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DIVISION OF BOTANY AND PLANT PATHOLOGY

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NINETEENTH ANNUAL REPORT OF THE CANADIAN PLANT DISEASE SURVEY

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FOREWORD

The present report is the Nineteenth Annual Report to be issued and the eleventh compiled by the present writer.

For several years the amount of data secured for incorporation in these reports has steadily increased, so that a wealth of material was available last fall. Since the opportunities for survey work will be considerably curtailed for several years on account of the War, it was decided to follow the general plan of the previous Reports for this year presenting all the essential data, but at the same time presenting the material in as compact form as possible.

I am indebted, as usual, to a great many collaborators. It is difficult to single out individual contributors, but I would like to mention Drs. W.L. Gordon, J.E. Machacek, T. Johnson and others of the Winnipeg Laboratory, who reported on various cereal diseases in Manitoba and the West, and also collaborated in studying diseased material from eastern Canada. In my observations on cereal diseases in Quebec, I was assisted by Mr. David Leblond of the Provincial Department of Agriculture while Messrs. K. Harrison, S.F. Clarkson, and G.W. Ayers continued the work on cereal diseases in the Maritime Provinces carried out by me in 1937 and 1938. Many valuable notes on diseases of forage legumes were contributed by Drs. M.W. Cormack and I.H. Crowell for Alberta and Quebec respectively. A special section on virus diseases isolated from potato varieties in cultivation in Canada was prepared by Mr. D.J. MacLeod of the Fredericton Laboratory.

Dr. R.S. Willison, St. Catharines, Ont., and Dr. R.E. Fitzpatrick, Summerland, B.C., have recorded their findings on several fruit tree diseases under investigation. In closing I would also acknowledge the co-operation of the Provincial workers, Prof. J.E. Howitt, Guelph, and Messrs. Fernand Godbout and Edouard Lavallee, Montreal, Messrs. W.A. Ross, H.G. Crawford and C.R. Twinn of the Entomological Division, and the District Potato Inspectors, all of whom have supplied valuable data. Besides the collaborators specifically mentioned, I wish to thank every one, who has supplied material for the survey.

May 22, 1940.
Central Experimental Farm,
Ottawa, Canada.

I.L. Conners,
Associate Plant Pathologist.

New or Noteworthy Diseases

Stem rust of wheat was of little importance in Canada in 1939. For the first time in at least a decade it caused only minor losses in Manitoba. One of the factors contributing to reduced rust infection was the limited amount of inoculum available to infect susceptible varieties. In Manitoba, 77% of the wheat acreage was sown to the new rust-resistant varieties, Thatcher and Renown; about 18% to durum wheats, chiefly Mindum; and the remaining 5% to Marquis, Ceres, Reward, and other susceptible varieties. Large acreages of varieties resistant to stem rust were also sown in the spring wheat region of the United States and eastern Saskatchewan. Moreover stem rust was much less prevalent than normal in the winter wheat areas in the United States and thus there was little primary inoculum reaching the spring wheat areas. Further, weather conditions during July and August retarded rust development. Rust infection was likewise limited in Eastern Canada. The growing of Coronation, and other rust-resistant varieties is increasing and while the weather was more favourable for rust development particularly in the Maritime Provinces, the prevailing drought throughout the States along the border greatly reduced the initial inoculum in Canada.

Stem rust of oats was generally very light throughout Canada. Some rust damage occurred in a few late fields of susceptible varieties in the West. In general, stem rust was light in the East, except in the Eastern Townships of Quebec, where considerable rust was recorded at harvest time. Elsewhere, severe outbreaks were limited and most of them were definitely connected with plantings of barberries in close proximity to the infected fields.

Crown rust of oats was also light throughout Canada, due to unfavourable weather conditions for its development. Nevertheless, considerable crown rust developed in certain areas, and while every case has not been investigated, outbreaks have been found repeatedly centering about plantings of buckthorns.

There was no appreciable change in the amount of wheat bunt (Tilletia caries and T. laevis) in Western Canada, the percentage of cars grading smutty being 0.26%. The oat smuts (Ustilago Avenae and U. Kolleri) were again present in considerable amounts across Canada. The average percentage was: Alberta and Saskatchewan, less than 1%; Manitoba, 4.4%; Ontario, 1.3%; Quebec, 2.7%; New Brunswick, 3.1%; Nova Scotia, 2.3%; and Prince Edward Island, 7.5%. The figure for the latter province was higher than usual. In general, covered smut is more common in oats than loose smut. Loose smut of barley and wheat occurred only in small amounts. However, certain of the newer barley varieties showed regularly rather high percentages.

Damage from common root rot (Helminthosporium sativum and Fusarium spp.) was the subject of special study in Manitoba. Fields selected at random in each of the major agricultural soil zones was systematically sampled. The plants from each field were divided into 4 classes, viz.: (1) healthy; (2) slightly root-rotted; (3) moderately root-rotted; and (4) severely root-rotted. The number of plants in each class was counted, each class was threshed separately and the yield obtained. It was found that on the average 21.9% of

the plants were diseased with an average loss in yield of 7.5%. The loss in yield was particularly striking in the plants classified as slightly affected.

Browning root rot (Pythium spp.) was prevalent in a number of districts in Alberta. This fact suggests that the disease is on the increase in that province. Browning root rot was of considerable importance in Saskatchewan, but it was only observed in a few fields in Manitoba.

Head blight was observed in slight amounts in wheat and barley in Quebec and the Maritime Provinces, while its occurrence was also reported in oats in Quebec. The disease may in reality be much more important than these records indicate, for these field surveys have to be carried out before the greater part of the crop is approaching maturity. Nevertheless, isolations from diseased material collected on such surveys do indicate what pathogens are operating. In wheat, species of Fusarium, particularly F. graminearum, the imperfect stage of Gibberella Saubinetii, were most frequently isolated from diseased spikelets. In barley, Fusarium Poae was the leading fungus, but Helminthosporium sativum was also important. In oats, Fusarium avenaceum was most frequently isolated from affected spikelets; in fact, it was recorded from all collections.

Head discoloration is often conspicuous in wheat varieties in many parts of Canada. While Alternaria, Cladosporium, and other more or less saprophytic fungi are frequently isolated, Septoria nodorum, the cause of glume blotch, was most common in material from Quebec and the Maritime Provinces.

Kernel smudge is a common defect of durum wheat in some seasons in Western Canada. In 1938, 25.4% of the cars of Amber Durum had kernel smudge marked against them, while in 1939 only 0.3% were so affected. The trouble was largely confined to the Red River Valley, Manitoba.

Yellow leaf blotch (Pyrenophora Tritici-repentis (Helminthosporium Tritici-repentis) appeared in epidemic proportions over most of the wheat-growing area in Manitoba. It was also recorded from Saskatchewan and Quebec. A rather complete account of our present knowledge of the disease appears on pp. 12-14 of the report.

Speckled leaf blotch (Leptosphaeria avenaria (Septoria Avenae) and leaf blotch (Helminthosporium Avenae) are both well recognized diseases of oats in Canada, but in the summer of 1939 both were found occurring simultaneously in many fields in Quebec. Leaf blotch is characterized by narrow stripes usually much narrower than long with parallel sides. Soon after the spots become necrotic the conidiophores of the fungus can be found. In speckled leaf blotch, the individual spots are broadly ellipsoid, on which the darker pycnidia may often be seen. As soon as these symptoms were clearly recognized, the two diseases could be assessed without difficulty in the field. They occurred in widely varying proportions. Field observations were supplemented by examination of a representative series of collections in the laboratory, from which it was learned that speckled leaf blotch also occurred in eastern Ontario and the Maritime Provinces.

Prairie Provinces, being particularly prevalent in Manitoba and northern Saskatchewan. Dr. Hagborg reported that only a portion of the fields in Manitoba showed a distinct chlorotic halo about the lesion, but all collections yielded typical P. coronafaciens. Its distribution in the East is not known.

Bacterial wilt (Phytomonas insidiosa) of alfalfa was found to be a destructive disease in the irrigated districts of southern Alberta. The disease appears to have been introduced rather recently and it is feared it may become a serious problem. Grimm, almost the only variety grown in Alberta, is also one of the most susceptible. The disease has already been reported from British Columbia. A new root rot of sweet clover caused by Phytophthora Cactorum was also discovered in Alberta.

A trouble of mangel, which has been known for several years in N.B., was shown to be of virus nature and was tentatively identified as curly top. A second condition in N.B., provisionally called fern leaf was thought to be of virus nature, but it was not successfully transmitted by sap inoculation.

Crested wheat grass was found affected by smut for the first time in Canada, when it was detected in a sample of seed from Spruce Home, Sask. The smut was identified as Ustilago Hordei.

Among the diseases of vegetables, the bacterial blights of beans, particularly halo blight (Phytomonas medicaginis var. phaseolicola), have caused great concern. Bacterial blight was reported from Alberta eastward, while halo blight was abundant in British Columbia and was reported from Alberta and Manitoba. According to Mr. D. Simpson, it was present in a sample of 1938 seed from Kitchener, Ont. The seed is often badly affected. Aster yellows in carrots appears to be definitely on the increase; some severe infections were reported this year in New Brunswick and Nova Scotia. Anthracnose (Marssonina Panattoniana), a new disease of lettuce for Manitoba, was severe at Brandon and about Winnipeg.

Late blight (Phytophthora infestans) of potato was less important than usual over large sections of the country, which fact is in marked contrast to the severe epidemic of 1938.

Bacterial ring rot (Phytomonas sepedonica) continues to be a very serious disease of potato. It was located in 12 townships in the irrigated districts of Alberta, and it was found for the first time in Eastern Ontario, although the number of cases in Ontario was small. The situation in Quebec remained unchanged, but the disease was located in over double the number of fields in N.B. than last year. Several new cases were found in P.E.I. and it was reported for the first time in N.S., where one field was found affected. Bacterial ring rot has not yet been discovered in B.C.

Psyllid yellows and a possibly associated net necrosis were rather severe at some points in southern Alberta this year, but they were far less general than last. Severe losses, however, were occasioned this year by planting seed lots affected by net necrosis. It was shown experimentally that

a seed lot might give poor germination even where only a few tubers were visibly affected. Curly top (virus) was believed to have affected scattered potato plants in the Okanagan valley, B.C. The disease has been known on tomatoes and some other plants for a long time, but it has not been previously recorded on potato. In a separate section of the report are recorded the viruses that have been isolated by Mr. D.J. MacLeod from various potato varieties being grown in Canada.

Tobacco streak, which was found for the first time in 1938, was observed this year in both Ontario and Quebec. Downy mildew or blue mould appeared for the second consecutive year and apparently overwintered for it appeared first on seedbeds where it was present in 1938. Phytophthora Rot (P. Cactorum) occurred on the fruit of tomato in several greenhouses in Ontario; it was also observed in 1935, but not reported to the Survey. Phoma rot (P. destructiva) was reported for the first time as a destructive rot in a field in Ontario. A Typhula rot, which has been known for several years in pit-stored turnips in B.C., has been ascribed to a new species, T. umbrina.

Possibly the most significant development in the fruit disease situation is the discovery of several new diseases of cherries and plums. Some of these are of a virus nature, others appear to be physiological, and several remain to be investigated. Some interesting evidence is presented on the fluctuation of peach yellows and little peach with the rise and fall of the vector population.

No new diseases of particular interest were reported on trees or ornamentals.

The Weather and Its Influence on Plant Disease

In the Coastal regions of British Columbia, winter damage to fruit trees, strawberry plants, and berry canes was negligible. In May, however, late frosts did considerable damage to the strawberry blossoms in the Fraser Valley areas and to the current season canes of loganberries and blackberries in some plantings on Vancouver Island. The months of March and April were comparatively dry but precipitation for May, June, and July was well above the average.

Seeding was completed in good time and the yield of fodder crops, grains, and vegetables was better in most districts than in 1938. The strawberry crop was damaged by rain in June, reducing both quality and yield. This was the only major crop adversely affected to a marked degree by the weather.

Fungus diseases on the foliage of field and fruit crops were more general than in 1938, but damage was not unusually great. The season was favourable for the spread of the downy mildew of the hops in summer, but this disease was checked during the dry weather later in the season and excellent crops were harvested. Late blight of potatoes was general in the crops of the Fraser Valley towards the end of the season where no spraying was done although precipitation was considerably less than in 1938.

In the Okanagan valley, the season was characterized by an exceptionally wet June and this was in part responsible for the severity of several diseases especially those on vegetables. It is thought that the severe outbreak of bacterial blight on bean was due chiefly to this factor. July and August were very dry and in some cases orchards suffered severely from wilting. This will no doubt affect next year's crop and may predispose the trees to winter injury.

Extremes of temperature and moisture characterized the 1939 crop season in Alberta. Seeding and germination were delayed in some districts by the general drought and high winds which prevailed until late in May. During June, heavy rains fell in all parts of the province except the Peace River district, and the weather was generally cold. This resulted in retarded growth, especially in west central Alberta and other areas where the rainfall was excessive. Although growth was slow under these cool, wet conditions tillering of the cereal crops was greatly stimulated, and by early July the prospects of an exceptionally heavy crop were excellent. Under these conditions, browning root rot of cereals was unusually prevalent and severe in certain areas, but many of the affected crops later made a fair to good recovery. An extremely hot, dry period started during the second week of July and lasted until about the middle of August. As a result, the growth of wheat and other crops was very seriously reduced. This general deterioration of crops was halted by cooler weather during the latter part of August. Frosts, severe enough to kill potato vines, did not occur, except in isolated localities, until September, and little crop damage from this factor was reported. Conditions were unfavourable for the spread of stem rust and most foliage diseases.

The Peace River district suffered from severe drought until about July 15, but after that received sufficient rainfall to produce an average crop. Consequently, the disease situation was quite different from that of the remainder of the province. Powdery mildew and white tip damage of wheat were very prevalent, and root rots of wheat and oats caused severe damage in many fields. Certain foliage diseases were also relatively abundant.

Seeding began in Saskatchewan about April 15 in the drier regions of the south; it was general by May 1, and was completed by May 15, except in northern Saskatchewan, where the land was too wet for seeding until after May 1. Soil moisture was fair to good, with low reserves in some areas, and excess in others. Weather was cool in April, but became considerably warmer in May. Some severe soil drifting occurred during the second week in May. Rains were infrequent during this period. Fair to good rains in the third week of May repaired damage to blown crops and growth was rapid except in the south-eastern area where it continued dry. During June, bountiful rains fell over nearly all but the southeastern portion of the province. The weather was cool and growth slow. July was hot and dry over most of the province. Rapid growth took place, but deterioration soon set in in the drier areas. The hot dry weather probably limited the amount of stem rust to a light and scattered infection, except in an area around Cabri, where up to 60 per cent infection occurred on the susceptible varieties. August remained dry. The increased rainfall in June seemed to affect the amount of leaf, stem and head spotting this year. Some lodging was evident in heavy crops where discoloration of the

basal parts seemed to be associated with the trouble. The increase in moisture this season came too late to increase the amount of smut. Some frost occurred about August 20 in the Lucky Lake area, but no serious injury was reported.

Observations on weather conditions in Manitoba and in eastern Ontario will be found in the discussions of stem rust of wheat and oats (pp. 1 et seq.).

Spring was late throughout Quebec and at the end of April the ground was still covered with snow in certain localities. Little winter killing was noticed in meadows and pastures. Seeding was considerably delayed, due to the dry and cool weather during May. This is particularly true for eastern Quebec where total precipitation during May varied from 0.78-2.21" depending on the district, while precipitation in the northern sections of the Province varied between 4.01" and 4.93".

June was wet; there was almost twice as much rain this year as last. Precipitation was lighter in eastern Quebec than in the weatern part of the Province. Apple scab was first noticed at Ste. Anne de la Pocatiere on June 30, while in the districts of Montreal and Sherbrooke the disease was reported about the 10th of June. Ascospore liberations were more abundant than last year due to more frequent rains. At the end of the month the various crops had made rapid and luxuriant growth except around Montreal where hay and grain suffered from drought. Late frosts were reported on the 18th of June from Lake St. John district and from Beauceville. The tobacco crop in Joliette county suffered considerable damage from a strong wind that blew over the district about June 10.

In July and August precipitation was heavier in eastern than in western Quebec. In eastern Quebec total precipitation varied, according to districts, between 4.35" and 6.50" in July and 3.98" and 5.64" in August, while the mean for the Province was 4.90" in July and 4.18" in August. On account of frequent rains, apple scab was difficult to keep under control in sprayed orchards. In neglected orchards the season was not far advanced when all the crop became affected. Fire blight spread very rapidly near Quebec City during these two summer months. Splashing rains contributed to a very large extent, to the spread of the disease over entire trees. Late blight of potatoes was first reported in the districts of Montreal and Lake St. John towards the end of July, after a moderate rain that followed a ten day period of drought. In several localities frequent rains and strong wind storms beat down entire grain fields and caused some damage. Throughout the Province harvesting was made difficult on account of rain; hay and grain remained for days and sometimes weeks out in the fields after being cut, before they could be taken in. In many places, crops were seriously threatened by excessive rains and it is not until late in October when they were taken under shelter. Several reports were received in which it was stated that stooked grain was germinating. In Joliette and Montcalm counties, a few hundred acres of pipe and cigar tobacco were flooded during the first part of August, thus delaying harvest for more than a week. Several growers in that same district suffered about 20% loss due to hail and wind storms.

During September, late blight of potatoes caused considerable damage to growers. In eastern Quebec the disease was not observed until the last days of August, but within two weeks, it completely destroyed the foliage in unsprayed fields and severely attacked the tubers. The first killing frost was recorded at Ste. Anne de la Pocatiere on Sept. 25, four days earlier than last year.

Winter conditions in New Brunswick set in later than in the previous year. The ground froze and thawed a number of times in November, and froze up for the winter on December 14. Fourteen inches of snow fell on November 25, but frequent rains thereafter left only a light covering of snow on the ground at the end of December. During January light snowfalls occurred, usually followed by rain, so that by February 15 only a thin layer of ice remained on the fields. Snow fell again on February 19, covering the ground until March 1, when it was removed by rain. The ground remained bare until March 13, at which date 10 inches of snow fell, but this was removed by a rain on March 16. Snow again fell on March 20, and light snowfalls were experienced until April 18. Rain removed the snow on April 20, on which date the river began to rise and the ice moved out of the St. John April 26. Frost came out of the ground slowly until May 8, when a rainfall greatly speeded up the process. The last two weeks of May were cool and dry and most favourable for farm operations and seeding.

Much winter injury to hay fields, especially newly seeded areas, was reported. Strawberry and raspberry plants also suffered severely from winter injury. June was cold and growth was slow, all crops being nearly two weeks late at the end of the month. The early part of July was warm with abundant rainfall and all crops made good growth. However, dry weather set in July 20 and from that date until August 31, only about 1 inch of rain fell in the central and southern parts of the province. In these sections the fertilizer and soil nutrients were rendered unavailable by the drought, and the early maturation of grain crops and potatoes resulted. The dry weather caused great damage to lawns, pastures and gardens. In the northern part of the province very heavy rainfalls were experienced during this period, in some cases causing great damage to fields through erosion. In this section a destructive outbreak of late blight of potatoes occurred. Much brown heart of turnips and internal cork of apples were reported in the drought striken areas of the province. Crown rust was first found on oats on July 24, and stem rust was first reported July 28. Abundant rainfall in September and the early part of October revived the grass stands in lawns and pastures. The weather was particularly favourable during the latter end of October for the harvesting of the potato crop.

The autumn of 1938 in Nova Scotia was favourable to a normal maturity of tree wood and most perennials were well hardened off before winter set in. The winter generally was quite favourable until towards spring when snow coverage became thin and intermittent freezing and thawing occurred and caused damage to unprotected perennials and particularly strawberries. The spring seeding and orchard spraying operations were delayed by cold, damp weather except on the lighter types of soil.

The summer was dry in contrast to that of 1938. The rainfall in June, July, August and September 1938 totalled 19.86 inches. In 1939 the rainfall for the same period was 8.25 inches compared to a 20-year mean of 12.34 inches.

Drought conditions affected many apple orchards. Fruit was small, leaves wilted, and many trees suffered premature defoliation. Drought spot and corky core were more conspicuous in apples than for several years. Deficiency diseases of root crops were more frequently observed and crop yields were considerably reduced in early harvested areas.

Despite an abundance of snow during the latter part of the winter, and generally higher temperatures than the previous year, considerable winter killing of plants occurred in Prince Edward Island. This was particularly true of clover where losses were severe, the damage being attributed to alternate freezing and thawing during April and early May. Average temperatures for May were lower than 1938, and during the last two weeks of the month considerable rain fell, with the result that the planting was held up in some sections of the province. Spores of the brown rot fungus were plentiful before blossom time but dry weather in June prevented this disease from becoming severe.

June was fairly cool and for the most part, dry, only 1.18 inches of rain being recorded during the month. A slight discharge of apple scab spores was noted June 4 and a heavy discharge June 14 when apples were in full bloom.

July and August of the past summer were unusually clear, hot and dry. It is worthy of note that there were 118.4 hours more sunshine during the combined months for 1939 than in 1938, and during August rain fell on four days only. As a result of this, some crops suffered slightly from drought, but diseases were practically negligible. Infections of crown rust of oats, and leaf and stem rust of barley and wheat were seldom more than slight. Late blight also, was checked and no outbreak was recorded before the end of August.

September and October were cool; a heavy killing frost being recorded on September 24, and the latter month, during which 8.80 inches of rain fell, was particularly wet. A few potatoes were damaged in the ground by early frost but the majority of the crop had been dug or escaped serious injury.

