface on some leaves. (G.C. Chamberlain)

CORNUS - Dogwood

Mosaic (virus). A single C. stolonifera shrub with variegated foliage was found at Newport, N.S., among other apparently normal plants. (J.F. Hockey)

Leaf Blight (Monilia Corni) was general, but caused slight damage to C. Nuttallii in the Fraser valley and on Vancouver island, B.C. (W. Jones)

FRAXINUS - Ash

Rust (Puccinia peridermiospora) was severe on young ash trees at Senneville, Que. The youngest trees of F. pennsylvanica and the current season's growth on others were killed (I.H. Crowell). A fairly heavy infection was present on specimens received from Liverpool, N.S. (J.L. Howatt)

JUGLANS CINEREA - Butternut

Leaf spot (Gnomonia leptostyla (Marssonina Juglandis). About 75% of the leaves and 10% of the nut husks were affected at Coldbrook, N.S. The tree was partially defoliated. (J.F. Hockey)

PICEA - Spruce

Needle Rust (Chrysomyxa ledicola) was common on young P. mariana in York and Sunbury counties, N.B. and caused some defolitation (J.L. Howatt). A rust (Chr. sp.) was heavy on P. canadensis in Queens and Prince counties, P.E.I.

Needle Rust (Chrysomyxa Weirii) was collected on P. rubra at St. Martins, N.B., June 20 (I.H. Crowell). As Dr. Crowell points out, this is apparently the first record of its occurrence in Eastern Canada.

Witches' Broom (Peridermium colorodense) was collected on Picea mariana at Tufts Lake, N.B. (I.H. Crowell)

PINUS - Pine

White Pine Blister Rust (Cronartium ribicola) killed many young white pine trees in a natural stand near Lake L'Achigan, Terrebonne county, Que. On a large plantation at Oka, the rust is

causing heavy losses, which are increasing from year to year (F. Godbout). It was observed at Mermaid, P.E.I.

Needle Cast. Lophodermium nitens was found in great abundance on needles of P. strobus on Ile Perrot, Que. L. pinastri was present on P. resinosa at Little Beach, N.B. (I.H. Crowell)

POPULUS - Poplar

Rust (Melampsora) moderately affected young plantations of poplars at the Sutherland Forestry Station, Sask., in August. M. medusae was heavy on the leaves of an ornamental variety of P. deltoides at Morden, Man.

Leaf Spot (Septoria musiva) was heavy at the Sutherland Forestry Station, Sask., in young poplar plantations. (R.C. Russell)

Leaf Spot (Marssonina Castagnei) slightly infected P. alba var. Bolleana in East St. Paul, Man.

Yellow Leaf Blister (Taphrina aurea) was fairly common on P. nigra in North Saanich and was found on P. trichocarpa at Cowichan Lake, B.C. (M. Wilson)

Branch Gall (Macrophoma tumefaciens Shear) severely infected 2 trees of P. tacamahaca (M.W. Cormack). It is reported commonly on P. trichocarpa and P. tremuloides (F. Kaufert. Am. Jour. Bot. 24:24-30. 1937). (I.L. Conners)

Cryptosphaeria populina was collected on Populus sp. (cult.) at Saskatoon, Sask. and Cucurbitaria staphula in good fruit on galls of P. tacamahaca at Beaver Creek, Sask. (R.C. Russell)

QUERCUS - Oak

Leaf Blister (Taphrina caerulescens). Three or four Q. rubra were almost completely defoliated, while other nearby trees of the same planting were not attacked at Macdonald College, Que. (I.H. Crowell). Affected leaves of Q. borealis and of an undetermined species of Quercus were received from Iberville. (D.B.O. Savile)

SALIX - Willow

Scab (Fusicladium saliciperdum) and Black Canker (Physalospora Miyabeana) was again destructive in N.S. Five applications of Bordeaux mixture held the disease in check at Grand Pre. Control was not as complete as has been secured in the past with this number of applications, but weather conditions were unfavourable for spraying, but very favourable for the spread of the disease (K.A. Harrison). Scab was general and destructive on willows throughout N.B. (J.L. Howatt). The disease was general from Bellechasse county to Rimouski, Que. A few trees have remained perfectly healthy so far, while trees all around them have been killed. (C. Perrault)

Cryptomyces maximus was severe on Salix pellita at Tisdale, Sask., and was evidently highly parasitic, as many limbs had been killed (W.P. Fraser and R.C. Russell)

Other fungi collected on native willows this year include Diaporthe tessella, Valsa boreella, Hypoxylon Blakei Berk. & Curt. (det. J.E. Bier) on Salix planifolia; Mastomyces proboscidea (Fr.) Sacc. and its perfect stage, Scleroderris fuliginosa (Fr.) Karst. on S. pellita and Diplodina Salicis West. (R.C. Russell)

Rust (Melampsora sp.) was discovered on the stems of S. serissima and S. pyrifolia, in early June, the lesions reaching a diameter of five-eights of an inch. According to Dr. G.B. Cummins, several collections of M. Bigelowii on willow stems are in the Perdue Univ. Herbarium and Dr. G.R. Bisby states that some European species of Melampsora occur on willow bark. (W.P. Fraser and R.C. Russell)

SORBUS - Mountain Ash

Fire Blight (Erwinia amylovora) severely affected several trees at Charlottetown, P.E.I. (R.R. Hurst)

Rust (Gymnosporangium Juniperi) was heavy on all mountain ash trees at Kipling Island, Lake of the Woods, Ont. (A.M. Brown)

Canker (Cytospora sp.) caused moderate damage to mountain ash at Edmonton, Alta.