Common scab of potatoes was more severe than usual in this province during the past year, the unusually dry weather in August and early September, undoubtedly being a factor. Check plots in a scab test at the Laboratory of Plant Pathology were one hundred per cent infected, ninety-five per cent of which was classed as severe. Slight outbreaks of late blight were found in a few fields of potatoes September 12, but the plants were already nearly matured and no decrease in yield was expected. Tuber rot was also reported as negligible throughout the province.

Recording Phenological Data

R.C. Russell

Phenological data have been compiled for four years at the Dominion Laboratories of Plant Pathology situated at Winnipeg, Saskatoon, and Edmonton. The 1939 records were collected by B. Peturson, R.C. Russell and M.W. Cormack.

Aided by the experience gained in the past few years, we are standardizing our methods of conducting this work. Perhaps the two rules of most importance to follow in future are to choose plants which can be observed almost daily and to make the observations of each species at the same spot every year, insofar as this is possible. We are using species of plants specially suited to the purpose. Certain species are observed at all three places, but it has been found necessary to use others which are common at only one or two of the points.

In the first column under each place in Table 1 (see page xi) are shown the dates on which the plants were first seen in flower. In the second column figures show how many days earlier or later than the average this was. The average dates of flowering are based on data taken in 1936, 1937, and 1938. A plus sign before the figure in the second column means that the plant was seen later than usual, while a minus sign means that it bloomed this year at an earlier date than usual. A capital A means that it bloomed at the average time.

Supplementing the phenological data we have recorded the time of sowing, emergence, heading and harvesting of early-sown Thatcher wheat at each place. As in the table of phenological data these dates have been compared with the average for the past three years. These are presented in Table 2.

Table 2. Dates of seeding, emergence, heading and harvesting of early-sown Thatcher wheat at Winnipeg, Saskatoon and Edmonton in 1939.

	Winnipeg		Saskatoon		Edmonton	
	1939	Av. 1936-38	1939	Av. 1936-38	1939	Av. 1936-38
Seeded	18/4	----	28/4	17/4	17/4	28/4
Emerged	28/4	----	7/5	4/5	29/4	10/5
Headed	21/6	----	1/7	26/6	26/6	1/7
Harvested	30/7	----	6/8	26/7	7/8	12/8

The phenological data indicate that the spring season of 1939 was relatively early at Winnipeg. At Saskatoon it was relatively early up to the middle of June, but after that, owing to cool temperature and abundant moisture in June, it was relatively late. At Edmonton the trend of the season was much the same up to the end of June. After this date, although we have plenty of records for 1939 we lack data concerning the previous seasons with which to compare them.

Table 1. Summary of phenological data taken at Winnipeg, Saskatoon and Edmonton in 1939.

Species	Winnipeg		Saskatoon		Edmonton	
	a	b	a	b	a	b
Pulsatilla ludoviciana			14/4	-3	17/4	-12
Populus tremuloides	24/4	-2	23/4	+3	21/4	-1
Acer negundo	1/5	-6	28/4	-10	27/4	-4
Phlox hoodii			24/4	-4		
Betula papyrifera	4/5	-9	2/5	-9	1/5	-6
Amelanchier alnifolia	8/5	-9	7/5	-6	6/5	-8
Prunus americana	7/5	-9				
Thermopsis rhombifolia			1/5	-12		
Crataegus coccinea	18/5					
Hierochloe odorata	18/5	-2	12/5	-4		
Prunus pennsylvanica			14/5	-6	10/5	-6
Viola canadensis			7/5	-8	18/5	
Prunus melanocarpa			22/5		19/5	
Prunus virginiana	21/5					
Smilacina stellata	19/5	-6	22/5	+2	24/5	+9
Svida sp. (Cornus sp.)	28/5	-2	22/5	-8	24/5	
Quercus macrocarpa	27/5	-1				
Elaeagnus commutata			31/5	+1	29/5	-2
Viburnum lentago	1/6	-2				
Viburnum trilobum	8/6	-4			3/6	
Anemone canadensis	7/6	-4	4/6	-4	16/6	
Lonicera glaucescens					6/6	
Achillea sp.	30/6		2/6	-9	22/6	+2
Rosa (alcea?)			19/6	+1		
Galium boreale			8/6		10/6	
Bromus inermis	20/6	A	21/6	A	29/6	+10
Gaillardia aristata	19/6					
Agrimonia striata					26/6	
Hedysarum americanum			2/6	-9		
Symphoricarpos occidentalis	1/7	+7			3/7	
Campanula petiolata			27/6	+7		
Phleum pratense					5/7	
Lactuca pulchella	15/6		11/7	+3	15/7	
Chamaenerion spicatum					8/7	
Spiraea alba			5/7	+3		
Solidago canadensis					14/7	
Steironema ciliatum	15/6?	-19?	12/7	+7		
Chrysopsis hirsutissima			4/7			
Grindelia perennis			23/7	+3		
Oligoneuron canescens			23/7	+1		
Aster crassulus (white)			14/7		2/8	
Aster laevis (purple)			17/7	-21	5/8	
Cirsium (lanceolatum?)			12/7	-2		

I. DISEASES OF CEREAL CROPS

WHEAT

STEM RUST (Puccinia graminis) moderately infected winter wheat at the Sub-Station, Creston, B.C. (G.E. Woolliams). It slightly infected Marquis at the same Sub-Station, but no stem rust was observed on Vancouver Island and the Lower Mainland. (W.R. Foster)

Stem rust was first observed at Edmonton, Alta., on August 3, as an isolated, quite severe infection. It was not found at Lacombe until August 12. Traces of rust were present in most late-maturing fields from Edmonton to Lethbridge on August 18. The heaviest infections were, however, within a forty-mile radius directly north-east of Edmonton, but in all fields, the infections were slight, even on late crops and they caused no damage. (G.B. Sanford)

A severe outbreak of stem rust occurred in a small area northwest of Swift Current, Sask., near Abbey and Cabri. The crop was late and heavy and consisted mostly of susceptible varieties. Elsewhere in the province traces of stem rust could always be found, although in an occasional field the infection was slight. Except in the area mentioned, no damage occurred. Stem rust was first observed in the south at Wawata on July 7, and in the north at Rosthern on July 18. (P.W. Simmonds)

For the first time in at least a decade, stem rust of wheat caused only minor losses in Manitoba. Approximately 77% of the wheat acreage of the province was sown to the new rust-resistant wheat varieties, Thatcher and Renown; about 18% to durum varieties, chiefly Mindum; and the remaining 5% to Marquis, Ceres, Reward, and other susceptible varieties. Only very slight traces of stem rust occurred on Thatcher and Renown. In fact, only occasional pustules were found on a small percentage of the stems of these two varieties and they suffered no reductions in yield from stem rust. Infections of stem rust were first observed in Manitoba this year on July 3. Owing to the extremely dry weather conditions which prevailed throughout most of Manitoba during July and early August, rust developed very slowly and infections on Marquis, Ceres, and Reward, ranged from 5 to 20% in intensity when the rust had reached its maximum. The hot, dry weather hastened the maturing of the crops and the susceptible varieties ripened before the rust increased sufficiently to cause appreciable damage.

The large acreage sown to varieties resistant to stem rust in the spring-wheat region of the United States and in the eastern part of the wheat-growing area of the Prairie Provinces no doubt reduced the amount of rust inoculum, which reached susceptible wheat fields in this area, much

below what it would have been had the whole area been sown to susceptible varieties. This reduction of potential inoculum within the spring wheat area, however, was not the only factor retarding the development of rust in 1939. Two other important factors tended to hold rust in check. First, stem rust was much less prevalent than normal in the winter wheat area of the United States and consequently the primary inoculum available for initiation of stem rust in the spring wheat area was less than usual. Secondly, adverse weather conditions during July and early August retarded rust development. (B. Peturson)

Stem rust was practically absent in eastern Ontario and Quebec, but in one field at Ste. Martine, a 20% infection was recorded. In the Maritime Provinces stem rust was distinctly more prevalent. While less than half of the fields were affected, individual infections ranging from 10 to 45% were recorded in 1 field in P.E.I., 3 fields in N.B., and 8 fields in N.S. These low percentages of rust are in marked contrast to the moderate to severe infection present on susceptible varieties in 1937 and 1938. Several fields of Coronation were examined in each of the provinces, but they appeared to be free from stem rust.

LEAF RUST (Puccinia triticina) was severe on Thatcher at the Agassiz and Sidney Stations of B.C., and much less prevalent on other varieties. At the Creston Sub-Station it was heavy on Marquis, Red Bobs, and Thatcher.

Leaf rust was relatively scarce in Alberta. It was first observed at Edmonton on July 21. Infection was slight in 2 fields near Peace River and slight to moderate in several fields between Lacombe and Calgary.

Leaf rust was first recorded at Rosthern, Sask., on July 18. Later in the season, it was very common over the province, many fields showing heavy infection, especially in the northern section of the cultivated area.

Leaf rust of wheat was present throughout the whole of Manitoba and was much more prevalent than stem rust. Infections on Renown ranged from a trace to 20%, and on Thatcher, from 5 to 60%. Only slight traces of leaf rust occurred on durum varieties. In general the lighter infections occurred on the early crops and the heavier infections on the late crops.

Fairly high percentages of leaf rust were recorded on susceptible wheat varieties in Ont., Que., N.B., N.S., and P.E.I., in both fields and plots. Of the new varieties resistant to stem rust, Thatcher and Apex are very susceptible, while Coronation, Regent, Renown (selection) are highly resistant. New unnamed varieties, which were equally resistant to leaf rust as Coronation were C-26-123.9, R.L. 1114, and R.L. 1005; R.L. 1165 and C-26-44.7 were somewhat more susceptible.

STRIPE RUST (Puccinia glumarum). A trace of stripe rust was found on Jones' Fife in May at the Sidney Station, B.C. Stripe rust was not recorded on wheat and it was relatively scarce and difficult to find on Hordeum jubatum in Alberta. A trace was recorded on the latter at Grande Prairie on August 10, and occasional infections were observed as far east as Lloydminster and Wainwright on September 12.

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 Mr. W. Popp.

Table 1. Wheat Bunt in Western Canada

Summary of Inspections from August 1 to October 31, 1939.

Class of Wheat	Cars Inspected	Cars Graded Smutty	Percentage Smutty
Hard Red Spring	103,397	207	0.2
Garnet	2,559	3	0.1
Amber Durum	3,961	48	1.2
White Spring	1	0	0.0
Alberta Red Winter	207	24	11.6
All classes (including mixed classes)	110,264	282	0.26

The figures for the first quarter of the 1939-40 crop year suggest little change in the bunt situation from previous crop years. Since 1932 the percentage of cars in durum wheat graded smutty has fluctuated between 0.1% (in 1937) and 1.2%, with an average of 0.7% per annum. In the same period 0.45% of the cars of Hard Red Spring has been graded smutty. The low figure for Garnet wheat suggests that the percentage of cars graded smutty of one class or variety of wheat is a direct reflection of its susceptibility or resistance to bunt. The relatively high susceptibility of durum wheat to bunt emphasizes the need of continuing energetic extension work among durum wheat growers, if bunt in durum wheat is to be kept down. The percentage of bunt in Alberta Red Winter is somewhat lower than usual, but it is still very high.

Bunt was found affecting 5% of the heads in 3 fields and in lesser amounts in 7 others, out of 176 fields examined in Alberta. Also infection ranged from 2 to 8% in 5 fields of winter wheat out of 15 examined in south-western Alberta. A trace was recorded in one field at Mozart, Sask.

Bunt was reported to be common and severe in certain areas in Kent Co., N.B. It was severe at St. Ignace this year.

LOOSE SMUT (Ustilago Tritici) was reported in small amounts in Western Canada as follows: 2% in one field, trace in 3 others in Alta.; a light infection in the University plots, Saskatoon, Sask.; 3% in a field of durum wheat at St. Adolphe, Man., and traces in two others, and 0.5% in 2 fields of common wheat and traces in two others. Loose smut infections were similarly low in Que., N.B., N.S., and P.E.I. The average infection was about 0.2%; the highest infections were: 5% at Rexton and St. Charles, N.B. and 4% at Napierville, Que.

BLACK CHAFF (Phytomonas translucens var. undulosa) was isolated from the leaves, neck, and glumes of affected Thatcher wheat received from Melfort, Sask. Damage was very marked. The kernels were definitely shrivelled and the lesions were so extensive that the green area of the plants was much reduced. (W.A.F. Hagborg)

Black chaff was found in 19 out of 63 fields examined in Man. Infection was heavy in an area north-east of Portage la Prairie and also near Virden. (W.A.F. Hagborg)

BASAL GLUME ROT (Phytomonas atrofaciens). The organism was isolated from severely affected specimens of Regent wheat showing both leaf and head infections. The specimens were sent by Prof. T.C. Vanterpool from Gronlid, Sask. The disease was also found on specimens from Alford. Out of 45 collections made in Manitoba, the organism was isolated from 8 collections. Of these eight, only one showed the typical discoloration at the base of the glumes, while 3 resembled black chaff, 3 bore leaf infections, and one showed an internodal discoloration. (W.A.F. Hagborg)

ERGOT (Claviceps purpurea) was reported as follows: trace infection in 3 fields at Innisfail, Alta.; slight infection in one at Lethbridge, and another at Wetaskiwin; a trace in the plots at Nappan, N.S. and in a field at McAras Brook; trace in a late field in Queens Co., P.E.I.

GLUME BLOTCH (Septoria nodorum) was found in the Peace River district of Alberta; infection was severe in one field at Wembly and slight in three other fields and in the plots at Beaverlodge. It was observed in material from Glen Bain, Sask. Septoria nodorum was isolated by Dr. T. Johnson from 23 of the 31 samples of discoloured wheat heads collected in Quebec and the Maritime Provinces and it was the principal fungus present in 18. Pycnidia of the fungus were visible on over half the samples. The

amount of discoloration did not appear to be correlated with the presence of the fungus. In Quebec, glume blotch was frequently encountered on glumes and leaves in wheat plots; there appeared to be considerable difference in varietal susceptibility. Glume blotch was also present to a slight extent on the varieties at Kapuskasing, Ont.

SPECKLED LEAF BLOTCH (Septoria Tritici) was reported in 45 out of 176 fields examined in Alberta; infection was a trace in 12 fields, slight in 26, moderate in 6 and severe in one in the Peace River district. The disease was also slight to moderate in the plots at Beaverlodge and Lacombe. (M.W. Cormack)

Leaf spots, mostly undetermined, caused slight damage in 15 out of 59 fields in Sask. S. nodorum was identified in material collected at Shipmen and Saskatoon, while S. Tritici, which is rarely collected in Sask., was also present in a collection from Naicam.

FOOT ROTS. Take All (Ophiobolus graminis) was severe in a 4-acre field at the Sidney Station, B.C. (W.R. Foster)

Take All was reported from 53 out of 176 fields examined in Alta. Slight to moderate infection was found in nearly all the wheat fields examined in the Grande Prairie, Hythe, and Pouce Coupe districts of the Peace River area and in 10 fields the damage ranged from 10 to 25%. Some varieties were severely damaged in the plots at Beaverlodge. Infection was also general in the Camrose district and in 6 fields it caused 5 to 15% damage. Traces of the disease were present in the plots at Olds.

Common Root Rot (Helminthosporium sativum and Fusarium spp.) was reported in 93 fields - trace in 49, slight in 23, moderate in 15, and severe in 6 fields, the latter all located in the Peace River district. Infection was moderate in the plots at Beaverlodge. Many areas were not surveyed this year owing to the extremely dry conditions, which prevailed in July and August, except in the Peace River district. Root-rot damage was found associated with winter injury in the winter wheat plots at Lacombe and Edmonton. Damage ranged from slight to severe in the different varieties at Lacombe. Fusarium spp. were apparently the principal pathogens. (M.W. Cormack)

Take All was found in 7 fields in zones 2 and 3 out of 107 examined in Saskatchewan, causing a trace to slight damage; diseased specimens were received from 4 other places. Common Root Rot was present in 105 of the 107 fields examined, damage was moderate in zone 1, and slight in zones 2 and 3. Specimens affected with Prematurity Blight (cause unknown) were received from 5 points.

A moderate infection of Take All was reported from Swan River, Man., on Thatcher wheat. Common Root Rot was very slight during May and June in all fields examined. Infection increased rapidly in July, when every field showed at least slight infection. The disease was generally more severe on durum than on common wheat. (J.E. Machacek)

In an attempt to obtain more accurate information on the effect of common root rot on the yield of wheat in Manitoba, it was decided to collect samples from at least 10 fields in each of the major soil zones of the Province while the grain was ripe, but not cut. During a preliminary survey when the wheat crop was approaching maturity the order in which the soil zones should be visited and the approximate location of the fields were determined. In all, samples were taken from 61 fields.

The method of collecting the samples was to choose a point 50 paces from the edge of the selected field; pull all the plants in a one-meter length of drill row, which were then tied into a bundle; then proceed 50 paces parallel to the edge of the field and collect another sample, repeating the operation until ten one-meter lengths of drill row were collected. The ten small bundles were tied together into one large bundle, wrapped to protect the heads from injury and tagged. At the same time the field condition, wheat variety, and soil type were recorded.

At the Laboratory the plants in each bundle were classified into - (1) healthy, (2) slightly root-rotted, (3) moderately root-rotted, and (4) severely root-rotted according to the lesions on the subcrown internode. The number of plants in each class was counted, each class was threshed separately, and the weight of grain obtained.

From Table 2 it will be seen that the percentage of plants diseased was 21.9% and the average loss in yield was 7.5%. The most striking result was the loss in yield induced by a slight amount of root rot. The plants placed in this class bore very small lesions on the subcrown internode, but they had conspicuously fewer culms per plant than those in the "healthy" class. The length of spike and the number of kernels per spike were not apparently reduced. In the "moderately diseased" class the plants were usually somewhat stunted and possessed single culms with shortened spikes. The plants in the "severely diseased" class were conspicuously stunted with single culms and very small or no spikes. (J.E. Machacek)

Take All was observed on plants of Coronation wheat sent from a small field at Chambord, Que. (J.E. Machacek and R.C. Russell). This is the first report of Take All in Quebec. The variety was slightly affected. (I.L. Connors)

Table 2 - Damage to common wheat from common root rot in Manitoba in 1939.

	Soil Zone							
	A_1 [1/]	A_2 East part	A_2 West part	A_2 Both parts	A_3	A_5	A_7	Mean all zones
Plants in sample	308.3	399.1	387.8	394.0	335.0	411.7	404.0	373.4
Yield, healthy plants (grams)	0.896	0.651	0.619	0.637	0.831	0.815	0.515	0.721
Diseased plants (%)	29.2	17.2	24.3	20.4	20.5	21.9	16.2	21.9
Reduction in yield (%)	11.8	5.7	7.5	6.6	5.6	10.7	6.7	7.5
Reduction in yield shown by plants (%):								
(a) slightly root-rotted	38.9	25.5	21.4	23.8	16.8	44.1	26.3	27.5
(b) moderately " "	38.8	51.3	40.6	45.3	38.4	53.1	57.3	41.5
(c) severely " "	68.6	87.0	60.9	68.3	70.4	90.6	90.0	72.6

1/ Soil zones A_1 - Dark brown steppe - black earth transition

A_2 - Black earth

A_3 - Northern black earth and degrading black earth

A_5 - Degrading black earth and grey wooded

A_7 - Rendzina (high lime) and degrading Rendzina

For a map showing these zones see fig. 14 in Ellis, J.H., The Soils of Manitoba. Project 14, Economic Survey Board, Province of Manitoba, 1938.

NODE DECAY (Fusarium Poae). A trace of infection was found on the nodes of wheat at Winnipeg at threshing time. Fusarium Poae was isolated. (W.L. Gordon)

ROOT ROT (Cryptoascus sp.) was found moderately affecting wheat at Churchill and Elmira, P.E.I. in 1939. The disease has been found widely distributed in P.E.I. on the roots of wheat and barley since it was first discovered in 1937, at the Experimental Station, Charlottetown. (R.R. Hurst)

BROWNING ROOT ROT (Pythium spp.) was found in 46 out of about 80 fields of wheat examined in June in Alberta. It was estimated to have caused slight damage in 12 fields, moderate in 18 and severe in 6. Many of the fields made a partial recovery later in the season. The disease was reported on heavy and light soils and from nearly all the cultivated sections of the province. (M.W. Cormack)

Browning root rot was most severe in an area between Calgary and Crossfield, an area, where it had not been observed previously. Wheat sown early in a relatively dry summerfallow apparently was not damaged, but very definite injury occurred to both wheat and oats sown on ploughed wheat stubble land. Even wild oats (Avena fatua) were attacked. Oospores were fairly abundant in the roots of affected plants. It is thought that the heavy precipitation which followed the early seeding favoured the development of the disease. (G.B. Sanford)

Browning root rot was prevalent in a number of districts of Alberta. Specimens were received from Thorsby, Mirror, Morrin, and Strathmore. A dozen or more fields were examined in the heavy soil region around Morrin in mid-June. The disease was most conspicuous on wheat on summerfallow and the damage appeared serious at that time. Some fields looked as if they would not yield a half a crop. Reports since harvest, however, indicate that affected crops made a remarkable recovery and yielded well. (A.W. Henry)

Browning root rot began to show up on wheat on summer fallow in Saskatchewan on June 3, which is about the usual date, but it was evident in many localities in a severe and readily observable form until the first week of July, which is one to two weeks later than usual.

Although moisture conditions had been good all spring and the general condition of the crops better than normal, the number of fields that showed a high percentage of browning zones and severe root lesioning was large throughout the northern half of the wheat-growing area. More crown roots than usual became diseased at their tips before they had a length of one to two inches. The relatively low temperatures in many

districts possibly slowed up the growth of the crown roots and in this way increased the chances for attack from Pythium and other root-infecting fungi. A microscopic examination showed that 68% of the lesions contained oospores.

By the third week in July, it was difficult in many instances to detect the diseased areas from the road, so that the impression was gained that recovery had occurred. Closer examination revealed, however, that recovery was only partial, for the diseased patches were thinner and more weedy, due to the reduced tillering, and height of the affected plants. Towards maturity, differences were again observable from the road. The diseased areas were delayed in maturing and stood out as green islands among the ripening healthy zones. Browning was most common on medium to heavy land (silt loam) this year.

Apex and Thatcher appeared to be free from the disease on one farm at Blucher, while Marquis was severely attacked. Thatcher showed considerably more field resistance than Reward on another farm at Hague. In this same field some Thatcher on fall ploughing was free from the disease. Near Humboldt one field of Thatcher was moderately attacked. This field evidence is in agreement with greenhouse results on varietal susceptibility.

The importance of the proper light conditions in detecting diseased fields should be pointed out. Favourable conditions prevail when the sun is in front or to the right or left of the observer-driver. A following sun is usually not so good. Dull conditions are not favourable, for it is then difficult to detect slightly damaged fields.

One wheat field on a peaty soil showed leaf discoloration resembling browning root rot, but root lesioning was not observed. However, wheat grown in the greenhouse in soil collected from this field developed typical root lesions from which Pythium arrhenomanes was isolated.

The average yield of diseased plants from six fields was 35% less than that of the same number of healthy plants. This reduction in yield was due mainly to the poor tillering and slightly shorter heads of diseased plants. This year the grain from diseased plants was, in general, as plump as the grain from healthy plants. This is not usually the case.

Couch grass (Agropyron repens) and green foxtail (Setaria viridis), a very susceptible grass, were found attacked in the field. Dr. G.B. Sanford sent in some wild oats (Avena fatua) from Alberta affected with browning root rot.

Browning root rot was clear-cut this year and its economic importance was strikingly brought out by its curtailment of tillering, retardation of growth, and delaying of maturity.

Browning was severe along the following routes: between Landis and Cathkin, Rosthern and Hague, Wakawa and Domremy, Birch Hills and Weldon.

The estimated average reduction in yield on affected fields in these districts was 10% or more. A particularly bad field south of Landis with 80% browning was estimated to be reduced in yield from 25 to 30%. (T.C. Vanterpool)

Browning root-rot was found in 3 places in Manitoba; infection was moderate at Brandon and slight at Rapid City and Swan River. The disease was much less evident than in 1937. (J.E. Machacek)

HEAD BLIGHT (chiefly Fusarium spp.). Traces, or occasionally slight infections of head blight were fairly common in Quebec both in fields and plots. At most Stations several varieties were affected. Sporodochia of Fusarium were frequently observed on the diseased spikelets. The disease was also present in the Maritime Provinces, but it was recorded less frequently. Isolations were made by Dr. W.L. Gordon from 18 head blight samples as follows: Quebec, 12 samples - Fusarium graminearum in 9 samples (43 isolations), F. avenaceum, 5 (17), F. Poae, 1 (1), F. Equiseti, 1 (1), Alternaria, 7 (9), Hormodendron, 1 (1), Epicoccum purpurascens, 1 (1); New Brunswick, 4 samples - F. graminearum, 3 (5), F. avenaceum, 2 (12), F. Poae, 2 (6), F. culmorum, 1 (1), Alternaria, 1 (4); Nova Scotia, 2 samples - F. avenaceum, 1 (1), Alternaria, 1 (5), Helminthosporium sativum, 1 (1). The frequent isolation of F. graminearum, the imperfect stage of G. Saubinetii, is worthy of note.

HEAD DISCOLORATION (Alternaria, Cladosporium, etc.). Head specimens of newly-developed and standard wheat varieties were collected from all the provinces of Canada. Where the heads showed evidence of a diseased condition, isolation studies were made to determine what, if any micro-organisms were associated with it. In Saskatchewan and Alberta, the heads of all varieties were generally free from disease. In all the other provinces, disease symptoms were present to a greater or less degree. In British Columbia, species of Alternaria, Cladosporium, and Pullularia were the organisms associated with the severe head discoloration common in that province. Alternaria was also commonly isolated from discoloured heads collected in Man., Ont., and Que. In Que., and the Maritime Provinces, glume blotch (see p. 4) was common and while Septoria nodorum was the organism most commonly isolated, Alternaria was present in most samples. Isolations made from 31 samples were as follows: Septoria nodorum in 23 samples (138 isolations), Alternaria (mostly tenuis type)

25 (97), Epicoccum purpurascens 5 (8), Cladosporium ?herbarum, 8 (9), Pullularia pullulans 8 (12), Helminthosporium sativum 3 (5), Macrosporium 1 (1). (T. Johnson) This spotting was observed in Apex wheat from several points in Saskatchewan.

E.S. McFadden (Jour. Agr. Res. 58:805-819. 1939) has given the name "brown necrosis" to a discoloration found on heads and culms of certain rust-resistant varieties of wheat, which he has found associated with rust infection in these varieties. Part of the discoloration reported above is this type, where it occurs on Coronation and other new rust-resistant varieties. (T. Johnson)

Under the name, false black chaff, 60% of the heads of a Hope cross at Olds, Alta., were reported affected. A trace was reported at Winkler and Killarney, Man.

KERNEL SMUDGE (Helminthosporium sativum etc.). A summary of the kernel smudge situation in Western Canada in 1938 and 1939 was prepared from the records of the Western Grain Inspection Division, Winnipeg, Man. The results of this survey are presented in Table 3.

Table 3. Kernel Smudge of wheat in Western Canada in 1938 and 1939. (A summary of car inspections from August 1 to October 31, 1938 and 1939).

Year	Class of Wheat	Cars inspected	Cars with Kernel Smudge	Percentage with Kernel Smudge	Percentage of smudged kernels in car samples	
					Range	Mean
1938	Amber Durum	6,774	1,720	25.4	5-58	24.4
	Hard Red Spring	66,558	0	0.0	-	-
1939	Amber Durum	3,631	10	0.3	1-9	3.2
	Hard Red Spring	103,250	0	0.0	-	-

In 1938, 51.7% of cars of durum wheat from the Red River Valley district of Manitoba had kernel smudge marked against them. The percentage of cars with kernel smudge decreased from east to west in Manitoba and Saskatchewan. For example, only 5.1% of the cars shipped from the southwestern crop district of Manitoba had kernel smudge, while of 344 cars of durum wheat from Saskatchewan points in 1938, only 6 cars, or 1.7% were recorded as having kernel smudge in them. Losses from this disease, owing to lowering of commercial grade, were of considerable economic importance in 1938, particularly in the eastern crop districts of Manitoba. Only a few scattered light infections of kernel smudge occurred in Western Canada in 1939. The disease was of no economic importance in that year.

A study of the internal fungus flora of a large number of samples of wheat infected with kernel smudge showed that, although a great number of different fungi were found in the kernels, Helminthosporium sativum and species of Alternaria were the predominating fungi associated with kernel smudge or black point of wheat. (F.J. Greaney)

POWDERY MILDEW (Erysiphe graminis) was observed on the wheat varieties in 7 of the 19 uniform rust nurseries located across the Dominion. These seven were - Saanichton, Smithers, and Agassiz, B.C.; Beaverlodge, Edmonton and Lethbridge, Alta.; Kapuskasing and St. Catharines, Ont.; and Macdonald College, Que. (M. Newton). Infection was slight to moderate in 8 out of 62 fields examined in the Peace River district, Alta. The disease was moderate to severe on many varieties at Beaverlodge while infection was slight on a few varieties at Edmonton and Lacombe. A slight infection occurred at St. Louis and Shipman, Sask. Powdery mildew was abundant on some varieties at Macdonald College, Que. (I.H. Crowell)

YELLOW LEAF BLOTCH (Pyrenophora Tritici-repentis (Helminthosporium Tritici-repentis) appeared in epidemic proportions over most of the wheat-growing area of Manitoba, south of the Riding Mountains and west of the Red River. The disease was most severe in the southwestern part of the province. Specimens of the disease were also received from Saskatchewan and Quebec.

Helminthosporium Tritici-repentis was originally described in 1902 by Diedicke, who found it attacking the leaves of Agropyron repens. He also observed the perithecial stage on the dead culms of the host. In 1923, Drechsler (Jour. Agr. Res. 24:641-739. 1923) reported that the fungus was very prevalent on A. repens in the northern part of the United States.

A similar fungus on wheat was described by Nisikado (R.A.M. 8:164) in Japan in 1939. He named it Helminthosporium Tritici-vulgaris. After a preliminary announcement in 1931 (R.A.M. 10:426), Mitra described in detail a fungus, which he considered identical with H. Tritici-repentis and which he found causing considerable damage to wheat in India (R.A.M. 14:90). The first European report of the disease on wheat was that of Raabe (Phytopath. Zeitschrift. 10:111-112. 1937), who referred the pathogen to H. Tritici-vulgaris. Raabe's illustrations strongly suggest that the disease as it occurs in Germany is identical with that in Manitoba. It is very probable, on account of the similarity of the descriptions of H. Tritici-vulgaris and H. Tritici-repentis that the names are synonymous and that the fungus on wheat should be called H. Tritici-repentis.

In Canada, the fungus was first observed on dead culms of Marquis wheat, collected at Assiniboia, in southern Saskatchewan on July 7, 1927. Both conidia and perithecia were found. On June 26, 1928 Dr. B.J. Sallans collected the perithecial stage on wheat straw at Fillmore, also in southern Saskatchewan. In Manitoba the fungus was first observed on living plants of Elymus canadensis in June, 1934, near Carmen (P.D.S. 14:100). This appears to be the first record of its occurrence on this host. On July 16, 1937 the fungus was discovered on leaves of Mindum wheat near Medora, Man. (P.D.S. 17:5). This appears to be the first report of the disease on wheat in North America. The original collection on wheat was made about 2 miles west of Medora and about 8 miles east of Melita, a somewhat larger place, which was given as the place of collection in P.D.S. 17:5. This report is also in error in stating that the fungus has been collected on Agropyron repens in Manitoba.

In 1939, the disease was first observed in early July. At that time the affected leaves and leaf sheaths showed pale yellow, irregularly oval mottlings, which were more or less uniformly distributed over their surface. The spots shortly afterwards turned brown and often coalesced to form streaks traversing the middle of the leaf. The diseased leaves withered prematurely. In durum wheats, which seemed particularly susceptible, all the leaves were frequently affected, but in the common wheats only the lower leaves usually showed the disease. However, all durum varieties are apparently not equally susceptible, for in the experimental plots at Brandon some varieties and hybrids were practically free from disease, while others were severely attacked.

In Manitoba, conidia of the fungus are not produced freely on the affected host. Conidiophores are sparsely formed in old diseased lesions and the conidia apparently separate from the conidiophore shortly after they are formed. Thus, conidia are not abundant on diseased specimens. The conidia resemble those of Helminthosporium teres, but are usually longer, more regular, and possess a conical basal cell, instead of a hemi-ellipsoidal one usually found in H. teres. In most conidia, the basal cell is distinctly swollen just below the lowest septum, causing the cell to resemble a snake's head. The conidia germinated in water after the infected material was stored for two months in the Laboratory at room temperature.

In Canada the fungus apparently overwinters on infected straw and stubble of wheat and on the dead culms and leaves of certain grass hosts. The perithecia mature in June, when the ascospores are discharged. Perithecia are abundant, but conidia are scarce on such material. Perithecia also form readily on various media in the Laboratory, but no suitable artificial medium for conidial fructification has yet been found

by the writer. Media consisting of autoclaved straw or ground oat-hull mash have proven very suitable for perithecial development.

An epidemic of yellow leaf blotch, such as was experienced in Manitoba in 1939, is possible only when inoculum is abundant. The factors responsible are thought to be the ease with which perithecia form on infected plant debris, particularly wheat straw and stubble, and the recent considerable increase in the use of one-way discs, which fail to cover stubble with soil as does the mould-board plough. (J.E. Machacek)

Yellow leaf blotch was reported as follows in Man.: Common wheat - infection, trace in 4 fields, slight in 9, moderate in 11, and severe in 4; durum wheat - infection, trace in 1, slight in 4, moderate in 8, and severe in 7. This disease was rather common at Saskatoon, Sask. It was particularly common one season several years ago at Indian Head (P.M. Simmonds). The disease occurred in definite, small rather conspicuous zones in one field of wheat on stubble in zone 3 (T.C. Vanterpool). Traces of yellow leaf blotch were found on leaves of Renown from Lennoxville, Que., and on durum wheat from St. Bernard. (J.E. Machacek). This is the first report for Quebec.

SPOT BLOTCH (Helminthosporium sativum). A trace of infection was reported from Portage la Prairie. H. sativum was found fruiting on the leaves of wheat at Lennoxville, Que., but the infection appeared to be secondary.

ANTHRACNOSE (Colletotrichum graminicola). A trace was found on the leaves in a collection made at Saskatoon, Sask.

CLADOSPORIUM LEAF SPOT (C. graminum) moderately to severely infected several varieties and strains of winter wheat in the plots at Edmonton, Alta., early in the season. (M.W. Cormack)

BRITTLE DWARF (Cause unknown) caused slight damage to plants in the borders of the plots of the wheat x wheat grass hybrids, F_1 Triticum pyramidale x Agropyron glaucum and Agropyron elongatum x Triticum sp., and of wheat plots at Saskatoon, Sask.

ALKALI INJURY was severe to moderate, at least in patches at Brandon, Pine River, Thornhill, Lowe Farm, and McCreary, Man.

WHITE TIP (Non-parasitic) was slight to moderate in 7 and severe in 1 out of 62 fields in the Peace River district, Alta. Most of the varieties were slightly to moderately affected in the plots at Beaverlodge.

OATS

STEM RUST (Puccinia graminis). Traces were present on Mabel, but not on the other varieties at Agassiz, B.C. on July 25. Stem rust was extremely scarce and was not recorded until mid-August in Alberta; trace to slight infections were observed in the Camrose and Wetaskiwin districts. Traces of rust, sometimes on all the stems in the field, were found in the northeastern sections of Saskatchewan; in other sections it was practically absent. In one field near Kamsack, infection was severe.

Stem rust of oats, although occurring in all parts of Manitoba, was generally very light. The earliest crops carried infections ranging from a trace to 1.0%. The infection on the susceptible oat varieties such as Victory and Banner averaged less that 5% on most of the crop. Only very slight traces of stem rust occurred on Vanguard and Anthony. A few very late fields of susceptible oat varieties carried infections averaging 30%. However, these more heavily infected fields represented less than one per cent of the crop. Rust damage was confined entirely to these late fields and in all cases was comparatively light. (B. Peturson)

Stem rust appeared in severe epidemic form in individual fields near escaped barberry bushes in an area east of Hawkesbury, Ont., where a hedge was found on a farm. Barberries were also located on farms near Cornwall and Vankleek Hill; aecia had been fairly abundant on these bushes in the spring and substantial traces of stem rust could be found in adjacent fields. Infections ranging up to 65% were present in small patches on susceptible varieties at Almonte; it is suspected that barberries in the vicinity were responsible. Traces of stem rust were not uncommon late in the season from Quebec to Montreal, Que. Spotty infections as high as 40% were present at Compton and Lennoxville on August 7-8. At harvest time, infections ranged from 65% on Mabel, 60% on Lanark, 55% on Cartier to 12% on Banner and Erban and no rust on Vanguard. Comparable, but lower figures were also recorded by Mr. Paul Gervais in the plots at Wotton, Farnham, Compton, Lennoxville and Ste. Edwidge, which places are mostly in the Eastern Townships, where stem rust has been observed to be destructive in recent years. Barberry bushes or hedges were found at Champlain, Neuville, St. Foy, Gifford, Montmorency, Chicoutimi, and St. Felicien. Old aecia were common on the leaves, but the bushes were located, in most instances, at some distance from grain fields, so that no outbreaks were directly traceable to them. (I.L. Conners)

Stem rust was recorded in only 2 fields out of 107 examined in New Brunswick. At Douglastown, where for the third year rust has been found spreading from a single large barberry bush, 35% of rust was reported this year. At Hartland, a 3% infection was recorded and barberries were found.

In a special survey, barberries were found on 14 properties at St. Stephen, 3 at St. Andrews, 2 at Milltown, and one at Fredericton. (S.F. Clarkson)

In Nova Scotia stem rust was present in 10 fields out of 103 examined, the highest infection being 20% at East Mountain. Barberries were located at Melvern Square, Parrsboro, Wallace, and River John. Plantings are also known to occur near Great Village and Middletown and at Glenboro, New Glasgow, Grand Pre National Park and Barton. (K.A. Harrison and I.L. Conners)

In P.E.I. little more than a trace of stem rust was recorded in 8 fields out of 33 examined. However, in the plots at Charlottetown, at least 5% of rust was present on Vanguard. (Geo. W. Ayers)

CROWN RUST (Puccinia coronata). A light sprinkling of crown rust was present throughout Manitoba. Infections generally did not exceed one per cent and no appreciable damage was caused by this rust. (E. Peturson)

Crown rust was seldom more than a trace on oats in Ontario on account of the dry weather. Even near one buckthorn site near Spencerville, where crown rust has been severe in other years, only traces were present. Some rust was also present in the plots at Almonte, where buckthorns are abundant.

Crown rust was fairly common this year in Quebec in the lower, poorly-drained sections along the St. Lawrence and Richelieu Rivers. Buckthorns were encountered at St. Jacques and near Deschambault. At the former place the rust was spreading from the buckthorns to the oats; the infection was about 50%. In the 36 fields examined the average infection was less than 2% and only between Quebec and Montreal in late fields were infections of 10-20% found. Although this was the first year that detailed observations were made in Quebec, the indications were that crown rust is usually much more prevalent. The unusually dry weather in some parts of Quebec and over wide areas in the States to the south hastened the maturity of the crop and reduced inoculum. (I.L. Conners)

In the West Fredericton-Springhill area, N.B., where a localized epidemic of crown rust has been observed annually for several years, buckthorns were located in 1937. Several mature trees occur on the Odell estate and on the local golf course. The exact location of the original plantings is uncertain. No aecia were present on June 8, but a few were found on June 18. In the variety test sown at Springhill on May 7, only a trace of crown rust had developed by August 1. The slight development was probably due to the dry weather. However, a few fields of oats which were sown later in the same area showed 25% of crown rust on August 20.

In the general survey, out of 107 fields examined, no rust was present in 59, traces in 28, and percentages ranging from 35-70% in seven. Crown rust was severe in Charlotte Co. about St. Stephens, St. Andrews, and Pomeroy Ridge, infections ranging from 10-70% in every field. This fact is quite understandable since during a special survey on September 28-29, bushes, trees, and hedges were found in the first two places. Other high infections were at Norton (65%) and Gilbert Corners, near Shadiac (45%).

The uniform rust nursery was planted in 1938 near the European buckthorn hedge on the Experimental Station, Fredericton. Crown rust was severe. In 1939, the nursery was planted again on the same ground, but the hedge was removed in the fall of 1938. Crown rust was not present in the nursery plot this year. (S.F. Clarkson)

In Nova Scotia, no crown rust was observed in 21 fields, traces were present in 53, and 25-65% in 16 out of 100 examined. Outbreaks at Glenholme, Parrsboro, Pictou, and Bridgetown were definitely associated with buckthorn plantings. In addition a severe outbreak at East Mountain was observed, but a survey for buckthorns was not made. The removal of a buckthorn on the Gaspereaux Ridge has reduced crown rust infection in the district. On the other hand, hedges of buckthorn were found at Digby, Barton, Tusket, and a few large bushes were observed at Lower Argyle, but no severe outbreaks of rust occurred in the vicinity of these places. It would appear that well trimmed hedges located in towns at some distance from any fields of oats, are not liable to initiate severe outbreaks of crown rust, but where the hedges have been neglected or they have been planted in the country, they are responsible for epidemics of crown rust. (K.A. Harrison and I.L. Conners)

In P.E.I., 33 fields were examined for crown rust; no rust was present in 3, traces in 12 and readable percentages in 18. Infection was fairly heavy in the plots at Palmer Road and Charlottetown. (G.W. Ayers)

SMUT (Loose Smut, Ustilago Avenae and Covered Smut, U. Kolleri). Slight infections of loose smut were observed in the Matsqui district, B.C., but none were seen on Lulu Island or at Pemberton Meadows (W. Jones). Smut was reported in 15 out of 71 fields examined in Alberta; in the infected fields, infection varied from a trace to 10% and averaged about 2%. Covered smut was present in 19 fields out of 34 in Sask.; the average infection was a trace plus. A trace of loose smut was found in one field.