THUJA - Arbor Vitae

Needle Spot (Keithia thujina) was general and caused moderate damage to T. plicata on Vancouver island and the lower mainland, B.C. (W. Jones)

Poria Weirii was collected in Feb. on T. plicata in North Saanich, B.C. Det. by Irene Mounce (W. Jones).

TSUGA - Hemlock

Sapwood Rot (Poria tsugina) was seemingly the cause of the death of several T. canadensis trees on Isle Perrot, Que. (I.H. Crowell)

ULMUS - Elm

Black Spot (Gnomonia Ulmi) was general on a clump of old trees causing premature leaf drop in Lincoln county, Ont. The disease was also occasionally noted on scattered trees (G.C. Chamberlain). It was severe on U. pumila, Chinese elm, at Brockville, Ont. (I.L. Conners). Several trees of U. americana were so heavily infected at Macdonald College, Que., that they were defoliated almost completely by early August (I.H. Crowell). Black spot was

heavy on young trees, but the damage was slight in York county, N.B. (J.L. Howatt). The disease caused partial defoliation of U. americana at Lawrencetown, N.S. About 60% of the leaves were affected. (J.F. Hockey)

Root Rot (Armillaria mellea) was apparently responsible for the death of 3 scattered trees in Ste. Anne de Bellevue and nearby Senneville, Que. (I.H. Crowell)

VI. DISEASES OF ORNAMENTAL PLANTS

ACONITUM - Monkshood

Crown Rot (Phytomonas Delphinii) infected odd clumps of A. bicolor (A. ?Fischeri) at Brandon, Man. This is the first record on Aconitum in Canada.

ALTHAEA ROSEA - Hollyhock

Rust (Puccinia Malvacearum) was moderate to severe at Summerland, Westbank, and Grand Forks, B.C. (G.E. Woolliams). A severe infection was found in one garden at Edmonton, Alta. It had not previously been recorded in Alta. (A.W. Henry). Rust was more severe at Winnipeg by July 25 than in former years. The disease was prevalent throughout Ont. in 1938 (J.E. Howitt). Rust was very severe in some places in western Que. (F. Godbout). It was severe and caused severe damage in many gardens in York county, N.B. (S.F. Clarkson). Hollyhocks were almost completely destroyed by rust at the Station, Charlottetown, P.E.I., by mid-summer. Spraying did not effectively control the disease because conditions were ideal for spore germination and subsequent infection throughout July and August (G.W. Ayers).

Leaf Spot (Ascochyta althaeina) infection varied from a trace to severe on the varieties at the Station, Charlottetown, P.E.I. The disease was also reported from Summerside and Souris (R.R. Hurst)

AMELANCHIER

Fire Blight (Erwinia amylovora) killed several branches on each of the following: A. levis, Cotoneaster sp., and Sorbus americana, at Macdonald College, Que. (I.H. Crowell)

AMMOBIUM ALATUM - Winged Everlasting

Foot Rot slightly affected this plant at St. Vital, Man.; Fusarium Solani was isolated from a diseased plant. (W.L. Gordon)

AMPELOPSIS QUINQUEFOLIA - Virginia Creeper

Leaf Spot (Cercospora Ampelopsidis) was severe on the leaves of this vine at Morden, Man.

Powdery Mildew (Uncinula necator). Infection was usually a trace, but in shaded locations it became moderate at Saskatoon, Sask.

ANTIRRHINUM - Snapdragon

Rust (Puccinia Antirrhini) infection was severe about Winnipeg, Man., in September. It was very injurious in gardens at Humberstone, Wallaceburg, and Walkerville, Ont. (J.E. Howitt). Snapdragons were very severely rusted by August in ornamental beds in Lincoln county. (G.C. Chamberlain)

W.R. Foster (Sci. Agr. 18:524-526. pl.1. 1938) finds that Bordeaux 4-4-40 plus a spreader, such as Agral 2, is an effective preventive of rust in snapdragons grown for seed in B.C. Two applications are made before the plants begin to flower. All volunteer and other snapdragon plants must be destroyed before spring. This fungicide renders the plants unsightly for ornamental purposes. Buisol, one pint to 10 gals.; Bordinette, 1 lb. to 10 gals.; Copper Hydro, 1 lb. to 10 gals.; Burgundy, 4-5-40 plus Agral 2 is recommended for trial on ornamental plants.

Root Rot and Wilt (cause unknown). A few plants were affected in a garden in East St. Paul and odd plants wilted at the Farm, Brandon, Man.

Root Knot (Heterodera marioni) caused a severe stunting in greenhouse plants in Lincoln county, Ont.

AQUILEGIA - Columbine

Rust (Puccinia Clematidis) affected a few cultivated plants forwarded to the Laboratory from Salmon Arm, B.C. (W. Jones)

ARISTOLOCHIA SIPHO - Dutchman's Pipe

Root Rot (Diplodia radicicola Tassi). Several specimens of Dutchman's pipe affected by a root rot were found in Ont. this year. Diplodia radicicola was found associated with the rot. (J.E. Howitt)

ASPARAGUS SPRENGERI

Yellowing and Foot Rot (?Fusarium spp.). A light infection was found in a greenhouse in Winnipeg, Man. The plants became prematurely yellow, due to a foot rot. The same disease has been reported in garden asparagus.