In a survey of 121 fields of oats in Manitoba, 5 fields were found to be free from smut and 5 to have from 21-30%, the remaining fields showing intermediate amounts. In the northwestern part of the province, where the spring was dry, the incidence of smut was much lower than in the

rest of the province and accounted for most of the fields with a trace to 1% of smut. For the 121 fields, the average infection was 4.4%. On this basis the loss in Manitoba would be around 2,500,000 bu., which at 40¢ per bu., would amount to $1,000,000. (W. Popp)

Loose smut was found more frequently and in higher amounts than covered smut in the 23 fields examined in Ont.; the average infection was - covered smut 0.3%, and loose smut 1%, or for both smuts 1.3%. Out of 120 fields examined in Que., covered smut was found in 95 fields and loose smut in 55. Covered smut not only occurred in more fields, but it occurred in higher amounts. The highest infections were: covered smut 25% at Larouche and near Pointe du Lac, loose smut 10% at Sorel. The average infection of covered smut was 2.2%, of loose smut 0.5% or of the two smuts, 2.7%. If 1937 crop is taken as a basis the loss is estimated at $550,000 (I.L. Conners). In N.B. smut was found in 56 fields out of 107 examined. The average infection was: covered smut 2.4%, loose smut 0.7%, or 3.1% for both smuts, representing a loss of $96,000 (S.F. Clarkson). The situation in N.S. was similar. Smut was found in 75 fields out of 96 examined. The average infection was: covered smut 1.8%, loose smut 0.5%, or 2.3% for both smuts representing a loss of $32,000 (K.A. Harrison). In P.E.I. smut was the heaviest that it had been for several years. The average infection of covered smut was 3.5% and loose smut 4.0%, with an average for both smuts of 7.5%, which represents a loss of $136,650. The highest infections were, Montague 29% (loose smut 14.5%, covered smut 14.5%), Freeland 27% (loose smut 27%, covered smut trace), Campbells Cove 35% (loose smut 6.5%, covered smut 28.5%). (G.W. Ayers)

HALO BLIGHT (Phytomonas coronafaciens) infection was a trace to slight in most of the 30 fields, in which it was observed in Alta., out of the 71 examined. In the plots at Beaverlodge infection ranged from a trace to moderate, while at Lacombe a few varieties showed a trace of halo blight.

Halo blight was found in practically every oat field examined in June, during the browning root rot survey in the northern half of the cereal growing area in Sask. Infection was slight to moderate, but in one field at Asquith and one east of Saskatoon the disease was severe. Soil from both fields was tested for manganese deficiency (grey speck) in greenhouse experiments, but no grey speck developed in untreated soil, nor was there any positive response in the manganese treated pots (T.C. Vanterpool). Halo blight was severe on some varieties at Saskatoon and the disease was moderate to slight in 14 out of 34 fields examined in July and August (H.W. Mead). In Manitoba halo blight was found in 16 fields out of 23 examined; it caused moderate damage. Two types of symptoms were noted - in some collections there was a distinct chlorotic halo about the lesion, a condition observed also after artificial inoculation; in others, the chlorosis is lacking. As neither type resembles the symptoms of stripe

blight and all the isolates appear to be P. coronafaciens all collections were referred to halo blight. The organism was also isolated from a collection made by I.L. Conners at Elmbrook, Ont. (W.A.F. Hagborg)

LEAF BLOTCH (Helminthosporium Avenae). A trace to slight infection was found in 6 fields out of 71 examined in Alberta, as well as on several varieties at Lacombe (M.W. Cormack). The disease was similarly present in 4 fields in Manitoba; infection was severe on Anthony and a trace to slight on several other varieties at Brandon. (J.E. Machacek)

In Eastern Canada, Leaf Blotch was not always separated in the field from SPECKLED LEAF BLOTCH (Leptosphaeria avenaria (Septoria Avenae), but from representative collections examined in Ottawa and by Dr. J.E. Machacek in Winnipeg, it was possible to estimate fairly accurately, the relative prevalence of the two diseases. Leaf Blotch is characterized by narrow stripes usually much longer than wide with parallel sides. Soon after the spots become necrotic the conidiophores of the fungus can be found. In Speckled Leaf Blotch, the individual spots are broadly ellipsoid on which the darker pycnidia may frequently be seen. In Ontario, a trace to slight infection of both diseases was found in a few fields. In Quebec and P.E.I. both diseases were fairly prevalent, but Leaf Blotch was, in general, more severe than Speckled Leaf Blotch. In N.B. and N.S. both diseases were about equally prevalent, being quite severe in some fields in the former province.

Re-examination of collections of leaf spots made in the Maritime Provinces in 1937 showed that Leaf Blotch was practically the only disease present. However, in 1938, Speckled Leaf Blotch was moderate in two collections, while Leaf Blotch was slight to moderate in three other collections, although at the time they were reported as Leaf Blotch. (I.L. Conners)

ANTHRACNOSE (Colletotrichum graminicola) was moderate to severe in two fields in the Peace River District, Alta.; no root rot caused by C. graminicola or any other organism was found in these fields (M.W. Cormack). A trace of anthracnose was found on Mabel in the plots at Deschambault, Que. (I.L. Conners)

HEAD BLIGHT (Fusarium spp. etc.) Traces of head blight were found both in the fields and the plots in Quebec. Diseased spikelets could usually be recognized by the diffused brownish cast of the glumes. As the kernels in diseased spikelets were more or less shrivelled away, the affected spikelets could be quickly identified by slight pressure between the thumb and fingers. Isolations were made by Dr. W.L. Gordon from 9 collections as follows: Fusarium avenaceum in 9 (24 isolations), F. gramineaum in 2 (7), F. Poae 1 (5), Alternaria spp. 5 (19), Epicoccum purpurascens 2 (4), Helminthosporium sativum 1 (1). (I.L. Conners)

POWDERY MILDEW (Erysiphe graminis) was present on oats in the uniform rust nurseries at Agassiz and Saanichton, B.C. (Margaret Newton). The only previous report of powdery mildew in the field was at Macdonald College in 1923. (I.L. Conners)

BLAST (Non-parasitic) was found in all fields examined in Alberta and was recorded as follows: a trace in 31 fields, 5% of the spikelets affected in 33, 10% in 11 and 15-20% in 6; blast ranged from a trace to 25% in the varieties at Beaverlodge and Lacombe. Blast was much less prevalent this year than last in Saskatchewan; it was recorded in 12 out or 34 fields examined. The disease was severe in a field at Neepewa, Man. Blast was common and fairly prevalent in Quebec and eastern Ontario; 30% of the spikelets were blasted in a sample from a 30-acre field at Jasper, Ont. The disease was general and severe in N.B.

NEMATODES (Heterodera schachtii). Oats infested by nematodes were again sent in by Agricultural Representatives from many parts of Ontario, but no further serious widespread infestations have been reported. The situation in Waterloo County was about the same as last year. In this county, several new serious infestations have been reported, but some of the men who had lost their oat crop in previous years stated that they are overcoming the trouble by crop rotation and by increasing the fertility of their soil. (J.E. Howitt)

BARLEY

STEM RUST (Puccinia graminis) was observed only on August 15 in Alta., and was very scarce; a trace to slight infection was found in 5 fields in central Alta. Stem rust was recorded in 6 out of 12 fields examined in Sask.; infection was a trace to slight. Traces of stem rust were general on barley in Man. (B. Peturson). Traces were recorded in the plots at Morven, Ont., and in a field at Cornwall. In Quebec traces of stem rust were usually recorded, but in one field at Ste. Martine, a 35% infection was noted (I.L. Conners). No stem rust was recorded in the 23 fields examined in N.B. and 12 in P.E.I. Stem rust was present in only 4 fields out of 56 examined in N.S., but 25% and 40% were recorded at Tatamagouche and Lake Killarney, respectively. (K.A. Harrison)

LEAF RUST (Puccinia anomala). Only a single record of leaf rust was made in 1939 in Man. - a trace on Trebi at Winnipeg (B. Peturson). Low percentages were present in the plots at 2 points in Ont. Trace of leaf rust were recorded in several fields throughout Que. No leaf rust was recorded in N.B., while a trace was present in one field in P.E.I. In N.S. it was observed in 13 fields; at Central Argyle and Danesville on the south coast, infections of 100% and 50% were recorded; 50% of rust was also noted at Milford.

LOOSE SMUT (Ustilago nuda) slightly affected several varieties at Sidney, B.C. It was found in 3 out of 12 fields in Sask.; 20% of the heads were affected in one at Watrous, Loose smut caused a 10% infection at Brandon, Man., and a trace at Kane. Usually only a trace of loose smut was found in Ontario, but in one field of Nobarb 7% of the heads were affected. Of the varieties under test, Newal has repeatedly shown high amounts of smut in Eastern Canada; percentages ranging from 5 to 13% were observed in Newal at Chatterton and Lansdowne, Ont., St. Hyacinthe and Oka, Que., and Fredericton, N.B. In all, 129 fields were examined in eastern Ont., Que., N.B., N.S., and P.E.I.; no smut was recorded in 79, a trace in 41 and 1-11% in only 9 fields. The average infection was 0.3%.

COVERED SMUT (Ustilago Hordei) was found in 9 fields out of 43 examined in Alta.; 5% of the heads were affected in one field. A trace to slight infection was present in 2 fields in Sask. Traces were recorded in 4 fields in Ont. Smut was present in a number of fields in Que.; but the highest infection was only 3%. In the Maritime provinces out of 90 fields, traces were present in 31 and 1-4% in 10 fields.

STRIPE (Helminthosporium gramineum). A trace was found in 2 fields at Grande Prairie, Alta. It was recorded in 2 fields in Sask.

FALSE STRIPE (Cause unknown) was recorded in 4 fields in Man. as follows: moderate at Deloraine, slight at Pigeon Lake, trace at Poplar Point and Roblin.

NET BLOTCH (Helminthosporium teres) was present in 20 fields out of 43 examined in Alta.; infection was a trace in 5, slight in 7, moderate in 5, and severe in 3. The disease was moderate in 2 out of 12 fields in Sask. It caused slight damage in 16 out of 17 fields in Man. A trace of net blotch was seen in 3 out of 4 fields in Ont.; it was moderate on several varieties at Chatterton, Ont. Net Blotch was slight to moderate in most fields examined in Que.; it was also present in the plots, being especially heavy at Lennoxville. In the Maritime Provinces, net blotch was recorded in 73 out of 84 fields examined; infection was as follows: trace in 38, slight in 23, moderate in 10 and severe in 2.

SPOT BLOTCH (Helminthosporium sativum) infection was a trace to slight in 7 fields out of 43 examined in Alta.; a slight infection occurred on a few varieties at Lacombe, while infection was a trace to moderate in the plots at Beaverlodge. It was recorded in one field in Sask., and a trace was reported from Cypress River, Man. Spot blotch was slight in one field in Ont. The disease was slight to moderate in several fields in Que.; it was most pronounced at Lennoxville. Spot blotch was moderate in a field at Sussex, N.B. The disease was found in 18 out of 56 fields examined in N.S. as follows: trace, 13; moderate, 4; severe, 1. Spot blotch was slight to

moderate in 3 fields in P.E.I. and was fairly prevalent in the plots at Palmer Road and Charlottetown.

SPECKLED LEAF BLOTCH (Septoria Passerinii). A slight infection was found in two fields in Alta. and on several varieties in the plots at Lacombe. A trace was seen on Olli at Lennoxville, Que.

COMMON ROOT ROT (Helminthosporium sativum and Fusarium spp.) caused a trace to slight damage in 7 fields in Alta. and moderate damage in one at Crossfield. This disease caused moderate damage in 9 fields out of 12 examined in Sask.

HEAD BLIGHT (Fusarium spp., Helminthosporium sativum, etc.). Traces or occasionally heavier infections were observed in Que., N.S., and P.E.I. Isolations were made from 25 collections by Dr. W.L. Gordon. These were identified as follows: Fusarium Poae from 20 collections (130 isolations); F. avenaceum 6 (27); F. graminearum 1 (8); Helminthosporium sativum 11 (44); Alternaria 10 (18); Epicoccum purpurascens 3 (7); a basidiomycete 1 (1); Fusarium Poae predominated in 14 collections, while Helminthosporium sativum was the principal fungus in 7.

ERGOT (Claviceps purpurea) was reported occasionally - slight infection in plots at Lacombe, Alta.; trace at Wawanesa, Man.; trace at Malignant Cove and in plots at Nappan, N.S.

POWDERY MILDEW (Erysiphe graminis) was general in plots at Sidney, B.C., in January and was severe on a few varieties in July. It caused slight to moderate damage in 3 fields at Cloverdale, Matsqui, and Sardis in July. Powdery mildew was slight in two fields in Ont. and it was severe on O.A.C. at Chatterton. The disease was present in most fields in Que., and was frequently heavy on the lower leaves. It was abundant on the lower leaves, especially of certain varieties at Macdonald College. Powdery mildew was recorded from 4 fields in N.S.; it was abundant on lodged grain at Central Argyle. The disease was heavy in a late field of Charlottetown 80 in Queens Co., P.E.I.

BACTERIAL BLIGHT (Phytomonas translucens) was moderate on Alberta No. 8 at Brooks, Alta. (A.W. Henry). A moderate infection was found at Brandon, Man., and a trace at Pigeon Lake out of 14 fields examined. (W.A.F. Hagborg)

SCALD (Rhynchosporium Secalis) was general, infection being slight to severe in the plots at Beaverlodge and Lacombe, Alta.; a trace was present in 3 fields and moderate to severe in 3 others. Scald was reported in 2 fields in Sask.

BLAST (Non-parasitic) was severe in a field at Didsbury, Alta. (G.B. Sanford)

ALKALI INJURY was severe in large patches in a field at Brandon, Man.; the plants were stunted and browned.

RYE

STEM RUST (Puccinia graminis). A trace was found in one field at Dolbeau out of 4 examined in Que.

LEAF RUST (Puccinia secalina). A slight infection was observed in the plots at Lacombe, Alta. A very heavy infection was present on two varieties in the plots at Saskatoon, Sask. Leaf rust was slight also in 2 fields in Sask. and slight to moderate in Quebec.

ERGOT (Claviceps purpurea) was recorded a few times as follows: slight infection in winter rye at Lacombe, Alta.; 10% of heads in a field at Antelope, Sask.; trace to slight infection in 3 out of 4 fields in Que.; trace in a small field in Kings Co., N.S.

POWDERY MILDEW (Erysiphe graminis) was general in a field at Hatzic, B.C.

SPECKLED LEAF BLOTCH (Septoria Secalis). A trace was seen at Saskatoon, Sask.

COMMON ROOT ROT (Helminthosporium sativum and Fusarium spp.) was slight in one field out of 5 examined in Sask.

Phytomonas atrofaciens caused severe leaf infection at Virden and Pipestone, Man., and slight infection at Scarth; no disease was present in 3 other fields. (W.A.F. Hagborg)

II. DISEASES OF FORAGE AND FIBRE CROPS

ALFALFA

COMMON LEAF SPOT (Pseudopeziza Medicaginis) was general but the damage was slight on Vancouver Island and in the Fraser Valley, B.C.; it was also general in the Okanagan district, being particularly noticeable along the irrigation flumes. Infection was severe in one field at Athabaska, Alta., and was slight to moderate in the plots and in 4 other fields out of 16 examined in Alta. At Macdonald College, Que., 75% of the leaves were affected in some fields on June 28 (W.E. Sackston). Infection was quite heavy on Grimm in September in Queens Co., P.E.I.

YELLOW LEAF BLOTCH (Pseudopeziza Jonesii) was slight in a field at Lacombe and moderate in one at Edmonton, Alta., in early July. Ascochyta imperfecta was also present on most of the plants in both fields and later in the season when other diseases became more prevalent, yellow leaf blotch was never observed. This is the first report of the disease in Alta., but a specimen of alfalfa showing the disease was collected at Stavely, in 1935 (M.W. Cormack). The disease was observed at Saskatoon, Sask.

DOWNY MILDEW (Peronospora aestivalis). A trace was observed on Ladak and a slight infection on Lytton at Agassiz, B.C., on May 12; the latter variety is definitely more susceptible than other commercial varieties including Grimm, which is the most widely grown variety at the coast (W. Jones). Downy mildew was slight to moderate at Thorsby, Alta., on July 3 (A.W. Henry). A trace of disease was found in one field at White Fox, Sask., on May 31. (T.C. Vanterpool)

BLACK STEM (Ascochyta imperfecta) was severe in 2 fields in the Peace River district and in the plots at Lacombe, Alta.; it was slight to moderate in 8 other fields and slight on all varieties in the Beaverlodge, Edmonton, and Lethbridge plots. (M.W. Cormack)

BACTERIAL WILT (Phytomonas insidiosa) was found this year in the alfalfa fields in the Experimental Station, Summerland, B.C. In one field a large portion of the plants were killed. (H.R. McLarty) Bacterial wilt was suspected in southern Alta. last year and it was definitely identified by Dr. F.R. Jones, when he visited Alberta this spring. It has apparently been introduced rather recently, but it is spreading rapidly through the irrigated districts and is likely to become a serious problem. It was found in 18 out of 40 irrigated fields examined, but it was not observed in unirrigated fields, even in the same districts. The damage was a trace in 5 fields, slight in 6, moderate in 3, and severe in 4. The disease is at present most prevalent and severe in the Brooks district, where over

50% of the plants were dead or dying in 2 fields and the damage was slight to moderate in several others. A large acreage of four-year-old alfalfa was also ruined by wilt on a ranch north of Medicine Hat. In the Lethbridge district the disease was much less prevalent; it was found in only one field out of 15 examined. In late May many of the infected plants were wilting severely in the field. In late September wilt was found in additional fields in the Brooks district and also farther north in individual fields at Cluny and Strathmore. Grimm, almost the only variety grown in Alta., is also one of the most susceptible. (M.W. Cormack)

The only previous report of bacterial wilt in Canada was from Windermere, B.C., in 1936.

RUST (Uromyces Medicaginis). A collection of this rust was obtained by Mr. J.A. Goode at Goodlands, Man., on September 25. (W.L. Gordon)

ROOT ROT (Various fungi) was found in 19 out of 25 fields examined in Alta.; the damage was as follows: trace to slight in 11 fields, moderate in 6, and severe in 2. The latter were located at Airdrie and Lacombe, where half the plants were killed or seriously weakened. Early spring infection of alfalfa and sweet clover was relatively slight in southern Alta., while it was fairly prevalent and destructive in other parts of the province. Cylindrocarpon Ehrenbergi apparently caused most of the damage, but Fusarium avenaceum and Plenodomus Meliloti also occurred in several diseased stands. (M.W. Cormack)

Root rot was scattered through the plots at the University, Saskatoon, Sask., but no large patches were affected. Further killing was reported in mid-summer. Fusarium was isolated. Root rot was also observed at White Fox, an alfalfa seed producing area. (T.C. Vanterpool)

Yellows (boron deficiency) was suspected in a field near Charlottetown, P.E.I.; the field was moderately affected. (R.R. Hurst)

COMMON CLOVER

COMMON LEAF SPOT (Pseudopeziza Trifolii). In the fields about Macdonald College, Que., red clover plants chosen at random showed from 15 to 45% of this leaf spot early in the summer, but the disease was inconspicuous on the second growth (W.E. Sackston). The leaf spot was heavy in all fields examined in August in P.E.I. (R.R. Hurst)

POWDERY MILDEW (Erysiphe Polygoni). A trace was observed in the red clover plots at Edmonton, Alta. Powdery mildew was first observed on red clover in the plots at Macdonald College, Que., on August 9, although it had

been noted in the woods by Dr. Crowell at a much earlier date. It became increasingly abundant throughout the season and was seen in all districts visited. No mildew was seen on alsike clover although the plants were growing near heavily infected red clover (W.E. Sackston). Powdery mildew was unusually prevalent and severe this year in York and Carleton Co's., N.B.

STAGONOSPORA LEAF SPOT (S. recedens). A trace was found in one field of red clover at Athabaska, Alta. (M.W. Cormack)

GLOEOSPORIUM LEAF SPOT (G. spadiceum). A trace of infection was observed on red clover in the plots at Olds, Alta. (M.W. Cormack)

RUST (Uromyces Trifolii) was general on red clover in the plots at Agassiz, B.C.; the damage was slight to moderate. Aecia were found on the leaves and petioles of spaced plantings at Macdonald College, Que.; uredinia and telia were common later, both there and in fields about the College (I.H. Crowell). Rust was light on red clover at the Fredericton Station, N.B. A slight infection was observed in 4 fields examined in P.E.I.

ROOT ROT (Sclerotinia sp.). Forty-five per cent of the plants were killed in the trial rows at Sidney, B.C. (W.R. Foster)

WILT (Verticillium sp.) has been found affecting a few plants of the spaced plantings at Macdonald College, Que., but the affected plants wilt and die; a Verticillium sp. has been repeatedly isolated from the roots of diseased plants, but its pathogenicity has not been tested. (W.E. Sackston)

WINTER KILLING (Freezing and thawing). As a result of winter killing, clover was killed out in most fields in P.E.I., except in those protected by windbreaks. (R.R. Hurst)

SOOTY BLOTCH (Cymadothea Trifolii) was general in the Fraser Valley, B.C. (W. Jones). Sooty blotch was present throughout the season in low moist parts of fields of red clover about Macdonald College, Que., and was most pronounced in dense stands of young plants; traces were found in all fields. On white clover the disease was found in woods, along headlands, and in the ditches throughout the season; up to 50% of the leaves were affected (W.E. Sackston). Sooty blotch infection varied from a trace to severe in N.B., while traces only on red clover were observed in P.E.I.

STEMPHYLIUM LEAF SPOT (S. sarcinaeforme) was found everywhere on red clover about Macdonald College, Que., but infection varied greatly. It was

most noticeable on the second growth particularly on plants, which were fully grown. In some fields, where the disease was severe, quite a few leaves were killed (W.E. Sackston).