ASTER

Powdery Mildew (Erysiphe Cichoracearum) was severe on the lower leaves at Morden, Man.

Leaf Spot (Septoria atropurpurea) infection was severe at Morden, Man.

Rust (Coleosporium Solidaginis). A few plants of A. apricus brought from Mt. Cheam and grown in a rockery at Agassiz, B.C., were rusted, (W. Jones)

AZALEA

Galls (Exobasidium Vaccinii) were present on a few plants of A. indica micranthae at Cowichan Lake and on Vancouver, B.C. (M. Wilson)

BERBERIS - Barberry

Rust (Puccinia graminis). Aecia were well matured on B. vulgaris on June 7 in the Arboretum, Ottawa, Ont. (C.N. Ross). Rust was severe on a hedge of B. vulgaris at Shediac, N.B. on June 10. One hedge was found at Hartland and two hedges at Dorchester in September. Rust was general on B. vulgaris in Queens county, P.E.I. in July.

CALENDULA

Yellows (virus). A trace was seen in private gardens at Saskatoon, Sask. (T.C. Vanterpool). Yellows affected up to 100% of plants in some gardens at Charlottetown, P.E.I. It was also reported from Summerside and Souris. (R.R. Hurst)

CALLISTEPHUS - China Aster

Yellows (virus) affected half the plants in one garden in Winnipeg, Man. Yellows occurred widely in varying amounts in P.E.I. (R.R. Hurst)

Wilt (Fusarium conglutinans var. Callistephi). Affected plants were received from the Substation, Creston, B.C. (G.E. Woolliams). Over half the plants of susceptible varieties, mainly California Giant Single, were severely affected in a garden at Edmonton, Alta. In adjacent rows of resistant strains of Crego's Giant Mixed and Giant Comet Mixed, infection was a trace and nil respectively (M.W. Cormack). Wilt was reported as severe in one garden in East St. Paul, Man. While the cause of wilt of China asters here is probably F. conglutinans var. Callistephi, other Fusarium spp., such as F. oxysporum f. 6 may be implicated (W.L. Gordon). Wilt was very conspicuous in gardens about Guelph, Ont. In some beds examined, 30-40% of the plants were destroyed (J.E. Howitt). At the Station, Lennoxville, Que., 60% of the plants were affected (H.N. Racicot). Slight infections were present in local gardens at Kentville, N.S. (J.F. Hockey)

CANNA

Soft Rot (Erwinia carotovora) of the rhizomes was severe in about 10% of the plants in one garden in East St. Paul, Man.

CARAGANA

Leaf Spot (Septoria Caraganae) was slight at Edmonton, Alta., but severe at Lacombe, where it caused considerable defoliation. Leaf spot was severe on many hedges at Saskatoon, Sask. This disease makes its appearance every year after July or early August rains. It hastens defoliation by one to several weeks (T.C. Vanterpool). Infection was severe on C. arborescens at Morden and St. Vital, Man., moderate at Bird's Hill, Brandon, and Winnipeg; moderate on C.

arborescens var. Lochbergi at East St. Paul; and severe on C. microphyllum var. Slender Lobe at Morden.

CENTAUREA

Foot Rot (?bacterial). A slight infection was found on Sweet Sultan at Brandon, Man. A trace was reported in a garden at St. Vital. No fungi were isolated from the Brandon material. (W.L. Gordon)

CENTAUREA CYANUS - Cornflower

Rust (Puccinia Cyani) was prevalent in the Horticultural garden, Central Experimental Farm, Ottawa, Ont. (F.S. Thatcher and I.L. Conners). A slight infection was found in a garden planting at Kentville, N.S. (J.F. Hockey). Specimens are in the Herbarium from Fulford, B.C., Toronto, and Westboro, Ont. The rust is reported by Arthur (Man. Rusts in U.S. & Can. p. 349. 1934) from Ont. (I.L. Conners)

CHRYSANTHEMUM

Grey Mould (Botrytis cinerea) affected 25% of the cuttings of Mrs. Seidwitz in Lincoln county, Ont. Several other varieties in the same cutting bed were not affected. (G.C. Chamberlain)

Leaf Spot (Septoria Chrysanthemi) caused slight defoliation of a few greenhouse plants at Melvern Square, N.S.

Yellows (virus) slightly to moderately affected the plants in a greenhouse at Redcliff, Alta.

Foliar Nematode (Aphelenchoides ritzema-bosi Schwartz) ruined a large percentage of large-flowered chrysanthemums of a grower at London, Ont. The leaves of affected plants showed dark spots or blotches. They then withered up and hung down. The flower buds remained small and failed to open. This is the first time the foliar nematode has been brought to my attention. (J.E. Howitt)

Powdery Mildew (Erysiphe Cichoracearum) was severe at Winnipeg, Man., in September. It was heavy on several greenhouse varieties in April at Charlottetown, P.E.I.

Foot Rot caused the death of a number of plants at Morden, Man. Fusarium spp. were isolated, but their identification is as yet incomplete. (W.L. Gordon)

CLEMATIS

Leaf Spot (Septoria Clematidis) was severe at Rosthern, Sask., and on C. ligusticifolia at Morden and Brandon, Man. It is destructive to this plant.

Leaf Spot (Cercospora squalidula) was moderate on C. ligustifolia at Indian Head, Sask.

CONVALLARIA MAJALIS - Lily of the Valley

Rust (Puccinia sessilis) affected 15% of the leaves and an occasional stem in a garden at Kentville, N.S.

COREOPSIS

Witches' Broom (?virus). Odd plants were affected at Brandon, Man.

COTONEASTER

Dark Berry (Phytophthora Cactorum (Leb. & Cohn) Schroet.) was general on C. horizontalis about Victoria, B.C. The normally red berries turn dark to black thus greatly reducing the value of the shrub as an ornamental. Oospore-like bodies were found in abundance in the affected tissue. It was also noted in Vancouver. (W.R. Foster)

CRATAEGUS - Hawthorn

Leaf Spot (Entomosporium Thuemenii (Cke.) Sacc.) was collected at Streetsville, Ont. on C. Oxyacantha (G.D. Darker 6651) and at Mount Denson, N.S. (J.F. Hockey). The disease was common in N.S. this year (I.L. Conners).

Rust (Gymnosporangium clavariaeforme) was heavy on C. Oxyacantha var. rosea in Queens county, P.E.I. (G.W. Ayers)

DAHLIA

Mosaic and Stunt (virus) affected 25% of the dahlias in commercial gardens near London, Ont. (G.C. Chamberlain). Stunt affected a few plants in a private garden at Fredericton, N.B. (J.L. Howatt). Stunt affected practically all the pompom varieties and several others at the Station, Charlottetown, P.E.I. It was also reported from Souris. (R.R. Hurst)

DELPHINIUM - Larkspur

Powdery Mildew (Erysiphe Polygoni) was severe at the Station, Summerland, B.C. A moderate infection was observed at McKague and Saskatoon, Sask. Powdery mildew was severe on dwarf perennial larkspur in one garden in East St. Paul, Man. A moderate infection was present in York county, N.B.

Bacterial Blight (Phytomonas Delphinii) affected a few plants at Salmon Arm, B.C. The disease was severe in York, Sunbury, and Saint John counties, N.B.

Foot Rot. A severe infection was observed in a garden in St. Vital, Man. Fusarium Solani was isolated from the diseased plants. (W.L. Gordon)

Mosaic (virus). An occasional plant was affected in Queens county, P.E.I.

DIANTHUS CARYOPHYLLUS - Carnation

Rust (Uromyces caryophyllinus) was slight to moderate in greenhouses at Lethbridge and Medicine Hat, Alta. It caused moderate damage in a greenhouse at Fredericton, N.B. A slight infection was observed at Sidney Mines and Halifax, N.S. A severe infection was present in the Station greenhouse, Kentville.

Bacterial Leaf Spot (Phytomonas Woodsii(E.F. Sm.) Bergey et al.) so severely affected 300-400 plants of Virginia Rose in greenhouses at Brampton, Ont., that they were destroyed and 300 others showed symptoms of the disease, out of 2,000 plants imported from New York, N.Y., on January 7, 1939. No disease was showing when the plants were imported on Dec. 22, 1938 (A.J. Hicks and W.H. Fowler). Severely infected material was received from a greenhouse in Peel county in Sept. (J.K. Richardson)

GAILLARDIA

Crown Rot (probably Sclerotinia sclerotiorum) caused the death of 5% of the plants in a garden in East St. Paul, Man.

Smut (Entyloma polyspermum) moderately infected this host at Morden, Man.

Yellows (virus) was heavy on all varieties in a private garden at Charlottetown, P.E.I.

GERANIUM

Rust (Uromyces Geranii). Some mature aecia were present on plants in the Arboretum, Ottawa, Ont., on June 8.

GLADIOLUS

Bacterial Blight (Phytomonas gummisudans) slightly infected one planting in Edmonton, Alta. The disease was severe in two gardens in Winnipeg and slight in a commercial planting in Fort Garry, Man. It was of little consequence in Manitoba this year.

Scab (Phytomonas marginata) was general in the bulb districts of B.C., up to 5% of the corms being affected. Slight infections occurred in single gardens at Lethbridge and Edmonton, Alta. Diseased specimens were received from Regina, Sask. (T.C. Vanterpool). A slight to moderate infection of scab was general in the Winnipeg area, Man.; it also occurred at Keewatin, Ont.