CERCOSPORA LEAF SPOT (C. zebrina Pass.) was fairly common on red and alsike clover about Macdonald College, Que., being somewhat heavier on the latter host. (W.E. Sackston)

MOSAIC (virus) affected 10% of the plants in spaced blocks at Macdonald College, Que. However, mosaic was seen in few fields, and then only isolated plants were affected (W.E. Sackston). A suspected virus disease of red clover, which was reported last year, was present again in field and greenhouse. It is less common than mosaic about Macdonald College, but it is much more destructive to individual plants. (I.H. Crowell)

The SLIME MOULD (Didymium squamulosum) was found fruiting on alsike clover, Sept. 12, 1939, at Macdonald College, Que. (M.C. Herb. 428). (I.H. Crowell)

SWEET CLOVER

STAGONOSPORA LEAF SPOT and STEM BLIGHT (Leptosphaeria pratensis (Stagonospora Meliloti). The leaves only were found affected in 8 fields out of 14 examined in Alta.; the infection was as follows: trace to slight in 6 fields, moderate in one at Athabaska, and severe in one at Peace River. (M.W. Cormack)

STEM CANKER (Ascochyta caulicola). Three fields were slightly infected in Alta. Yellow Blossom sweet clover was slightly to moderately affected in the plots at Olds, but the other varieties were free from infection. (M.W. Cormack)

ROOT ROT (Sclerotinia and Fusarium) was slight in the plots of the Dominion Forage Crops Laboratory at Saskatoon, Sask. Typical specimens were secured in company with Dr. F.R. Jones. (T.C. Vanterpool)

PHYTOPHTHORA ROOT ROT (Phytophthora sp.). A soft watery root rot of sweet clover was found in 4 fields out of 10 fields examined in southern Alta., and also on roadside plants on two occasions. The damage was slight except in one field near Lethbridge, where 20% of the plants were dying. A highly pathogenic species of Phytophthora was isolated which was identified by Mr. S.F. Ashby as a strain of Phytophthora Cactorum (Leb. & Cohn) Schroet. Sweet clover is apparently a new host for this species.

The symptoms of the disease are similar to those of the Phytophthora root rot caused by P. megasperma Drechsl. in the United States (Jones, F.R., Phytopathology 19: 909-910. 1939), but apparently in Alberta it is caused by a different species of Phytophthora. (M.W. Cormack)

VETCH

DOWNY MILDEW (Peronospora Viciae) was severe on the varieties Gray, Spring, Nain, Blanche, Poivre, Jean Baptiste, Divine, and Blanche Desmarais in the plots at the Sidney Station, B.C., while no infection was found on Hungarian, Monantha, Scarlet 527, Hairy, Black Bitter, Tangier, and Scarlet 524. As the varieties were grown alongside of each other and the disease was heavy on the affected varieties, it is believed the differences in infection are due to varietal reaction to the disease. (W. Jones)

FOOT ROT. Odd plants of the variety Monantha were found affected at Brandon, Man. Isolations yielded Fusarium Scirpi var. acuminatum and F. redolens. (W.L. Gordon)

RUST (Uromyces Fabae) was slight on a few plants of Vicia Cracca near Bridgewater, N.S. (J.A. Boyle)

BROOM-CORN MILLET

SMUT (Sorosporium Panici-miliacei) was heavy on Hog millet at Brandon, and moderate on Hog, Red Turgai, and Turgai Proso millet at Mordon, Man. Smut affected 50-75% of the heads of a Hog millet crop in Lincoln Co., Ont.; the crop was worthless for hay. (G.C. Chamberlain)

BACTERIAL LEAF SPOT (Phytomonas Holci). A moderate, general infection occurred on Empire, Kuisk, Hansen's Proso, Hungarian, and Siberian millet at Brandon, Man.

BUCKWHEAT

YELLOWS (virus) was widespread on buckwheat in York, Sunbury, Queens, Westmoreland, Northumberland, and Charlotte counties, N.B. The disease was severe on the rough varieties, but was slight on the smooth in commercial fields. At the Station, Fredericton, 10-14% of the plants were affected in the plots of the rough Tartarian varieties, 1.2-1.6% were affected in those of the smooth Japanese sorts. (D.J. MacLeod)

The two so-called types of buckwheat belong in reality to two different species of Fagopyron. The smooth type is Fagopyron esculentum Gaertn., which is known as Buckwheat or Common Buckwheat, while the rough type is F. tartaricum Gaertn. which is called India-wheat, Tartary Buckwheat, Rye Buckwheat, or Duck-wheat. According to Dr. W.G. McGregor, the common buckwheat is probably grown more extensively than the Tartary Buckwheat, except possibly in New Brunswick. Dr. McGregor also reports only two or three plants are affected by yellows in any one season in the plots at Ottawa. (I.L. Conners)

CORN

SMUT (Ustilago Zeae). A trace of infection was observed at Medicine Hat, Alta. (R.A. Ludwig). Smut was reported in Man. as follows: Brandon, moderate infection, but less than in 1938; Morden, slight general infection; Winnipeg, 60% of plants of Minn. 13 and 7% of Manitoba Amber infected. Smut was present in every field examined in south-western Ontario, but in amounts that it appeared to be of slight economic importance. (J.K. Richardson)

RUST (Puccinia Sorghi). In Manitoba, rust infection was moderate and general at Brandon, heavy in patches at Morden, and slight and general at Winnipeg. Rust was general in Ontario in September, but it apparently caused little damage (J.K. Richardson). A very slight infection occurred in P.E.I.

STALK ROT (Fusarium moniliforme). A pink coloured rot was found occasionally affecting the nodes and adjacent tissue. Isolations yielded F. moniliforme and moulds. The above is the first record of the occurrence of this pathogen on corn in Man. (W.L. Gordon)

ROOT ROT (cause undetermined). Several fields were observed in south-western Ontario, where the stands were poor and growth uneven. The roots on the affected plants were sparse and badly rotted. (J.K. Richardson)

EAR ROTS (Fusarium and Diplodia Zeae) was just beginning to show up in the fields examined in Essex, Kent, and Lambton counties, in late August, but was present in every field. (L.W. Koch)

FLAX

RUST (Melampsora Lini). A slight infection was observed at Brooks, and a trace on most varieties at Lacombe, Alta. A trace of rust was seen in a field at Garrick, Sask., out of 6 examined; it was severe on a sample

from Rosetown out of several received from growers. Traces of rust were reported from Elie and Haywood, Man., and a slight infection from Rosenfeld.

WILT (Fusarium Lini) caused slight damage in two fields out of 6 examined in Sask. Only a trace occurred in the plots at Saskatoon.

BROWNING (Polyspora Lini). Several specimens of flax showing in some instances severe damage were received at the Saskatoon Laboratory in the summer of 1939 (P.M. Simmonds). Browning caused slight to moderate damage according to the variety in the plots at Saskatoon; at first the disease was confined to the tips of the seedling plants and was thought to be caused by frost. Damping-Off (Rhizoctonia Solani) was not observed. (T.C. Vanterpool)

PASMO (Septoria linicola (Speg.) Garass., formerly (Phlyctaena linicola Speg.) was severe on most varieties in the plots of the Cereal Division, Central Experimental Farm, Ottawa, Ont., following heavy rains and high winds in late July and early August. Plants nearing maturity were most severely affected. (F.S. Thatcher)

The transfer of the pathogen to Septoria was made by Garassini (cfr. R.A.M. 15:441. 1936) and confirmed by Rost (cfr. R.A.M. 16:676-77. 1937).

SEED DISCOLORATION (Phytomonas atrofaciens). A sample of seed was submitted by the Seed Laboratory, Winnipeg on account of the discoloration of the seed coat and its poor germination. The seed was found to be severely infected by P. atrofaciens. (W.A.F. Hagborg)

HEAT CANKER (non-parasitic). Affected samples were received from Dollard, Yellow Grass, and Saskatoon, Sask., at the Saskatoon Laboratory. In other samples received the Pasmo disease was also present.

MANGEL

CERCOSPORA LEAF SPOT (C. beticola) was fairly heavy in a field of Yellow Intermediate in York Co., N.B., but the damage was slight (D.D. Dolan). This leaf spot caused some reduction of yield in a severely infected field of Laurentian mangels in Queens Co., P.E.I. (R.R. Hurst)

CROWN GALL (Phytomonas tumefaciens) was found on a single plant in P.E.I.

SOFT ROT (Erwinia carotovora) destroyed two plants in a field near Charlottetown, P.E.I.

DAMPING-OFF (Rhizoctonia Solani). Affected plants were received from Deep Brook, N.S.; the amount of damage was not stated.

?CURLEY TOP (virus). In York Co., N.B., mangels were affected with a trouble where the middle and top leaves were rugose with the veins showing a faint clearing and the basal leaves were dead. The basal leaves first developed an interveinal foliar necrosis, the necrotic areas being circular and from 5 to 20 mm. in diam. These areas frequently coalesced resulting in the destruction of the leaves. During the latter part of the season the symptoms gradually disappeared and the plants appeared to continue their normal growth. The leaves of seedling mangels became strikingly rugose and the margins of the top leaves curled downward when leaf hoppers. (?Thamnotettix sp.) were confined on the seedlings after feeding on diseased plants. The leaves also showed a marked veinal mottle. The petioles and blades later developed a brown rusty appearance and a number of leaves died. The virus was successfully transmitted by grafting, but its transmission by sap inoculation to Datura Stramonium, Nicotiana Tabacum, Solanum nodiflorum, Lycopersicon esculentum, Capsicum annuum, Lycium barbarum and mangel was unsuccessful. It is concluded that the rugose symptoms and veinal mottle are due to a virus and that the foliar necrosis is due to some other cause. (D.J. MacLeod)

FERN LEAF (?virus). An unusual condition was also found in White Prince mangel in York Co., N.B. All the leaves of the affected plants were spindling and filiform, varying from 10 to 12 in. in length by ½ to 2 in. in width. The production of new leaves was stimulated to form a compact bunch. Over 200 leaves were found on one plant. Besides the marked reduction in the width of the lamina, the leaves were twisted round in a loose spiral and their margins were irregularly rolled upwards. In young leaves the laminae were quite uneven and chlorotic. The basal leaves developed a diffused veinal mottle and died prematurely. The affected plants were extremely dwarfed and the roots were about two-thirds the normal size; 3% of the plants were affected in a test plot. Attempts to transmit a virus by sap inoculation to standard differentials were unsuccessful. (D.J. MacLeod)

CROWN or DRY ROT (non-parasitic) causes a necrosis of the petioles and leaf veins and occasionally an internal breakdown of the roots. The leaf symptoms were particularly prevalent in York Co., N.B., this year during a dry period in August and early September. During the latter part of September, when heavy rains fell, the mangels recovered (J.L. Howatt). A few affected plants were seen in one field in Queens Co., P.E.I. The trouble may be due to lack of boron. (R.R. Hurst)

ORACH or HUNGARIAN SPINACH

LEAF SPOT (Cercospora dubia) was moderate on Atriplex hortensis at Brandon, Man. (J.E. Machacek and W.L. Gordon)

SORGHUM

BACTERIAL LEAF SPOT (Phytomonas Holci) moderately infected Japanese Amber, Early Amber, Wheatland Milo and Sudan grass at Brandon, Man.; while infection was slight on Sudan grass, and severe on Early Amber Cane, Rhodesian Sudan grass, White Kaffir corn, and Doff's Kano at Morden.

COVERED SMUT (Sphacelotheca Sorghi) was reported as slight on Early Amber at Brandon, Man., and common on Early Amber and Sooner Milo at Morden. (W. Popp)

SOY BEAN

BACTERIAL BLIGHT (Phytomonas glycinea) was general but moderate at Brandon and Morden, Man. All varieties were mildly affected at the Harrow Station, Ont.

MOSAIC (virus). Traces of mosaic were present in the test plot at the Charlottetown Station, P.E.I.

SUGAR BEET

ROOT ROT was destructive in patches killing many plants in a field at Lethbridge, Alta. Fusarium culmorum was isolated from the diseased roots. (R.A. Ludwig)

SUNFLOWER

WILT (Sclerotinia sclerotiorum) had affected less than 1% of the plants at Saskatoon, Sask. The head rot, which was so conspicuous last year appeared to be entirely absent. There was a trace of infection in some patches and severe in others at Morden, Man.

RUST (Puccinia Helianthi) was moderate at Paradise Valley, Alta. (S.B. Clay). Rust was again present in the University plots, Saskatoon, Sask., infection ranging from a trace to severe. Rust was severe in the plots at both Brandon and Morden, Man.

CULTIVATED GRASSES

AWNLESS BROME GRASS (Bromus inermis)

Leaf Blotch (Septoria bromigena) was moderate at Sedgewick, Alta. (W.C. Broadfoot)

CRESTED WHEAT GRASS (Agropyron cristatum)

Stripe Rust (Puccinia glumarum). Infection was slight at the Agassiz Farm, B.C. (W. Jones)

Barley Covered Smut (Ustilago Hordei). Smut was detected in a sample of seed from Spruce Holm, Sask., by Mr. Nobles, Dominion Plant Products Laboratory, Saskatoon. The sample was communicated by Dr. P.M. Simmonds. Examination revealed that the spores agreed with Ustilago Hordei, which G.W. Fischer (Mycologia 30:385-389. 1938) found on this host at Pullman, Wash., and Bozeman, Mont., rather than Ustilago bullata also reported by Fischer (Mycologia 29:408-425. 1937) on Agropyron cristatum. He has also been able to show by infection experiments that the smut on crested wheat grass would infect barley (Phytopathology 29:490-494. 1939). (I.L. Conners)

ORCHARD GRASS (Dactylis glomerata)

Purple Leaf Spot (Mastigosporium rubricosum (Dearn. & Barth.) Sprague) was general and caused slight to moderate damage on Vancouver Island and the Fraser River Valley, B.C. It appears to be the commonest leaf spot of orchard grass throughout the season (W. Jones). R. Sprague (Jour. Agr. Res. 57:287-299. 1938) describes the species in some detail. He recognized it to be distinct from M. album and proposed the name M. calvum (Ellis & Davis) Sprague. Later he found the name untenable and proposed the new combination M. rubricosum (Mycologia 32:43-45. 1940). (I.L. Conners)

Brown Stripe (Scoletotrichum graminis). A general slight infection occurred on Vancouver Island and in the Fraser River Valley, B.C. (W. Jones). The fungus was fruiting freely on leaves received from the Forage Crop Division, Ottawa. (I.L. Conners)

Powdery Mildew (Erysiphe graminis). A slight infection was observed in the pastures at the Stations at Agassiz and Sidney, B.C.

PERENNIAL RYE GRASS (Lolium perenne)

Eye Spot (Ovularia Lolii) was general, but caused slight damage on Vancouver Island and the Fraser Valley, B.C.

TIMOTHY (Phleum pratense)

Rust (Puccinia graminis). A trace to slight infection occurred on strains O 1818, O 1601, O 1602, while it was moderate to severe on others at Agassiz, B.C. (W. Jones). Infection was slight to moderate in

the plots at Edmonton and Lacombe, Alta. Some selections were free from infection, while others were heavily rusted at Macdonald College, Que. The II and III stages were found both in the field and greenhouse. The teliospores could not be induced to germinate (I.H. Crowell). Infection varied from a trace to very heavy on wild plants and in the nursery at Charlottetown, P.E.I. The selections were classified into hay, hay-pasture and pasture types. Some highly resistant strains were present in each class, while others were severely infected. (R.R. Hurst)

Leaf Spot (Heterosporium Phlei). Infection was general but slight on Vancouver Island and the Fraser River Valley, B.C. The disease caused the death of a large proportion of the leaves in several plots at Ottawa, Ont. (F. S. Thatcher). Infection was heavy on several seedling selections at Charlottetown, P.E.I. (R.R. Hurst)

Brown Stripe (Scoletotrichum graminis) was general but the damage was slight in the Fraser River Valley and on Vancouver Island, B.C. (W. Jones)

Anthracnose (Colletotrichum graminicola) was heavy in a patch of timothy as a leaf spot at Naicam, Sask.

Ergot (Claviceps purpurea). Traces were found in the plots at Charlottetown, P.E.I.

WESTERN RYE GRASS (Agropyron tenerum)

Smut (Ustilago bromivora). A 20% infection was recorded at Saskatoon, Sask.

III. DISEASES OF VEGETABLE AND FIELD CROPS

ASPARAGUS

RUST (Puccinia Asparagi) caused serious injury to asparagus, said to be Martha Washington, in a field at Waterville, N.S. This appears to be the first record of the occurrence of the rust in Nova Scotia. (J.F. Hockey)

FASCIATION (non-parasitic). A trace was observed in Lincoln Co., Ont. A few fasciated plants were noted in some fields in Jacques Cartier and Laval Counties, Que.

BEAN

MOSAIC (virus). A slight amount of mosaic was found in most bean fields in the Interior of British Columbia, but it was rarely severe and usually less than 1% of the plants were affected. In other parts of the Dominion the percentages varied widely: Coaldale, Alta., trace; Lethbridge, 7%; Saskatoon, Sask., 25%; Rosthern, trace in one variety; Ontario and Quebec, trace to 5%; Kentville, N.S., single plant; Queens Co., P.E.I., 7% and 2% respectively.

ANTHRACNOSE (Colletotrichum Lindemuthianum) was reported as follows: B.C., none seen in the Interior and a trace to 2% at the Coast; Medicine Hat, Alta., moderate infection in a commercial planting. Up to 90% of the plants infected in Kent Co., Ont., the damage being more extensive than in 1938; in a 16-acre field at Chatham a few of the spots on the pod penetrated to the seed. General and quite severe in most fields, but not as injurious as bacterial blight in the 27 fields of Brittle Wax and Pencil Pod beans grown for seed at St. Eustache, Lanoraie, Lacole, and St. Valerien, Que., and inspected at the end of the growing season (E. Lavallee). Infection was 5% in a field in York Co., N.B. Infection was slight this year in most gardens at Kentville, N.S., and also slight at Grand Pre. It destroyed 60% of the plants in relief gardens at Cascumpec, P.E.I.

BACTERIAL BLIGHT (Phytomonas Phaseoli). Infection was general and in some fields severe in the Brooks and Lethbridge districts in southern Alberta. It was also reported from Edmonton, Hughenden, and Peace River. The damage was a trace to moderate in the varietal plots at Olds and Lacombe and a trace to severe at Lethbridge. Although halo blight is present, it seems much less common. Bacterial blight was moderate in the gardens at Saskatoon and the Melfort Station, Sask.

Bacterial blight was moderate on Bountiful and Davis White Wax at Brandon, Man.; a trace occurred on other varieties. At Morden the disease was severe on some varieties, e.g. Davis White Wax. The disease was rather

severe in an 8-acre field at Streetsville, Ont.; about 4% of the plants were wilted and spots on the pods were numerous (J.K. Richardson). Out of 27 fields inspected in the Montreal area, Que., 26 were severely diseased; the remaining field, which was sown with beans selected from healthy plants only was remarkably clean (E. Lavallee). Bacterial blight was moderate in a field in York Co., N.B. The disease was also fairly severe at Kentville, N.S., and in Queens Co., P.E.I.

HALO BLIGHT (Phytomonas Medicaginis var. phaseolicola) was found at Lillouit, Rayleigh Mountain, Armstrong, Vernon and Grand Forks, B.C. In some fields only a trace of disease was found; in others, it was general and infected from 50 to 75% of the plants. The causal organism was definitely determined (G.E. Woolliams and H.R. McLarty). Halo blight was found in the coast region, in three fields where the crop was grown for seed. It was particularly severe in a field at Langley Prairie. The crops were all Black Pencil Pod and were grown from certified seed imported from Ontario (W.R. Foster). Slight to moderate infections were observed at Brooks and Lethbridge, Alta. (M.W. Cormack). The disease was reported as severe in Red Kidney and Altoba beans in the University gardens, Winnipeg, Man. The organism was isolated (W.A.F. Hagborg). As my correspondents report this is the first record of halo blight in B.C. and Man. (I.L. Conners)

RUST (Uromyces appendiculatus) was heavy in 2 acres of Kentucky Wonder on Lulu Island, B.C. (W.R. Foster). Aecia literally covered the leaves of Kentucky Wonder sent from a garden at Beavan Lake, near Arundel, Que., on July 16. Uredinia and telia were abundant on specimens received in August. Arthur (Manual Rusts U.S. and Canada p. 296. 1934) states that "aecia .... are rarely observed" (I.H. Crowell). A trace of rust occurred also on pole beans at Kentville, N.S., and Queens Co., P.E.I.

GREY MOULD (Botrytis cinerea) affected 5% of the pods in a greenhouse at Macdonald College, Que., in June (I.H. Crowell).

ROOT ROT or FOOT ROT (Fusarium spp.) caused a trace of damage at Coaldale, Alta. (G.B. Sanford). Odd plants of Early Wonder were wilted at Morden, Man. Isolations yielded Fusarium spp. (W.L. Gordon). Many plants showed severe stem lesions just below ground level in a field of Pencil Pod Wax at Streetsville, Ont. (J.K. Richardson).

ROOT and STEM ROT (Rhizoctonia sp.) was general at Lethbridge, Alta., causing about 1% damage (G.B. Sanford). Traces of stem rot were present in Scarlet Runner beans in Queens Co., P.E.I. (R.R. Hurst)

SUNSCALD (non-parasitic) varied from a trace to severe in the Interior of B.C., averaging slight to moderate.

BEET

CERCOSPORA LEAF SPOT (C. beticola) was slight in a planting in York Co., N.B., and moderate in a garden at Charlottetown, P.E.I.

SCAB (Actinomyces scabies). A few lesions were seen on several roots in Queens Co., P.E.I.

ROOT ROT (Rhizoctonia sp.) affected several roots in a garden in Queens Co., P.E.I.

CABBAGE

CLUB ROOT (Plasmodiophora Brassicae) was general in the market gardens on the lower mainland, B.C.; the damage was moderate (W. Jones). Club root was very destructive in many fields of Laval and Jacques-Cartier Counties, Que.; it was also found in home gardens in various localities (E. Lavallee). A few plants were severely injured in a garden at Charlottetown, P.E.I., and 4 reports of the disease in P.E.I. were received. (R.R. Hurst)

BLACK ROT (Phytomonas campestris) affected nearly all cabbage fields near Chatham, Ont., under contract to a canning company. In one field, 65% of the plants were infected, and in 4 others, 40%. The damage was severe. (L.W. Koch)

BLACK LEG (Phoma lingam) was general on the leaves, causing slight damage at the Sidney Station, B.C. (W. Jones)

DAMPING OFF (Rhizoctonia Solani). Diseased specimens were received from Deep Brook, N.S. (D. Creelman)

SOFT ROT (Erwinia carotovora). One affected plant was brought to the Laboratory, Charlottetown, P.E.I. (R.R. Hurst)

POWDERY MILDEW (Erysiphe Polygoni). A single plant of several under cages in a greenhouse at Ste. Anne de la Pocatiere, Que., became severely infected with powdery mildew in November. (C. Perrault)

CARROT

YELLOWS (Virus). Scattered plants of all varieties grown were infected at Brandon, Man. Yellows was common on carrot in commercial fields in York, Sunbury, Queens, Westmoreland, Carleton, and Charlotte counties, N.B. In two such fields in Sunbury Co., 45% and 50% of the crop respectively were affected and less than 10% of the affected plants produced marketable roots (D.J. MacLeod). According to correspondents from Leitche's Creek Station, N.S., quite a percentage of the carrots in their market garden have

failed to produce sound roots in the last two years. "The tops turn light in colour and get rather bushy and there will be a carrot all covered with roots or there will be no carrot at all, just a kind of fuzzy root". Frequently the affected plants go to seed. Their yield has been cut to quite an extent. (I.L. Conners). In a garden at Kentville, 1% of the plants were affected (K.A. Harrison). About 95% of the carrots were affected in a garden at Charlottetown, P.E.I., but the roots were not affected very much. (R.R. Hurst)

LEAF BLIGHT (Macrosporium Carotae) was of fairly general occurrence in the Lower Mainland and on Vancouver Island, B.C.; it caused considerable damage in one field in North Saanich. (W. Jones)

SOFT ROT (?Erwinia carotovora) destroyed 50% of the plants in a garden at Coalhurst, Alta. (R.A. Ludwig)

BACTERIAL BLIGHT (Phytomonas Carotae). A heavy, general infection occurred at Brandon, Man. This was the most extensive infection yet seen.

CAULIFLOWER

CLUB ROOT (Plasmodiophora Brassicae) was present in most cauliflower fields in Laval and Jacques Cartier Counties, Que.; the disease generally appears in patches (E. Lavallee). Traces were seen at the Station, Charlottetown, P.E.I., and one specimen was brought to the Laboratory. (R.R. Hurst)

WHIPTAIL (non-parasitic) was found in Ont. for the first time in the fall of 1938 and it developed again in several fields this past summer. Inspections of truck farms near Weston made by members of the Departments of Horticulture and Botany revealed the fact that a large percentage of the crop on several farms had been rendered useless by the trouble. Analyses were made of the soil from fields in which Whiptail was serious and from neighboring fields in which the cauliflower crop was normal. These showed that soils from the fields where Whiptail was serious, were acid in reaction, while the soils from fields with a normal crop were neutral or alkaline in reaction. In many instances, but not in all, the soils from fields badly infected by Whiptail were low in phosphorus in comparison with their potash content (J.E. Howitt). Whiptail was observed in one field at Ste. Dorothee, Que. (E. Lavallee)

WIRE STEM (Rhizoctonia Solani) has become a serious disease in the seed beds in Laval and Jacques Cartier Counties, Que. Three applications of $HgCl_2$ are recommended. (E. Lavallee)

SOFT ROT (Erwinia carotovora). An outbreak of soft rot occurred in the Leamington district, Ont., and resulted in the price being cut in two for about a week. One grower estimated his loss at $400. (L.W. Koch)

BLACK ROT (Phytomonas campestris). Two fields were found severely infected at St. Laurent, Que.; these same fields were affected last year. (E. Lavallee)

BROWNING (boron deficiency). This outbreak in Queens Co., P.E.I. affected 85% of the plants and the loss was heavy. Some control was obtained where boron was used under test. (R.R. Hurst)

CELERY

LATE BLIGHT (Septoria Apii). A trace of infection was observed at Lacombe, Alta.

Late blight (S. Apii-graveolentis) was not as common as usual in Ont., due to the dry conditions in the early season. However, with increased precipitation in late August and early September, some of the late crops became slightly infected. (J.K. Richardson)

The disease was satisfactorily controlled in well sprayed fields of celery in Que., but it was more or less severe in small unsprayed celery plantings (E. Lavallee). A slight infection occurred in a field in York Co., N.B. (D.D. Dolan). Traces of late blight were observed in stores and markets at Charlottetown, P.E.I. (R.R. Hurst)

EARLY BLIGHT (Cercospora Apii). On August 1, at Burlington, Ont., only the occasional field was found affected. Where spraying is regular and thorough, the disease is absent (J.K. Richardson). For the 4th consecutive year a field at St. Dorothee, Que., has been found quite heavily infected. The field was dusted but operations began too late; no rotation is practiced. (E. Lavallee)

STEM CRACKING (boron deficiency) seems to be general and causes considerable loss to some growers in Que. At Charny, where a grower had applied lime to the soil, the plants remained stunted and took on a rusty appearance, while the heart of each plant remained undeveloped. Affected plants on this farm reached about 10" in height, but others that received applications of borax grew normally. The disorder was first noticed about August 10, and became more serious as the season advanced (C. Perrault). Three fields in Laval Co. were severely injured. (E. Lavallee)

HEART ROT (cause unknown) was observed in 7 fields between Deschambault and Ste. Anne de la Pocatiere, Que. According to the Provincial Instructor in Horticulture practically every grower has suffered more or less loss from the trouble. In the fields visited, the damage varied from 10% to 90% and if, in some cases, the crop had been harvested two weeks later, it would have been a total loss. When the disease is not too far advanced, growers may still get a certain price for the crop. Plants being grown in the Laboratory greenhouse for experimental purposes

were almost all destroyed by heart rot (C. Perrault). Heart rot caused practically no damage in the Montreal district this year; the losses were very heavy in 1937 and 1938. (E. Lavallee)

SCLEROTINIA ROT (S. sclerotiorum) affected and destroyed about 10% of the plants when stored in a greenhouse in Lincoln Co., Ont., instead of being pitted. The ground was heavily watered. The disease appeared in areas. (G.C. Chamberlain)

DAMPING OFF (various), as well as root rot, caused considerable loss in a small contaminated greenhouse in Lincoln Co., Ont. Although the compost was sterilized, the old flats were not. (J.K. Richardson)

YELLOWS (?virus). A moderate to severe infection was found at Lethbridge, Alta. The symptoms were the same as those observed several years ago at Edmonton, and no organism was isolated. (A.W. Henry)

CHINESE CABBAGE

CLUB ROOT (Plasmodiophora Brassicae) was found in 3 fields in Laval Co., Que. This disease always causes severe injury to Chinese cabbage. (E. Lavallee)

CUCUMBER

BACTERIAL WILT (Erwinia tracheiphila) was found frequently in the Montreal district, Que., but the losses were not severe. (E. Lavallee)

ANGULAR LEAF SPOT (Phytomonas lachrymans). A slight infection was observed on 20% of the plants at Medicine Hat, Alta. (R.A. Ludwig). The disease was quite severe in York, Sunbury and Kings Counties, N.B., early in the season, but it became less important with the coming of dry weather in midsummer. (D.D. Dolan)

SCAB (Cladosporium cucumerinum) was severe in three fields at St. Laurent, Que.; many diseased specimens were observed on the public markets (E. Lavallee). No scab was seen in York or Sunbury counties, N.B., but around Sussex in Kings 10-15% of fruit were unmarketable due to the disease. Scab was less important than in 1938 on account of the dry weather. (D.D. Dolan)

SCLEROTIAL ROT (Sclerotinia sclerotiorum) was rather severe in a greenhouse at Medicine Hat, Alta.; in one planting 20% of the plants were affected.

MOSAIC (virus). Two canning companies in Essex and Kent Counties, Ont., reported damage in their "contract" crops due to mosaic. In one ½-acre of cucumbers 20% of the plants were affected (L.W. Koch). Mosaic affected 1% of the plants in a greenhouse in Lincoln Co. (G.C. Chamberlain)

EGGPLANT

EARLY BLIGHT (Alternaria Solani). A trace was present at Kentville, N.S., on eggplant planted adjacent to tomatoes, which were severely defoliated. (K.A. Harrison)

HOP

DOWNY MILDEW (Plasmodiophora Humuli). There was considerable basal spike infection in the Fraser River Valley, B.C., on the Clusters variety, but the disease was kept in check. Leaf infection was prevalent in June due to rain. Damage to the crop on the whole was slight since practically no cone infection occurred owing to good harvesting weather. Branling and Brewers Gold were also affected, but to a less degree than Clusters. This disease was found in small plots of Clusters established by Japanese growers in the Matsqui, Mission, and Haney districts. (W. Jones)

CHLOROSIS (virus). Affected plants are still prevalent in the hop yards in the Fraser River Valley, B.C., particularly in Fuggles and Golding. In one Fuggles yard, where roguing has been practised consistently a great improvement has been made in the uniformity and foliage colour of the plants. (W. Jones)

HORSE RADISH

LEAF SPOT (Ramularia Armoraciae). A slight infection was observed at Beaverlodge, Alta.

KALE

POWDERY MILDEW (Erysiphe Polygoni). A slight, general infection was observed at the Station, Sidney, B.C.

LETTUCE

ANTHRACNOSE (Marssonina Panattoniana) was severe on New York No. 12 at Brandon, Man., and in the suburban districts, East St. Paul and East

Kildonan, of Winnipeg. At the last point the crop was unsaleable. This is the first record of its occurrence in Manitoba. (J.E. Machacek)

DROP (Sclerotinia sclerotiorum) affected 10% of the lettuce in a 4-acre field in Surrey, B.C. (W. Jones)

TIP BURN (Non-parasitic) is general throughout the Okanagan Valley, B.C. The damage was slight this season (G.E. Woolliams). A narrow margin of the outer leaves of some 2,000 plants was scorched and dead. The plants were in cold frames at a grower's in Lincoln county, Ont. It was thought that the trouble was due to too high a temperature and low humidity, for a few plants grown at a cooler temperature were healthy. (G.C. Chamberlain)

MELON

BACTERIAL WILT (Erwinia tracheiphila) affected 4% of the plants in a plantation in Essex Co., Ont.; the damage was slight (L.W. Koch). The disease was occasionally observed in Laval and Jacques Cartier Counties, Que. (E. Lavallee)

LEAF SPOT (Cladosporium cucumerinum) was general in the Aldershot district, Ont., but it caused little damage, because only the leaves were affected. In the western part of the province the vines were severely defoliated resulting in marked reduction in yield, except in a few cases where the plants were sprayed. (J.K. Richardson)

ANTHRACNOSE (Colletotrichum lagenarium) was present in all plantations in the Leamington district, Ont. The damage was moderate, but less extensive than in 1938. (L.W. Koch)

MOSAIC (virus). About 5% of the plants were affected in an acre field in Lincoln County, Ont. (J.K. Richardson)

WILT (Fusarium sp.). The entire crop in the Aldershot district, Ont., appeared to be affected and it was estimated that there would be a 50% reduction in yield. Extremely dry weather in July was partly responsible. (J.K. Richardson)

ONION

DOWNY MILDEW (Peronospora Scheideniana) was prevalent in the Lower Mainland, B.C., and at Duncan, Vancouver Island, and neither dusting nor spraying was effective (W. Jones). Downy mildew was found in 2 out of 16 fields inspected in Eastern Ont.; 3% and 6% of plants respectively were affected. In Quebec infections were a trace, 20%, and 25% in the 3 fields examined. (D.M. Simpson)

NECK ROT (Botrytis Allii). An outbreak of neck rot and soft rot was observed in Spanish onions soon after they were harvested and placed in storage in Essex Co., Ont. Every grower suffered some loss, due to decay of the onions and in grade. One grower reported a loss of 500 bushels from 8 acres. (L.W. Koch)

LEAF SPOT (Alternaria sp.). A moderate infection was found at Morden, Man.

LEAF BLOTCH (Fusarium moniliforme). Only a trace of infection was observed at Morden, Man.; isolations from the infected tissue yielded F. moniliforme. (W.L. Gordon)

SOFT ROT (Erwinia carotovora). Where Spanish onions were irrigated in midsummer in the Leamington district, Ont., losses ran as high as 15% of the crop. (L.W. Koch)

PINK ROT (Fusarium sp.) was patchy in a 2-acre field at Cloverdale, B.C.; the damage was slight due to later recovery. (W. Jones)

FUSARIUM BULB-ROT (F. oxysporum Schl. f. 7 Wr.). Some fields in the Kelowna district, B.C., are so heavily infested with the pathogen that onion production is unprofitable in these fields; probably 60% of the bulbs are affected. The average infection in the district is 5%. For many years, the disease was confined to the Kelowna district, but recently it has appeared in the Vernon area. The pathogen has been identified by W.L. Gordon (G.E. Woolliams). Several growers are apparently suffering considerable losses from bulb-rot. The extent of the damage is not known because the crop was harvested when it was examined. (J.K. Richardson)

PARSNIP

YELLOWS (virus) was common in parsnips in York, Sunbury, Charlotte, and Northumberland counties, N.B. From 2% to 5% of the plants were affected in the 8 acres examined; the damage was slight. (D.J. MacLeod)

LEAF SPOT (Ramularia Pastinacae). A severe infection was observed in a garden at Kentville, N.S. (J.F. Hockey)

PEA

DOWNY MILDEW (Peronospora Pisi) was slight at the Station, Sidney, B.C.; it was, however, somewhat heavier in the Fraser River Valley. (W. Jones)

POWDERY MILDEW (Erysiphe Polygoni) was general and severe in the Lethbridge district, Alta., and in many fields the yield was seriously

reduced. Powdery mildew was severe at New Carlisle, Que., on August 22, while none was found at Cap d'Espoir. The peas were ruined before they were harvested at New Carlisle, but they escaped any appreciable damage at Cap d'Espoir (C. Perrault). Powdery mildew developed to some extent late in the season in Queens Co., P.E.I. (R.R. Hurst)

LEAF and POD SPOT (Ascochyta Pisi). Infection ranged from a trace to moderate in the plots at Olds, Alta. A moderate infection was present at Brantford, Ont., on July 11 (J.K. Richardson). The disease was fairly heavy at New Carlisle, Que., on August 2, while traces only were present at Cap d'Espoir (C. Perrault). Leaf and Pod Spot was fairly prevalent on the vines after harvest at Charlottetown, P.E.I.

RUST (Uromyces Fabae). Slight infections were observed in fields of canning peas at Ste. Martine and St. Jean, Que. A light infection also was present at New Carlisle on August 2, and also at Macdonald College and in all 3 counties of P.E.I.

ROOT ROT (Fusarium spp.). Infection ranged from a trace to severe in the varieties at Lacombe, Alta. In a canning area near Brantford, Ont., the disease was so severe that the crop had to be harvested prematurely, resulting in a loss of 30% of the crop. It was also reported as destructive in Essex county. A trace of root rot was found at Cap d'Espoir, Que. Root rot was quite severe in a garden where the disease has been observed for the past two years at Kentville, N.S. The pathogen was identified as F. oxysporum by Dr. W.L. Gordon. (D. Creelman)

LEAF BLOTCH (Septoria Pisi). A general light infection was observed at Lacombe, Alta. The disease was heavy on plants maturing seed at Charlottetown, P.E.I.

MOSAIC (virus). Infection was general in a field near Brantford, Ont., due to a rather severe infestation of asphids. The loss was estimated at 20% (J.K. Richardson). About 50% of the plants were affected in a small garden at Kentville, N.S. (J.A. Boyle)

PEPPER

MOSAIC (virus) affected about 3% of the plants in a planting in Wentworth Co., Ont.; the growth was markedly reduced. (G.C. Chamberlain)

FRUIT SPOT (cause unknown). About 20% of the fruit were spotted in a field at Ste. Dorothee, Que.; Alternaria was isolated from the spots. (E. Lavallee)

POTATO

Mr. L.S. McLaine, Chief of the Plant Protection Division, Production Service, kindly supplied the 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 diseases - black leg, leaf roll, and mosaic - found in the fields. All fields entered for certification are planted with certified seed.

Table 4 - Seed Potato Certification: Number of Fields and Acres Inspected, 1939.

Province	Number of Fields		Fields Passed %	Number of Acres		Acres Passed %
	Entered	Passed		Entered	Passed	
P.E.I.	4,482	3,700	82.5	19,945	16,809	84.3
N.S.	652	551	84.5	1,273	1,110	87.2
N.B.	2,982	2,226	74.6	14,189	10,850	76.5
Que.	976	487	49.9	1,418	518	36.5
Ont.	902	675	74.8	2,022	1,422	70.3
Man.	92	26	28.3	184	21	11.4
Sask.	174	131	75.3	277	161	58.1
Alta.	163	122	74.8	249	136	54.6
B.C.	382	283	74.1	729	518	71.1
TOTAL	10,805	8,201	75.9	40,286	31,545	78.3

Acres Entered

1938	38,825
1939	40,286

Increase of 1,461 acres or 3.7%

Acres Passed

1938	27,817
1939	31,545

Increase of 3,728 acres or 13.4%

Table 5 - Seed Potato Certification: Acreages Passed by Varieties, 1939.

Variety	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.-B.C.	Total
Green Mountain	5,637	141	7,069	409	111	71	13,438
Irish Cobbler	10,754	319	439	57	148	29	11,746
Katahdin	193	231	1,537	33	639	1	2,634
Bliss Triumph	209	354	1,721			3	2,287
Netted Gem					6	482	488
Rural New Yorker					285		285
Chippewa	5	1	32		202	9	249
Warba		1	2	1	27	41	72
President		18	23	11			52
Early Ohio						48	48
Early Epicure						31	31
Spaulding Rose	9		19	1			29
Garnet Chili		29					29
Columbia R.						28	28
Gold Nugget					3	23	26
Early Rose		2		3		9	14
Up-to-Date		8				5	13
White Rose						8	8
Other Varieties	2	6	8	3	1	48	68
TOTAL	16,809	1,110	10,850	518	1,422	836	31,545

The acreage entered for certification was again slightly increased, until it was double what it was in 1936, when 20,083 acres were entered. The acreage that has passed inspection has lagged slightly; nevertheless it has increased from 16,739 acres in 1936 to 31,545 acres in 1939. Bacterial ring rot accounted for the rejection of 202 and 130 fields respectively in N.B. and Que., while leaf roll was still high in N.B. where 332 fields were rejected on account of this disease. In most provinces, mosaic was the chief cause of rejection, so that for the Dominion it accounted for 775 or 29.8 of the rejections. Green Mountain and Irish Cobbler are the leading varieties grown, since 25,184 acres of these two passed inspection. However, the acreage of Katahdin was nearly doubled in 1939 and became the third leading variety in place of Bliss Triumph.

LATE BLIGHT (Phytophthora infestans) was found in most of the potato growing areas in the Fraser River Valley, B.C. It was first observed on July 8, but it was not generally prevalent until late July. On the whole, the disease was less prevalent or severe than usual.

Table 6 - Seed Potato Certification: Fields Rejected, 1939

Province	Mosaic	Leaf Roll	Black Leg	Bacterial Ring Rot	Foreign Varieties	Adjacent Diseased Fields	Misc.	Total
P.E.I.	360	31	17	5	140	90	139	782
N.S.	28	17			27	20	9	101
N.B.	112	332	3	202	30	48	29	756
Que.	236	5	2	130	11	31	74	489
Ont.	12	52	9	4	56	22	72	229
Man.	5		2		2		57	66
Sask.	3		7		6	5	22	43
Alta.		5	4	1		1	30	41
B.C.	19	21	10		3	23	23	99
TOTAL	775	463	54	342	275	240	455	2,604
Rejections as a percentage of fields:								
Entered	7.2	4.3	0.5	3.2	2.5	2.2	4.2	24.1
Rejected	29.8	17.8	2.1	13.1	10.5	9.2	17.5	100.0

Table 7 - Seed Potato Certification: Average Percentage of Disease Found in Fields, 1939.

Average percentage of disease found in	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
	%	%	%	%	%	%	%	%	%
Fields intered (first inspection)									
Black Leg	.11	.01	.04	.03	.12	.31	.23	.24	.15
Leaf Roll	.15	.43	1.23	.14	.42	.01	.01	.17	.60
Mosaic	.63	.55	.48	1.64	.08	.29	.09	.03	.65
Fields passed (final inspection)									
Black Leg	.02		.01	.38	.08	.02	.01	.01	.02
Leaf Roll	.05	.12	.16	.23	.15			.04	.11
Mosaic	.12	.15	.14	.53	.03	.08		.01	.10

Most of the crop was harvested in dry weather. However, in certain crops, which were not harvested until after the autumn rains had begun, late blight caused a maximum loss of 10% or an average loss of 1% in all late crops. Early and efficient spraying gave good results.