Yellows (Fusarium sp. Elegans Section) was much less common in the Winnipeg area, Man., than during 1937. A trace of infection occurred at Keewatin, Ont. In an experiment using corms from root rotted plants (Fusarium yellows) in 1937, only 3% of the corms grew when planted in 1938 at Winnipeg. The disease appears to be identical with that reported by R. Nelson (The Gladiolus, Int. Ed. 124-131. 1938). (J.E. Machacek and W.L.Gordon)

Yellows was prevalent throughout southern Ontario, especially on the varieties Albatross, America, Dr. F.L. Bennett, Break of Day, Crimson Glow, Duna, Halley, Purple Glory, and Star of Bethlehem. The damage was worst in districts, which had a hot dry spell in July (A.J. Hicks). For a more detailed account see A.J. Hicks. A survey of gladiolus growing in Ontario, with special reference to disease. Reprint Can. Gladiolus Soc. Annual 6 pp. 1939. (I.L. Conners). Yellows was severe on Rose Marie Pfitzer, Bagdad, Commander Koehl, Star of Bethlehem, Duna and Acadia in a garden at Cornwall, P.E.I. (G.W. Ayers)

Root Rot (unknown). Only traces of this root rot, which was in epidemic form last year could be found at Saskatoon, Sask., this year. This was true even for areas which were heavily infested in 1937. Growing conditions, however, were excellent in 1938. Out of some 12 isolates made from diseased roots in 1937, only a Pythium sp. caused conspicuous root rot in greenhouse tests. Some Fusarium spp. caused slight retardation of growth. (T.C. Vanterpool)

As a root rot, Yellows has been known from P.E.I. since 1933 (P.D.S. 13:68, 14:84; 15:67) and in Sask. and Man. since 1937 (P.D.S. 17:76) (cfr. also R. Nelson, Bull. Mich. Gladiolus Soc., Spring 1938, 4 pp. mimeo) (I.L. Conners)

Fusarium Corm Rot (F. oxysporum var. Gladioli Massey). Corms of the variety Gertrude grown at Winnipeg, Man., in 1937, developed this corm rot during storage. The variety was severely affected. Isolations of the causal organism were made and its pathogenicity compared with a culture originally obtained from the Centraalbureau, Baarn, Holland. Both were quite pathogenic. This is the first record of the disease in Canada (cfr. L.M. Massey. Phytopath. 16:509-533. 1926). (W.L. Gordon)

Penicillium Corm Rot (Penicillium Gladioli). Three hundred corms of the variety F.J. McCoy from a grower in the United States and planted at Winnipeg, Man., were partially or completely destroyed. Another lot of the same variety from a different source showed no sign of the disease (J.E. Machacek). Several affected corms were received from P.E.I. growers (R.R. Hurst). Storage rots caused by Penicillium sp. and Botrytis sp. caused a loss of 1% of the corms among the commercial growers in B.C. (R.J. Hastings)

Dry Rot (Sclerotinia Gladioli) was found affecting about 1% of the plants in the field and 1-20% of the corms in storage in B.C. (R.J. Hastings)

Hard Rot (Septoria Gladioli) was affecting 75% of the corms of a grower at Charlottetown, P.E.I.

Leaf Spot (virus suspected) was slight in the bulb areas of B.C., except in Libelle, E.J. Shaylor, Bill Snowdon, and others, in which infection was severe (R.J. Hastings). The disease was present

throughout southern Ont.; infection was 100% in the varieties J.W. Crow, T.E. Langford, Pink Lady, Byron L. Smith, Southern Cross, and Queen Mary. The symptoms are a red flecking or spotting on the leaves (A.J. Hicks).

Leaf Spot (cause unknown) was severe particularly in cormel stock at Belleville, Ont. It was specially severe in Commander Koehl, Marmora, Pink Magnet, Red Lory, and Vagabond Prince. The symptoms are fairly large, circular or oval spots, which are light brown at first, becoming darker later. Towards the end of the summer the affected leaves become shredded about the larger spots. (A.J. Hicks)

HELIANTHUS - Sunflower

Crown Rot (Sclerotinia sclerotiorum) severely affected the 2 plants of H. californicus in a garden at Charlottetown, P.E.I.

HYDRANGEA

Grey Mould (Botrytis cinerea) affected a few leaves on a plant at Kentville, N.S.

IRIS

Leaf Spot (Heterosporium gracile) is usually present on the mainland and Vancouver island, B.C., wherever iris is grown. On German iris the disease causes a spotting or sometimes a blighting of the foliage. Where sanitary measures are strictly applied it is hardly evident. In bulbous iris it was prevalent in some plantings; in one the flower crop was a total loss and the early death of the tops greatly reduced the bulb yield. Beds that were boxed early to hasten flowering were more severely affected than open beds. On bulbous iris it causes a scorching of the foliage, but the lesion itself is grey, i.e., there is a grey spot surrounded by a reddish area (W. Jones and R.J. Hastings). The infection was reported to be slight at Windermere, B.C.; slight at Brooks and moderate at Vermilion, Alta.; severe on many species and varieties of Iris at Morden, and moderate at Brandon, Man.; slight in Lincoln county, Ont.; severe at Cap Rouge, Que.; very prevalent on some varieties at Kentville, N.S., and fairly prevalent in P.E.I.

Ink Disease (Mystrosporium adustum) affected 5-10% of the bulbous iris in B.C.; the damage was slight. The spots do not have the grey centre of the Heterosporium leaf spot. The reddish discoloration surrounds irregular dark areas, which lack a definite margin (R.J. Hastings)

Nematodes (Ditylenchus dipsaci) infected an average of 2-3% of the bulbous iris grown in B.C. (R.J. Hastings). Nematodes were evidently responsible for the failure of a large number of bulbous iris, variety Wedgewood, from B.C. in the hands of a florist at Brampton, Ont., in October. (J.K. Richardson)

Storage Rot (Penicillium spp.) affected 2-3% of the bulbous iris in B.C.

Mosaic (virus) affected 2-3% of the bulbous iris in B.C., judged by occurrence of flower spotting only (R.J. Hastings)

Rhizome Rot (Erwinia carotovora) caused moderate to severe damage at the Sub-station, Beaverlodge, Alta. Infection was severe at Brandon, Man., in June and in one variety at Morden. Rhizome rot was reported several times in P.E.I. and completely destroyed the plants in 2 gardens at Charlottetown.

Botrytis Rhizome Rot (Sclerotinia convoluta) was observed on one plant at Summerland, B.C. (R.E. Fitzpatrick). The only previous report of this disease in Canada is that of Drayton, who found it near Ottawa in 1927 (H.H. Whetzel and F.L. Drayton. Mycologia 24:469-476. 1932).

LATHYRUS ODORATUS - Sweet Pea

Powdery Mildew (Microsphaera diffusa) was present, but appeared too late in most gardens at Saskatoon, Sask., to cause any damage (T.C. Vanterpool). It was severe in one large planting in St. Vital, Man. Infection was moderate at Farnham, Que. It was very common and destructive in Queens county, P.E.I.

Mosaic (virus) affected a few plants at Victoria, B.C. (W.R. Foster)

Streak (virus). A trace was present in one garden at Saskatoon, Sask. It was severe in a garden at East St. Paul, Man. It was present at Charlottetown, P.E.I.

Root Rot. A slight infection of root rot and wilt occurred in a garden in East St. Paul, Man. Root rot (Fusarium sp.) had been severe for two years in a bed, where sweet peas had been sown for 15 years, at Farnham, Que. Root rot (Rhizoctonia sp.) was moderate to severe in a garden at Charlottetown, P.E.I.

LAVATERA - Tree Mallow

Leaf Spot (cause undetermined) was severe at Morden, Man.

LIGUSTRUM - Privet

Powdery Mildew (Microsphaera Alni) was prevalent, but caused little injury to L. vulgare in Lincoln county, Ont. It was heavy, causing early defoliation at the Station, Charlottetown, P.E.I.

LILIUM - Lily

Blight (Botrytis elliptica) was fairly prevalent in bulb growing sections of B.C., but damage was severe on L. candidum only. The disease was in general severe at Morden, Man., particularly on L. Davidii and L. martagon; at Brandon L. philadelphicum was moderately infected.

MAHONIA AQUIFOLIUM - Oregon Hollygrape .

Rust (Uropyxis sanguinea) was general in North Saanich, B.C.

MATHIOLA - Stock

Powdery Mildew (Erysiphe Polygoni) was severe at the Station, Summerland, B.C.

MECONOPSIS BAILEYI - Tibetan Poppy

Bacterial Blight (Phytomonas papavericola Bryan & McWhort.) was severe in a garden at Salmon Arm, B.C.; the plants gradually die down (W. Jones). This is the first report of the disease in Canada.

NARCISSUS

White Mould (Ramularia vallisumbrosae) rarely occurs in field plantings of narcissus in B.C., but in 1938 it was found in the Victoria, Gordon Head, and Cowichan districts of Vancouver island and at Bradner, B.C. The injury was slight, but up to 50% infection occurred in certain varieties. The greatest injury occurred on varieties with small leaves which were killed back to a considerable degree, while on large-leaved varieties, the leaves were split, curled or distorted. (R.J. Hastings)

Scorch (Stagonospora Curtisii) was general but injury was slight in B.C.

Smoulder (Botrytis narcissicola) was slight in B.C., except in Golden Spur and Obvallaris varieties where losses amounted to 10-30%.

Nematode (Ditylenchus dipsaci) was in general slight in B.C., but in some plantations up to 10% of the plants were affected.

Mosaic (virus) was slight in B.C.

NIGELLA - Love-in-a-Mist

Foot Rot (Fusarium spp. associated). A slight to moderate infection occurred on the variety Miss Jekyl, at Brandon, Man. The identification of the isolations from diseased plants is as yet incomplete. (W.L. Gordon)

OENOTHERA - Evening Primrose

Powdery Mildew (Erysiphe Polygoni) moderately infected the lower leaves of cultivated Oenothera at Morden, Man.

Leaf Spot (Septoria Oenotherae) affected a few plants at Agassiz, B.C. (W. Jones). A slight infection was observed at Morden, Man.

PAEONIA - Peony

Blight (Botrytis Paeoniae). As a leaf blight the disease was generally slight at Morden, Man., but it was severe on some varieties; crown rot and wilt occurred on odd plants at Brandon. Blight was very prevalent about Guelph, Toronto, and Kincardine, Ont. (J.E. Howitt). Blight affected about half the flower buds at Ste. Anne de la Pocatiere and Cap Rouge, Que., and in 3 gardens visited in Quebec City. Only an occasional stalk went down with the disease (C. Perrault). Blight caused moderate to severe damage in York, Sunbury, Carleton, and Saint John counties, N.B. The disease can be held in check by applying 2 sprays of Bordeaux mixture before the plants come into blossom (J.L. Howatt and S.F. Clarkson). Infection was slight in most gardens at Kentville and moderate at Nappan, N.S. Infection was usually heavy in all parts of P.E.I.