In experiments conducted at Steveston, 7 different spray materials were applied at the rate of 200 gallons per acre on July 12, July 27, August 12, and August 26. Both early and late blight were kept well in check until September 5. Little tuber rot developed, but the yield was considerably increased by spraying. The unsprayed plot yielded 15.8 tons per acre, while the plots sprayed with Powdered Bordeaux and Micronized

Burgendy yielded 18.9 and 20.8 tons per acre respectively, and those sprayed with the other materials ranged between these values. (H.S. MacLeod)

Although hot weather checked an incipient outbreak of late blight over most of Ont., the disease was severe in the Nippissing and Sault Ste. Marie districts. Considerable tuber rot also developed in Eastern Ontario. (O.W. Lachaine)

Late blight caused some damage throughout Que. The disease was first recorded in the Lake St. John district on July 27, 11 days later than last year. It appeared a few days later near Three Rivers, but it was not until August 24 that it was observed in the lower St. Lawrence. The disease was also found along the north shore of the St. Lawrence from Manicouagan to Havre St. Paul. In some fields where growers had planted their own seed along side certified seed, late blight was severe in the former; it is believed the tubers used for planting were affected by the disease. Late blight rot was more severe near Three Rivers than along the lower part of the St. Lawrence. The benefits of thorough spraying were more evident than usual. Many large fields sprayed 7 times were free from late blight and developed no rot. Most of the fields that were destroyed by blight were sprayed only 3 or 4 times, or in some cases no spray was applied.

Of 976 fields inspected for certification, 41 were rejected for late blight. The highest percentage of tuber infection recorded was 47% in a field which had not been sprayed. The average percentage of tubers infected was 5.7%. (B. Baribeau and C. Perrault)

Late blight was not as severe and widespread in N.B. as in 1938. The disease developed rapidly in the northern half of Carleton and in Victoria, Madawaska, and Restigouche Counties, since favourable conditions prevailed during August and September. However, only a few cases of serious loss from tuber rot were reported. (C.H. Godwin)

Late blight was not general in N.S. in 1939. It was found in Colchester Co. on July 22 and was fairly common by Aug. 17. In Kings Co. the disease was severe only at Scott's Bay. Tuber rot was negligible, except in Colchester Co., where 0.75%, of the crop was rotted. Heavy spraying with bluestone at Scott's Bay just before digging probably helped greatly to prevent rot. (W.K. McCulloch)

Late blight was found at Charlottetown, P.E.I., on July 27 and near Cascumpec on July 29. Both outbreaks were of minor importance and the dry weather for the next month held the disease completely in check. Traces of blight were reported in several fields near Hunter River on Sept. 12, but again a dry period followed, so that no tuber rot nor decrease in yield was noticeable. The damage was the least experienced since 1935. (E.H. Saunders)

RHIZOCTONIA (Corticium Solani (Rhizoctonia Solani) was quite prevalent on the plants in B.C., but in most areas it was of little importance. Only a few crops showed abundant sclerotia on the tubers (H.S. MacLeod). In Alta., sclerotial development was slight on the tubers. However, in one lot of 1200 bu. grown in the Oliver district, 85% of the tubers bore sclerotia (J.W. Marritt). Stem canker was very prevalent and severe at Edmonton, Calgary, Lethbridge, and intermediate points. No other potato disease in Alta. reduces the yield as much. A cool wet planting season, followed by a very dry summer appears to have favoured the disease (G.B. Sanford). A slight development of the sclerotia occurred on the tubers in Sask. Rhizoctonia was not prevalent in Man. and northern Ontario to judge from its presence in the field. (J.W. Scannell)

Rhizoctonia was less prevalent in Que. than in 1938. The average tuber infection was 3.2% in 400 bins (B. Baribeau). Rhizoctonia as a damping off during May and June in N.B. caused a high percentage of misses in fields of Green Mountain and Katahdin. Sclerotia were abundant on tubers harvested late in the season. Four per cent of the crop would be infected (C.H. Godwin). Rhizoctonia was less severe than in 1938, Katahdin in particular showing less. The average percentage of tubers showing sclerotia were about 3.5%. Spongy tubers, which were common in Katahdin on sandy soil, were invariably found attached to plants severely injured, presumably by Rhizoctonia (W.K. McCulloch). Rhizoctonia was particularly severe on Katahdin and less so on Green Mountain in P.E.I. In the former variety the yield of some affected plants has been reduced to two tubers with a total weight of 4 ounces. The tubers show discoloration of the stem end and frequently of the vascular ring; sclerotia also occur on the tubers. (S.G. Peppin)

BLACK LEG (Erwinia phytophthora) was more prevalent than usual in B.C.; it was the cause of rejection of 10 fields and was found in 45 others out of 344 inspected (H.S. MacLeod). From 1 to 4% of the plants were affected in many fields near Edmonton and Lethbridge, Alta. The cool, wet weather in the early season apparently favoured the disease (G.B. Sanford). The disease was more prevalent than usual in fields inspected for certification, particularly in the northern part of the province; 21% were affected. In Sask., black leg was the cause of the rejection of 7 fields and was present in 28 out of 174 inspected; these fields were mostly in the north-eastern section of the province (J.W. Marritt). Black leg was not common in Man.; only 2 fields were rejected on account of this disease. (J.W. Scannell). Black leg decreased slightly from 1938 in Ontario.

Black leg was the cause of rejection of 2 fields out of 976 inspected in Que.; it was relatively scarce, the highest infection recorded was 4% (B. Baribeau). Only 3 fields out 2,928 were rejected for black leg in N.B.; dry weather prevailed during the growing season. The disease continued to decline in N.S.; 10 fields out of 652 were infected. Only a few growers do not regularly treat their seed. (W.K. McCulloch)

EARLY BLIGHT (Alternaria Solani) was severe on tubers from the Cloverdale district, B.C., in April; it was also severe on Sutton's Reliance at Cloverdale in July (W. Jones). In general the disease was not severe except in a few instances, although present both on the coast and in the southern part of the Interior (H.S. MacLeod). A trace of early blight occurred in the plots at Saskatoon, Sask. (T.C. Vanterpool). Early blight was severe in some fields near Port Arthur, Ont.

Early blight was first reported on July 29 in Temiscouata Co., Que.; in general, infection was slight, but it caused the premature death of the plants in some sections. It was more prevalent along the north shore of the St. Lawrence between Clark City and Havre St. Pierre than late blight in late August. A trace of tuber rot was observed at the time of bin inspection (B. Baribeau and C. Perrault). Early blight was prevalent in August in all fields in N.B.; it caused some premature ripening of the plants (C.H. Godwin). A moderate infection of early blight combined with drought reduced yields about 25 bu. per acre in N.S. Only a trace of tuber rot was found (W.K. McCulloch). Early blight varied from a trace to occasionally heavy in P.E.I.; 12 lots of tubers showing rot were brought to the Laboratory. (R. R. Hurst)

BACTERIAL RING ROT (BACTERIAL WILT and ROT) Phytomonas sepedonica). The adoption of the name, Bacterial Ring Rot, in Canada seems to be desirable since it has come to be used widely in the United States. Morover, by calling the disease bacterial wilt and rot, growers associated it with the comparatively mild Fusarium and Verticillium wilts, with which they were familiar. In consequence, it has been difficult to impress upon them the highly infectious and destructive nature of the disease. (I.L. Conners)

Bacterial ring rot has not been found in B.C.; one suspected case proved to be negative upon microscopic examination by Dr. W. Newton (H.S. MacLeod). An extensive survey for the disease was made in 1939 in Alberta by the Provincial Department of Agriculture in co-operation with the University. The principal potato growing areas south of township 33, and west of range 5 of the 4th meridian were visited, during which time, 680 fields of all sizes selected at random were examined. The disease was located in 12 townships in the irrigated districts of southern Alberta, including the districts of Lethbridge, Coalhurst, Coaldale, Raymond, Taber and Retlaw. The severest infections were found in early varieties and in early planted fields of Netted Gem, but little or no disease was identified with certainty in late planted or late maturing fields. Approximately 200 tons of potatoes showed 1% to 10% of the disease at the time of inspection. In addition some 800 tons showed a trace or were suspected of being infected. Some of these stocks may have been free. On the other hand, because of the difficulty of detecting traces of the disease, it may have been present in stocks where none was reported.

Although bacterial ring rot was not recognized until 1937 in Alberta, there is evidence that it has been present for several years on certain farms in the Lethbridge district. Potatoes constitute an important part of field production on many farms in the irrigated districts. About 200 carloads are exported annually by Lethbridge wholesale houses. The presence, therefore, of bacterial ring rot in this area is of considerable economic importance (O.S. Longman). The disease was found in one field out of 163 inspected for certification in Alberta; the seed had been imported last spring (J.W. Marritt). Bacterial ring rot was found in two fields at Birds Hill, Man., at digging time. These fields consisted of 26 acres of Irish Cobbler and 9 acres of Chippewa respectively and had been previously rejected on account of Fusarium wilt. The diagnosis was confirmed by Dr. W.A.F. Hagborg. (J.W. Scannell)

Bacterial ring rot was found on nine farms in Ontario, seven being in the Alliston district. On four of these seven, the disease was found last year. Instead of getting rid of their contaminated stock as advised, the growers had attempted to select healthy tubers from it. Infection ranged from 7 to 25%. Growers who obtained clean seed and had disinfected their equipment appear to have eliminated the trouble. Where a picker planter was used to plant diseased seed and then a lot of clean seed, it transmitted the disease to the clean seed, but the infected plants were mostly concentrated in the first few rows. The disease was found for the first time in Eastern Ontario; it appeared to have been introduced in 1938 seed obtained from P.E.I. (O.W. Lachaine). Bacterial ring rot was found in 130 fields out of 976 entered for certification in Quebec. The disease was also present in many commercial fields and in some fields 25% of the crop was unfit for sale on account of the rot. Some evidence of spread of bacterial ring rot by a picker planter was obtained at two widely separated districts in the province (B. Baribeau). To judge by the number of diseased specimens received at the Laboratory, bacterial ring rot is widespread in Quebec. Experiments have shown that the knife is a most important agent of transmitting the disease from diseased to healthy tubers. The planter is also capable of spreading the disease to a certain extent, and disinfection of a contaminated machine with strong formaldehyde did not give quite 100% control. All white varieties so far tested have proven equally susceptible, but among the red varieties Rural Blush has shown considerable resistance in the past two years. (C. Perrault)

Bacterial ring rot was found in 202 fields in N.B. this season, compared to 81 in 1938, and has been found in all important seed producing areas in N.B. All varieties commonly grown have been found to be infected (C.H. Godwin). The disease was found in N.S. for the first time at Glenmont, in a field of White Rose; the seed came apparently from North Dakota via St. John, N.B. (W.K. McCulloch). Bacterial ring rot was found on 13 farms in P.E.I. These fields were: 2 of certified Irish Cobbler at Monticello, 0.6% infection; 2 of certified Katahdin of the same stock, Freetown, 10% infection; and 9 of table stock Green Mountain in an area

about New London, Long River and Hope River. Infected stock was from one source, and practically all stock sold from this source in the past 3 or 4 years was infected. The diseased lots were consigned to a starch factory. (Geo. W. Ayers)

Bacterial ring rot has now been found in at least one place in 27 of the 48 States of the United States. These States are as follows: Me., Mass., N.Y., Penna., N.J., Md., N.C., S.C., Fl., Ala., La., Ohio, W.Va., Ky., Mich., Wisc., Minn., Iowa, N.D., Nebr., Mont., Wyo., Utah, Colo., Idaho, Oreg., and Calif., according to a letter received from Dr. J.G. Leach, on January 9. The prevalence of the disease varies greatly in the individual States. (I.L. Conners)

FUSARIUM WILT (F. sp.) affected 18% of the fields inspected in B.C. in 1939 as compared to 13% the previous year, but no fields were rejected (H.S. MacLeod). Eleven out of 174 fields were rejected in Sask. on account of wilt and 8 others showed a trace to 1%; the disease was more prevalent than previously (J.W. Marritt). The disease was widespread in Man. in 1939. It was present in 69 out of 92 fields inspected, and the percentage of diseased plants varied from 0.3 to 12.6%. The weather was hot and dry in July, followed by showers nearly every day and high relative humidity in August. All fields of table stock showed a great deal of wilt in late summer. (J.W. Scannell)

VERTICILLIUM WILT (V. sp.) caused moderate damage in one garden in Edmonton, Alta. (G.B. Sanford). It was more in evidence in P.E.I. in 1939 than in any previous year due to favourable climatic conditions for its detection and to the absence of early and late blight. In all 67 fields were rejected for wilt on account of the infection exceeding 1%; 44 fields were in Prince Co., and the other 23 in Queens, with no cases in Kings. The increase in the number of fields reported affected with wilt is probably due to factors mentioned above, to the use of diseased stock and, to a limited extent, to spread from contaminated soil to healthy stocks. The disease has been greatly reduced by treating the cut sets with Semesan Bel, 2 lb. in 15 gal. of water; in a preliminary experiment the percentage of wilted plants was reduced from 58.9% in untreated diseased seed to 12.5% in the treated, while untreated healthy seed showed 2.2%. The yield was also improved by treatment. These results confirm the observations of one of the potato inspectors, on the value of seed treatment. (G.W. Ayers)

STEM-END ROT (Fusarium Solani var. eumartii) was much less important in 1939 than the previous year in Ont., due to the fact that a large number of growers replaced their diseased seed with sound material. There are, however, many table stock growers still planting diseased seed. The worst centre is about Mount Albert (O.W. Lachaine). The presence of stem-end rot was established in several fields in the Alliston and Everett districts. The disease is mostly confined to fields where growers plant their own, undoubtedly contaminated seed instead of securing fresh seed,

known to be free from the disease. Soil contamination was not a factor as a fairly long rotation is already practised. (D.B.O. Savile)

WILT (cause undetermined) was reported again in small amount in Colchester Co., N.S.

STORAGE ROTS were prevalent and often severe in Alberta in the winter 1938-39. Several pathogenic fungi were isolated, the most common being Fusarium caeruleum, F. sambucinum f. 6 and Pythium ultimum. Severe rotting in storage was caused by Erwinia phytophthora following black leg damage in the field at St. Albert. Storage rot due to Fusarium spp. was reported from Madison, Sask. Two cases of storage rot were investigated in Man.; odd tubers were infected. Fusarium sambucinum f. 6 was isolated from Winnipeg material, and F. Solani from Birds Hill. (W.L. Gordon)

COMMON SCAB (Actinomyces scabies) was found on potatoes in only a few areas in B.C., and the infection was usually slight (H.S. MacLeod). Scab was more severe than usual in Alberta on smooth skinned varieties. In Saskatchewan over 50% of the tubers on the average were affected by scab, and after grading about a quarter of the lots inspected showed too much scab to pass certification standards (J.W. Marritt). It was less common than usual in Man. and northwestern Ont. Common scab was not serious in Que. this year. Infection ranged from a trace to 4% upon bin insection and averaged 1.6% (B. Baribeau). The average infection in N.B. was 2% of the tubers.

Scab was widely distributed in N.S.; the average infection was 2.5%. About 20% of the crops were clean, but one crop of Katahdin showed 45% of scab (W.K. McCulloch). Scab was plentiful in P.E.I. making it difficult to grade the crop. (R.R. Hurst)

POWDERY SCAB (Spongospora subterranea) was found in several fields in the Fraser River Valley, B.C., and in the Ladysmith district, Vancouver Island. Infection ranged from very slight in Netted Gem to very severe (75% of tubers) in White Rose (H.S. MacLeod). Powdery scab was found in a few lots of seed potatoes in Que. It was less evident than last year in N.B. Powdery scab was found in 7 fields in Kings Co., N.S. and 2.2% of the tubers were affected; it was much less common than in 1938. A trace was observed in one lot of tubers in P.E.I.

SKIN SPOT (Oospora pustulans). A slight infection was found at Edmonton, Alta.; the pathogen was identified by Dr. Gussow. (G.B. Sanford)

SILVER SCURF (Spondylocladium atrovirens). In two lots of Irish Cobbler, 10% of tubers had to be discarded when the seed was graded for certification; otherwise the disease was unimportant in B.C. Silver scurf was noticed in a few lots in Que., N.S., and P.E.I.

STEM-END HARD ROT (Phomopsis tuberivora). A few affected tubers were noticed on Lulu Island, B.C. (E.R. Bewell)

LEAF ROLL (virus) was found in 171 fields in B.C. and caused the rejection of 21. This is an increase over 1938 (H.S. MacLeod). The disease was prevalent in suburban gardens of Edmonton and Calgary, Alta., and the 3 fields rejected for leaf roll were similarly grown near Edmonton. Only a trace of leaf roll was seen in Sask. (J.W. Marritt). Leaf roll was again almost absent from Man. (J.W. Scannell)

The hot dry summer of 1938 apparently favoured the spread of leaf roll in Ont.; 52 fields were rejected in 1939 as compared to 12 in 1938 and the percentage of infection was trebled (O.W. Lachaine). Leaf roll was recorded in 274 fields out of 976 inspected in Que. and caused the rejection of 5. An increase of the disease is anticipated in 1940, since Myzus persicae was comparatively abundant in 1939 (B. Baribeau). Leaf roll was still prevalent but not as serious as in 1938 in N.B. The disease was mostly concentrated in York, Carleton, and Victoria counties; in one area the average infection in 100 fields fell from 16.6% in 1938 to 9% in 1939. Leaf roll was reported in 52% of the fields inspected in N.S., and caused the rejection of 2.6%; in one field of Chippewa 21% of the plants were affected (W.K. McCulloch). Considerable more leaf roll was found in P.E.I. than in any previous year. (S.G. Peppin)

MOSAIC (virus) was found in 201 fields in B.C. and 19 fields were rejected; it was more prevalent than in 1938. The disease was again common in gardens in Edmonton and Calgary, Alta. Mosaic was found in only 5 fields in Sask. Mosaic was prevalent in Man., and 5 fields and several plots were rejected. Mosaic was common but slightly less prevalent in Ont. than in 1938. In Que., 236 fields were rejected on account of mosaic; infection ranged from a trace to 20%. In N.B., 112 fields were rejected; the symptoms were obscure this year. Mosaic was found in 56% of the fields inspected and caused the rejection of 4.3% in N.S.

GIANT HILL (virus suspected) was found in 50% of the fields inspected in B.C., but none were rejected on account of its presence. It is very difficult to control the trouble satisfactorily even by the most careful selection of the stock for a tuber unit seed plot and thorough roguing (H.S. MacLeod). Giant hill was found in an 8-acre field of Early Ohio near Winnipeg, Man. This is the first time the trouble has been noted in Man. (J.W. Scannell). Traces were found in fields of Green Mountain in N.B.; use of seed free from the condition has reduced the number of fields reported (C.H. Godwin). A trace was present in a few fields of Green Mountain in Kings Co., N.S.

SPINDLE TUBER (virus) was rare in Man. and northwestern Ont. A trace to 0.6% occurred in 44 fields out of 976 inspected in Que.; the disease is general in table stock, up to 10% of the plants being affected. Spindle tuber was not so conspicuous as last year in N.B. due to the better quality of the seed being used, particularly the Katahdin variety; 4 fields were

rejected. The trouble was found in 2 fields of Irish Cobbler in N.S. Spindle tuber was noted in 25 fields of table stock in P.E.I.; a trace to 5% of the plants were affected.

WITCHES' BROOM (virus) affected a trace to 2% of the plants in 38 fields inspected in B.C. Two plants were found affected in a field in P.E.I.

YELLOW DWARF (virus) increased somewhat, particularly in the Caradoc district, Ont.; 14 fields were rejected this year against 5 fields last year. Yellow dwarf affected 25% of the plants of Sebago and 1% of Arran Consul at Ste. Arsene, Que.; a clover field was growing 400 feet from the potatoes. The Sebago planting was one of 21 lots scattered across Canada all from the same seed; all other plantings were free from the disease. Yellow dwarf was also reported in B.C. and Alta.

The vector of yellow dwarf, Aceratagallia sanguinolenta, is represented in the National Entomological Collection by specimens from several localities in Ont. and Que., by a few specimens from Man. and a series from Saskatoon, Sask., on alfalfa. Two collections from B.C. are referred here with some doubt. It appears that this leaf hopper is widespread and occurs in comparative abundance throughout the agricultural areas of eastern North America. There are no records of an epidemic or near epidemic in Canada unless the Saskatoon report might be so considered. (H.G. Crawford)

PSYLLID YELLOWS. Severely affected plants were seen in vacant plots near Calgary and at Medicine Hat, Alta., and definitely affected plants were recorded at Olds and Brooks. The disease was not general as it was last year (J.W. Marritt).

Severe net necrosis of the tubers with the characteristic distortion and abnormal pigmentation of the vines was observed again at Medicine Hat, Calgary and Lethbridge. At Lethbridge and in a section of Calgary all the tubers in the affected plantings were severely netted and unfit for sale or table use. At Lethbridge the outbreak, contrary to the previous season, was local in nature. However, heavy losses were incurred by those, who, contrary to advice, used affected 1938 stock for seed. Some fields were plowed up early, while others showed a high percentage of misses and many weak and backward plants. The monetary loss is estimated to be double that of 1938. Present experimental and observation evidence is that the necrosis was initiated by the tomato psyllid (Paratrioza cockerelli). Moreover, it appears that under conditions in Alberta a characteristic netting of the tubers, discoloration of the vascular region of the tubers and stem, and the destruction of the cortical area of stolons and roots are constant symptoms produced by the attack of these insects (G.B. Sanford). Psyllid yellows was not observed in Saskatchewan.