Root Knot (Heterodera marioni) was severe on 2 plants in a garden at Charlottetown, P.E.I. (R.R. Hurst)

Mosaic (virus). What appears to be a mosaic has been under observation for 3 years on one plant in a garden at Charlottetown, P.E.I.

Ring Spot (virus) was moderate at Saskatoon, Sask. Ring spot was much less severe than in recent years at Morden, Man.; it was severe on Albatross; moderate on Souvenir d'Auguste Miellez, Atro-sanguinea and Triomphe de l'Exposition de Lille.

Leaf Mould (Cladosporium Paeoniae) infection was general and heavy in late summer at the Vineland Experimental Station, Ont. (D.L. Bailey)

Leaf Spot (Phyllosticta Commonsii) infection was moderate at Vermilion, Alta.

Leaf Spot (Alternaria sp.) was heavy on one plant at Saskatoon, Sask.

PAPAVER - Poppy

Foot Rot slightly affected poppies of the Shirley group at Brandon, Man. Fusarium spp. were isolated from diseased plants. (W.L. Gordon)

PELARGONIUM - Geranium

Grey Mould (Botrytis cinerea) was general as a leaf spot in one greenhouse at Victoria, B.C. (W. Newton)

PENTSTEMON

Leaf Spot (?Ramularia sp.) moderately infected a few plants of P. secundiflorus and P. unilateralis at Morden, Man.

PETUNIA

Powdery Mildew (?Erysiphe Cichoracearum) became severe in November on P. hybrida flore pleno brought into the house at Winnipeg, Man. It appeared late in the season on window-box petunias at Ottawa, Ont.

Yellows (virus) slightly affected petunia at Lethbridge, Alta. The disease, although common in 1937, was absent this year at Saskatoon, Sask. (T.C. Vanterpool).

PHLOX

Powdery Mildew (Erysiphe Cichoracearum) was very prevalent about Guelph, Ont.; some varieties were ruined by it. (J.W. Howitt). It was also present in many gardens about St. Catharines, but it caused only slight damage. (G.C. Chamberlain)

Leaf Spot (Septoria divaricata) was relatively severe on P. divaricata varieties O. Wittig, Carillon, Ada Blackjack, and Miss Lingard at Morden, Man. It has been previously reported in Man. on P. Drummondii (W.L. Gordon). The disease was general and heavy on several varieties of perennial phlox causing much leaf killing at Vineland Experimental Station, Ont. (D.L. Bailey).

PRUNUS - Plum

Black Knot (Dibotryon morbosum) was so severe in a hedge of P. Pissardi at Port Hope, Ont., that the correspondent fears it will be eventually destroyed. (H.N. Racicot)

Blight (Sclerotinia americana). Diseased specimens of P. triloba were received from Montreal, Que. (H.N. Racicot)

RHAMNUS - Buckthorn

Crown Rust (Puccinia coronata). The aecia were abundant on June 1, on the leaves and also on stems and fruits of a R. cathartica hedge at the Station, Fredericton, N.B. (J.L. Howatt). Infection was slight on R. cathartica hedge at St. Croix, N.S.; maturing aecia were present on June 18 (J.F. Hockey). Rust on buckthorn was general, but not abundant in Queens county, P.E.I.

ROSA - Rose

Rust (Phragmidium spp.) was severe on both cultivated and wild roses on Kipling island, Lake of the Woods, Ont. It was severe on some plants of Banchee and other varieties at Morden, Man. Rust is abundant on roses in gardens about Guelph, Ont. (J.E. Howitt). Rust infection was slight on roses at Ste. Anne de la Pocatiere, Que. Earliest infections were noted about mid July (C. Perrault). Rust caused severe damage to roses in Carleton, York, and Sunbury counties, N.B.

Powdery Mildew (Sphaerotheca pannosa) was severe at the Station, Summerland, B.C. The disease was light at Saskatoon and Indian Head, Sask. It was commonly found on Captain Heywood at Winnipeg, Man. Powdery mildew was particularly prevalent this year on hybrid tea, hybrid perpetual, and rambler roses in the Lincoln county area, Ont.; and caused more damage than usual on account of its early appearance (G.C. Chamberlain). It was prevalent on rambler roses throughout the province (J.E. Howitt). Powdery mildew was severe on rambler roses at Macdonald College, Que., and moderate at Farnham. The disease was troublesome this year on rambler roses in P.E.I. (R.R. Hurst)

Black Spot (Diplocarpon Rosae) was general and caused some defoliation on Vancouver island and the Fraser valley, B.C. (W. Jones). It was severe on Austrian Copper and moderate on Persian Yellow at Saskatoon, and several varieties at Indian Head, Sask. A moderate infection occurred on some varieties at Morden, Man. Black spot disfigured to a marked extent, hybrid tea roses at Guelph, Ont., and caused severe defoliation of 20-30% of the plants (J.E. Howitt). In Lincoln county black spot was less prevalent than usual and only of some importance very late in the season on hybrid teas (G.C. Chamberlain). Black spot was severe in commercial greenhouses at Fredericton, N.B.; damage was severe on unsprayed garden roses in York county (S.F. Clarkson). The disease was heavy on Mrs. John Lang, Blaze, and Frau Karl Druschki at Charlottetown, P.E.I. It was also reported from Alberton, Freetown, and Souris. (R.R. Hurst)

Stem Canker (Coniothyrium Fuckelii) was found slightly affecting only Briarcliffe hybrid tea in a greenhouse at Grimsby, Ont. (G.C. Chamberlain)

Grey Mould (Botrytis sp.) destroyed about 40% of the flower buds in a garden at Ste. Anne de la Pocatiere, Que., in July, which greatly reduced the number of flowers and shortened the blooming period. (C. Perrault)

SOLIDAGO - Goldenrod

Leaf Spot (Septoria sp.) was moderate on cultivated goldenrod at Morden, Man.

Rust (Coleosporium Solidaginis) infection was severe on two varieties at Morden, Man.

STATICE

Leaf Spot (parasitic) was severe on S. sinuata at Morden, Man.; the fungus was too immature for positive identification.

Foot Rot (Fusarium spp. associated). Odd plants of Yellow Statice were affected at Brandon, Man.

Yellows (virus) was severe on S. latifolia in a garden in East St. Paul, Man.

SYRINGA - Lilac

Blight (Phytomonas Syringae) moderately affected about 20% of the bushes at Blackfoot, Alta. (A.W. Henry). Blight was first observed at Marysville, N.B., and the Station, Fredericton, on June 13. In N.B. infection was heavy and the damage severe in the spring; the first shoots are blackened and killed and the first leaves heavily spotted. (J.L. Howatt and S.F. Clarkson)

Powdery Mildew (Microsphaera Alni) was prevalent in June in Lincoln county, Ont. (G.C. Chamberlain). Lilac hedges were all severely affected by September in N.B. (S.F. Clarkson). Traces of powdery mildew were observed in Queens and Prince counties, P.E.I., in Sept. (R.R. Hurst)

Grey Mould (Botrytis cinerea) was severe as a twig blight on the hedges in Saint John and York counties, N.B.; it was associated with bacterial blight (J.L. Howatt and S.F. Clarkson). A moderate infection of twig blight was present on some white lilacs at Charlottetown, P.E.I. The disease was very troublesome in 1936 and 1937, but it was less severe in 1938. (R.R. Hurst).

Root Rot (cause unknown). A few bushes were wilted due to a root rot at Morden, Man.

TAGETES - Marigold

Foot Rot (Fusarium spp. associated). Odd plants of the variety Golden Gem were infected at Brandon, Man.

Yellows (virus) was observed on T. patula in Charlottetown, P.E.I.; the individual plants were severely affected.

TULIPA - Tulip

Fire (Botrytis Tulipae) infection was general in commercial plantings on Vancouver island, B.C. Primary infection varied from 0.1 to 5% (R.J. Hastings). The disease was very prevalent about Guelph and in many other parts of Ont. In one bed over 40% of the plants were disfigured by fire (J.E. Howitt). Diseased specimens were received from Hemmingford, Que. (F.L. Drayton). A few affected plants were seen in a test bed at Kentville, N.S., and specimens were received from Annapolis county (J.F. Hockey). The disease was general in many gardens about Charlottetown, P.E.I. (R.R. Hurst)

Break (virus). The incidence of tulip break has been reduced by roguing on Vancouver island, B.C. (R.J. Hastings). Break affected 1% of the plants in a garden at Charlottetown, P.E.I.

Basal Rot (Fusarium bulbigenum and F. Solani) severely infected several small bulbs of the 1938 crop at Winnipeg, Man. Isolations yielded most commonly, Fusarium bulbigenum and occasionally F. Solani. Rhizoctonia Solani was isolated to a limited

extent and in association with the Fusaria. It was thought to be secondary. (W.L. Gordon)

Bulb Rot (Sclerotinia sp.) had destroyed about 10% of a planting of 200 bulbs in a garden at Westmount, Que., when it was examined on May 20. This was the same bed, where the disease was observed two years ago. The soil had been removed and replaced with fresh soil at that time (H.N. Racicot). The disease has been found in Canada on two occasions previously, and cultures of the fungus are indistinguishable from a fungus causing a root rot of sweet clover in Alta., which has been studied by Dr. Cormack (Progress Rept. Dom. Bot. 1935-37. pp. 40-41. 1938).

Blossom Blight (Phytophthora Cactorum (Leb. & Cohn) Schroet.) was found at Belleville, Ont., this year. (J.E. Howitt). This is evidently a new disease for Canada.

ZANTEDESCHIA - Calla Lily

Soft Rot (Erwinia Aroideae) was estimated to have destroyed one third of the tubers of 9,000 plants at Brampton, Ont., in Jan. 1938. About 4% of the plants were affected by a crown rot in a greenhouse in Lincoln county in Oct. 1938. (G.C. Chamberlain)

ZINNIA

Powdery Mildew (Erysiphe Cichoracearum) was common in gardens in Lincoln county, Ont. (G.C. Chamberlain).

Yellows (virus) was severe on 8-10% of the plants in a garden at Charlottetown, P.E.I.

Wilt (Fusarium sp.) affected 20% of the plants at the Station, Summerland, B.C. (G.E. Woolliams)

Stem Rot (Sclerotinia sclerotiorum) destroyed 1% of the plants in a bed at Senneville, Que.

Grey Mould (Botrytis sp.) destroyed a small planting of Dwarf Double Spun Gold zinnias in a garden at Charlottetown, P.E.I.

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