The potato and tomato psyllid, Paratrioza cockerelli Sulc, was present over the greater part of Alta. and Sask. from the International Boundary

north to Edmonton, Alta., and Melford, Sask., in 1939. Approximately the same area was infested in 1938, but there was a marked reduction in population this year. A survey through the Crow's Nest Pass as far west as Cranbrook, B.C., showed no P. cockerelli west of Cowley, Alta., where a trace was found.

Loss from psyllid yellows was limited to local areas, particularly near infested greenhouses. In these greenhouses and in nearby plots of tomatoes and potatoes, the loss was equal to that of 1938, in many cases approaching 100%. (G.F. Manson)

PURPLE TOP (cause unknown) was found in 16% of the fields inspected in Alta. and 2 fields were rejected. In one field of table stock at Pouce Coupe, B.C., 75% of the plants were affected (J.W. Marritt). So-called purple top was found in many plantings throughout Alberta with an average of about 1% of the plants affected (G.B. Sanford). In Sask., 6% of the fields inspected were affected and one was rejected due to the disease (J.W. Marritt). One field of Netted Gem at Brandon, Man., was rejected on account of purple top. The seed used was from a field that was perfectly healthy in 1938. The disease began to show up as soon as the crop came up according to the growers. In general less purple top was observed than in the previous year (J.W. Scannell). A disease referred to as purple top has been found in Katahdin, in N.B. and P.E.I. (See special section on virus diseases by D.J. MacLeod).

PEPPER SPOT (cause unknown) was first recognized in 1938. This year it was observed in several lots in west and north Edmonton, Alta. It is characterized by many small, superficial black spots observable on both sides of the terminal leaves; more or less chlorosis, and later well marked brown pulpy streaks in the vascular area of the stems. The streaks begin at the upper nodes. The disease is apparently not of a virus nature, but is due to mineral unbalance or concentration in the soil. (G.B. Sanford)

NET NECROSIS (cause unknown). The disease so designated was found in a large number of potato fields in southern Alberta. Damage was exceptionally severe at Medicine Hat and Calgary. In Medicine Hat 100%, of the tubers were affected in several fields (A.W. Henry). The germination of tubers from 5 lots of certified 1938 seed was tested. These lots showed no more net necrosis than is permitted by the regulations, i.e. not over 4% of the tubers affected. Many eyes failed to grow, or weak spindling sprouts developed with an abnormal amount of roots. A survey in June showed that the planting of affected seed had resulted in many extremely poor stands, the returns from which would not pay for further cultivation (G.B. Sanford). While net necrosis and psyllid yellows may be different expressions of one and the same trouble, the two diseases are reported separately, here.

Net necrosis was much more prevalent than usual in B.C., the trouble varying from a trace to quite severe. Several fields were rejected for

certification and there were complaints of its occurrence in several shipments of table stock potatoes. The necrosis was of several types and the amount present in any field varied with the location in the field (H.S. MacLeod). Traces were seen in Sask.

Samples of tubers showing stem-end browning and net necrosis were planted in 1939; 85% of plants developed leaf roll (B. Baribeau). Net necrosis was found in all seed in the Keswick area, N.B., during shipping inspections (C.H. Godwin). Traces were seen in Prince and Queens counties, P.E.I.

DEEP STEM-END BROWNING (cause unknown) was also observed in Keswick area, N.B. It was seen occasionally in P.E.I.

HOLLOW HEART (non-parasitic). Several specimens were received at the Laboratory, Charlottetown, P.E.I.

FROST INJURY. A frost caused slight damage to potatoes in the Lake St. John district, Que., on June 17. A trace of damage was observed in October in the Lake St. John district and L'Islet Co.; and severe damage in Matapedia Co. (B. Baribeau). Traces were found on bin inspection in Prince and Queens Counties, P.E.I. (R.R. Hurst)

FLEA BEETLES caused some injury to the foliage in the southern districts of B.C., but tuber injury was not observed (H.S. MacLeod). There was a severe outbreak of flea beetles in P.E.I. in 1939. (R.R. Hurst)

SPINDLING SPROUT affected a trace to 15% of the tubers. Many of the plants from such tubers were weak and failed to develop or were affected by virus diseases.

BLIND TUBER (non parasitic). In affected sets, the eye fails to develop a normal stalk, forming a small tuber at the eye or fleshy tuberances develop anywhere on the surface of the set. In N.B. the condition is usually associated with unfavourable weather conditions following planting. High storage temperatures and high temperatures during tuber maturation are also said to have unfavourable influence. The trouble was unusually prevalent in 1939 and was responsible to some extent for missing hills, especially in areas where potatoes were planted very early and exposed later to cold wet weather. (J.L. Howatt)

SEED-PIECE DECAY (Pythium de Baryanum). Four lots of seed planted in pots in the greenhouse, Kentville, N.S., about December 1, showed 93%, 92%, 66% and 24% of seed-piece decay, respectively, on December 21. The organism was isolated. The soil in the pots was wet and cool. Later plantings in drier soil were not affected (K.A. Harrison). Seed-piece decay was responsible for many poor stands in P.E.I. (R.R. Hurst)

STEM ROT (Sclerotinia sclerotiorum) was found affecting 2% of the plants of Netted Gem near Ladner, B.C. The pathogen was identified by Dr. Drayton. This is the first time the disease was found in B.C. (H.S. MacLeod). In a crop of White Rose at Cloverdale, over 10% of the plants were affected (W. Newton). The disease affected 1% of the plants in a quarter acre of Houma in Kings Co., N.S. (P.E. Donat)

GREY MOULD (Botrytis cinerea) was observed as a stem rot in several fields in Que. towards the end of the season. Usually the stem was attacked at the base of the leaves, which turn yellow and dry up (C. Perrault). Infection was a trace to slight on the older leaves in a field of Green Mountains in Kings County, N.S. (J.F. Hockey)

CURLY TOP (virus) was found affecting scattered plants in the Okanagan Valley, and the boundary districts of the Interior of B.C. This is the first Canadian report of its occurrence on potato. The symptoms are an upward rolling of the leaves, aerial tubers, and an abundance of small tubers below ground. Tomatoes and redroot pigweed affected by curly top were found growing in close proximity to the infected potato plantations. The identity of the disease was unknown but when the symptoms were described to Dr. Leon K. Jones, Wash. Agr. Exp. Station, Pullman, Wash., on his visit to the Laboratory this fall, he suggested that the trouble was curly top. The diseased plants were collected by Mr. E.R. Bewell and Mr. W. Touzeau (W. Newton). Curly top appears to be fairly prevalent and destructive in the vicinity of Pullman on Katahdin, Chippewa, and a number of seedling strains that have Katahdin as a parent. The disease does appear on the Russet Burbank variety at times, but the symptoms are not as pronounced on this variety as they are on the above mentioned varieties, which contain a colour factor. On Russet Burbank the disease can be readily confused with extreme Rhizoctonia root and stem injury (L.K. Jones). The insect vector, Euttetix tenellus, is unrepresented in the National Entomological Collection. (C.R. Twinn)

SOFT ROT (Pythium ultimum) was found in 3 fields at Grand Forks, B.C., and also a shipment of potatoes from Kamloops to Calgary, Alta. (W. Jones & E.R. Bewell)

EELWORM (Heterodera marioni) was found in 2% of the tubers in storage at Sooke, B.C. (W.R. Foster)

BLACK DOT (Colletotrichum atramentarium) was fairly common on Green Mountain in October in Queens Co., P.E.I. (R.R. Hurst)

SUN SCALD (non-parasitic) affected a trace to 5% of the tubers in some localities in P.E.I. Soil temperatures were in some cases as high as 98°F. (R.R. Hurst)

RADISH

CLUB ROOT (Plasmodiophora Brassicae) affected 2% of the radishes in a garden at Charlottetown, P.E.I.

BROWN HEART (boron deficiency) caused slight to moderate damage to radish in a garden in Queens Co., P.E.I.

PROLIFERATION (cause unknown) affected about 70% of the plants in three lots of Scarlet Globe being grown for seed at Summerland, B.C. Affected plants failed to produce seed, except a few of the earliest formed pods. (T.B. Lott)

RHUBARB

CROWN ROT (cause unknown). Traces were recorded at Rosthern, Melfort, Saskatoon, Sask.; and in Queens Co., P.E.I.

LEAF SPOT (Ascochyta Rhei) was moderate in a garden at Edmonton, Alta.; slight on some plants at Brandon and Morden, Man.; severe in Queens Co., P.E.I.

LEAF SPOT (Phyllosticta straminella) was moderate on a new variety at Kentville, N.S. (D.W. Creelman)

ANTHRACNOSE (Colletotrichum erumpens) was moderate to severe at Kentville, N.S.; in a lot of Early Sunrise set this spring, 62% of the foliage was dead or dying on August 4. (K.A. Harrison)

SALSIFY

WHITE RUST (Cystopus cubicus). In a garden in Saskatoon, Sask., a large salsify plot was severely infected by white rust in mid-season, but the roots developed quite well in spite of every leaf being infected (T.C. Vanterpool). A trace was seen in one field at St. Leonard - Port Maurice, Que. (E. Lavalle)

SPINACH

DOWNY MILDEW (Peronospora Spinaciae) was general in one garden at Sidney, B.C. (J. Bosher). It caused slight damage in one garden in Saskatoon, Sask., but was absent from another (T.C. Vanterpool). Downy mildew was observed in many fields in Laval Co., Que., but it caused no serious damage. (E. Lavallee)

WILT (Fusarium redolens f. 1 Wr.) affected 80-100% of Bloomsdale Long Standing plants in a plot for seed at Grand Forks, B.C. The disease

develops during the hot weather in summer and kills the plants shortly before the seed begins to mature. Isolations were compared with authentic cultures and the two appeared identical. (G.E. Woolliams)

SWEET CORN

SMUT (Ustilago Zeae). A specimen was received from Shellbrook, Sask. Smut was of no economic importance in the Niagara Peninsula and Western Ont. except in isolated fields where no crop rotation is followed or cultural practices are careless (J.K. Richardson). Smut is commonly seen in sweet corn in the Montreal district, Que., but the loss is always slight. (E. Lavallee)

SEED DISCOLORATION (Fusarium sp.). A sample from the Seed Laboratory, Vancouver, B.C., showed pale brown areas on the seed, chiefly around the germ end. A Fusarium was isolated. (W.R. Foster)

TOBACCO

The tobacco disease report presented below was prepared by Dr. G.H. Berkeley from notes gathered by himself or supplied to him by Mr. P.G. Newell, St. Catharines, Ont.; Dr. L.W. Koch and Mr. R.J. Haslam, Harrow, Ont.; Mr. F.A. Stinson, Delhi, Ont.; Mr. R.J. Stallwood, Tillsonburg, Ont.; Mr. G.E. Turcotte, L'Assomption, Que.; and Mr. R. Bordeleau, Farnham, Que.

Diseases in the Seedbed

DAMPING-OFF (Rhizoctonia sp. and Pythium sp.) was present in the majority of seedbeds in both the old and new districts of Ontario and to a lesser extent in Quebec. Though the disease was generally confined to small patches in most beds, several cases were observed where large areas were affected. In several beds, damping-off was so severe that it became necessary to reseed. Damping-off appeared early and caused considerable damage at the time the seedlings were emerging from the soil. Again, at transplanting time, damping-off was a factor of considerable importance. A few growers found it necessary to buy plants because of the severity of damping-off in their seedbeds.

BLACK LEG (?Erwinia Aroideae). In the old belt, black leg was more prevalent than in 1938, as it was present to some extent in most beds by transplanting time. In the new belt, black leg was observed in only seven greenhouses. Appreciable loss of plants occurred in only two beds.

BLACK ROOT ROT (Thielaviopsis basicola) was more general than ever before in seedbeds in the new belt. Of 134 beds examined, black root rot was found in 62. In eighteen cases, the disease was so general that all the plants had to be discarded. In the old belt, black root rot was observed

in 28 beds. Most cases developed late in the seedbed stage and consequently damage was not severe.

YELLOW PATCH (cause unknown) was not as prevalent in the new belt as it was in 1938. In the majority of cases, the plants outgrew the early stunting caused by this trouble. In the old belt, yellow patch occurred in several localities, particularly in beds where large quantities of fresh muck were used.

BLUE MOULD or DOWNY MILDEW (Peronospora tabacina) appeared for the second consecutive year in Essex county, Ont., in eight seedbeds and two fields. The fact that the disease first appeared in seedbeds where it had developed last year indicates that it was able to overwinter under Ontario conditions.

GRAY MOULD (Botrytis sp.). In the new belt, gray mould occurred in a small patch in one seedbed. Large necrotic spots were formed on the lower leaves, and lesions extended from one to four inches up the stem. The characteristic conidiophores were present. This is apparently the first report in Canada of gray mould as a seedbed disease.

Diseases in the Field

MOSAIC (virus) was more prevalent than last year in both the old and new belts of Ontario and in the northern district in Quebec, while in the southern district in Quebec it was about the same as in 1938. It was again observed that the great majority of cases of high infection were in fields which had been planted to tobacco the year previous. During the early part of the season, mosaic was not so much in evidence, but following the rains in August, it became widespread with many fields showing a high infection. A few cases were observed where infection ranged between 70% to 90%. Counts made in 62 fields gave an average of 10.6%, as compared with 3.5% average in 100 fields last year. In 24 fields where tobacco followed tobacco, the average percentage of mosaic was 28.2%, whereas it was only 1.8% in 33 fields where rye preceded tobacco. Mosaic was more general in the flue-cured district of Quebec than it was in the cigar-leaf and pipe tobacco district.

RING SPOT (virus) was observed on isolated plants in a number of fields in various sections of the new belt. Ring spot was prevalent in the old belt, causing appreciable damage in some cases.

STREAK (virus). This disease was reported last year under the heading "A virus disease new to Ontario". Since then, investigations have indicated that this new disease is tobacco streak, as described by J. Johnson in 1935. This year, it was encountered in both the old and new districts in Ontario and in the northern district in Quebec. Kelley was again the variety most severely affected. However, streak was not so widespread as in 1938 and caused much less damage. In most fields, only a few affected plants appeared scattered here and there in the field.

BLACK ROOT ROT (Thielaviopsis basicola) was more prevalent in the new belt in Ontario than ever before. It was responsible for some of the unevenness of stand that was apparent in the early season. On the whole, however, the importance of black root rot lay in checking the growth in the earlier part of the season, with a consequent delay in maturity. Instances of severe reduction in yield were not numerous. A root-rot survey made in 126 fields indicated that root rot was present in 43 fields (34.1%) and absent in 83 (65.9%). Of the 43 fields affected with root rot, black root rot was present in 28 (65.1%), brown root rot in 11 (25.6%) and both brown root rot and black root rot in 4 fields (9.3%). Due to favourable harvesting conditions continuing later into the season than usual, the later-maturing, root-rot affected crops were, for the most part, satisfactorily harvested. Losses from root rot were accordingly not as great as they might have been had frosts occurred earlier.

In the old belt, the disease caused much less damage than in 1938. Though numerous fields were midly affected, favourable weather toward the end of the season favoured recovery, with the result that there was little serious damage.

Black root rot was the most prevalent disease in the northern district of Quebec this season, though it did not reduce the crop yield to any appreciable extent. In the southern district, black root rot was less prevalent than in 1938 and only a few fields were adversely affected.

BROWN ROOT ROT (Cause unknown). In the new belt, brown root rot was observed in 15 fields (11.9%) out of 126 examined. Of these 15 cases and seven additional fields encountered in the district, seven followed corn, seven followed tobacco, four followed sod, and the rotation in four is unknown. It should be pointed out that in the seven cases following tobacco, corn may have been a factor in the manure, or in the 1937 rotation. Brown root rot was found on the following varieties: Yellow Mammoth (12), White Mammoth (3), Gold Dollar (1), White Stem Orinoco (1) and unknown in 5 cases.

In the old belt, 38 cases of brown root rot were observed, 26 of which occurred in soil which had had corn, or corn refuse, added to it in 1937 or 1938. In 22 cases the Burley variety infected was Harrow Velvet, while in 7 cases it was Halley's Special. In one field where Kelley was replanted in several rows of Harrow Velvet, the Kelley plants became several times the size of the nearby Harrow Velvet plants. Of the flue-cured varieties, Yellow Mammoth was the most severely attacked. Brown root rot was present in the district to about the same extent as last year. Although brown root rot was quite serious during the early growth period, a large percentage of mildly affected fields recovered to make fairly normal growth towards the end of the season. However, severely affected fields did not recover, resulting in serious losses to the grower.

FRENCHING (Non-parasitic). This disease was much less prevalent than in 1938. Out of 126 fields examined in the new belt, only 12 or 9.5% showed frenching. Only a few cases of extreme frenching were noted. In the old belt, six cases of frenching were observed, all on imperfectly drained fields.

ANGULAR LEAF SPOT (Phytomonas angulata). In the new belt, angular leaf spot was not so prevalent as it was in 1938. In fact, it was observed on only a few plants in three fields. In the old belt, however, mild outbreaks of this disease occurred towards the end of the season in the Gest, Wheatley, and Tilbury districts, where it could be found in practically every field by the end of August. In the two Quebec districts, this disease became prevalent towards the end of the season, following rains in August.

LEAF SPOTS (non-parasitic) were much less prevalent than last season in both Ontario and Quebec. Where it did occur, it appeared to be associated with poorly drained soils.

HOLLOW-STALK (?Erwinia Aroideae). Only a few cases were reported in Quebec.

SORE-SHIN (Rhizoctonia Solani) was more prevalent in the new belt than in 1938. Many fields throughout the district contained several sore-shin plants. It was of no importance, however. Not reported from other districts.

NEMATODES (Heterodera marioni) were found on tobacco roots in six fields in the new belt. In five fields, only a few plants were affected. In the sixth field, where tobacco followed potatoes and field peas, the infection was general.

WILT (cause undetermined). A wilt corresponding in many respects to that caused by Fusarium oxysporum was observed in both the old and new belts in Ontario. A Fusarium sp. has been isolated, but its pathogenicity has not as yet been tested. This wilt was observed on plants in widely separated districts. Single leaves or several leaves or one side of a plant were affected. Necrosis of water-conducting tissues was observed in affected leaves. Wilt was observed in flue-cured, Burley, and dark types.

UNEVEN RIPENING. This condition was observed again this season in the new belt, but was less abundant than in 1938.

MAGNESIUM DEFICIENCY was more in evidence in the new belt than in 1938.

POTASH DEFICIENCY occurred in all districts in about the same proportions as in 1938.

LIGHTNING. Several cases of lightning injury were reported.

TOMATO

BLOSSOM-END ROT (non-parasitic) was frequent in gardens about Victoria, B.C. Damage by blossom-end rot was reported from the greenhouses at Oliver, Alta. The trouble was general and severe at Morden, Man. Blossom-end rot was observed in many parts of Ontario. In some cases, 20% of the fruit were being destroyed (J.E. Howitt). No severe cases were seen in the Montreal district, Que. Traces of blossom-end rot were seen in gardens throughout P.E.I., but it was of little importance.

MOSAIC (virus). There was considerable less mosaic, or streak, than in previous years about Victoria, B.C. (W.R. Foster). Mosaic was present in practically all greenhouse tomatoes in the Okanagan district; the average loss was not over 1% (G.E. Woolliams). Mosaic affected 3% of the plants of one variety in a 6-acre field inspected for seed at Brighton, Ont. It also affected 15% of the plants in a seed plot at St. Catharines (G.E. Chamberlain). Traces of mosaic were found in 2 fields at St. Jean and Boucherville, Que., but it is known to be much more common (E. Lavallee). Mosaic was observed in 5 gardens about Charlottetown, P.E.I.

SPOTTED WILT (virus) caused slight damage in greenhouses at Medicine Hat and Edmonton, Alta.

YELLOWS (virus) appeared in most fields at Summerland, B.C., but it was not very prevalent (G.E. Woolliams). Yellows, due to the virus causing curly top of beets is present every year on tomato in the Okanagan district, but varies greatly in severity. This year it was noticed on Hubbard squash in the Grand Forks area. (H.R. McLarty)

LEAF MOULD (Cladosporium fulvum) caused 20-25% loss in a few greenhouses about Victoria, B.C., due largely to neglect of proper ventilation (W.R. Foster). The disease was found in most commercial greenhouses in the Okanagan district; as a rule the losses are slight and take place mostly at the end of the picking season (G.E. Woolliams). Leaf mould infection was heavy in a greenhouse in Lincoln Co., Ont., in March, 1939. The mould resistant variety, "Vetamold", was outstandingly resistant (G.C. Chamberlain). An outbreak of leaf mould occurred on the late tomato crop in late August and early September in Essex and Kent counties. By Sept. 15, the disease was found in every plantation. It caused some defoliation, but the attack came too late to cause appreciable damage. All crops in the Harrow district in November were suffering from leaf mould, resulting in a shortening of the picking period in many greenhouses (L.W. Koch). A few affected leaves were received from River Herbert, N.S. (D.W. Creelman). Two cases of leaf mould were reported in P.E.I. (R.R. Hurst)

EARLY BLIGHT (Alternaria Solani). A trace was reported on New York State at Morden, Man. Many early tomato crops were entirely ruined in Essex Co., Ont., before the crops were half harvested, in spite of the comparatively dry weather early in the season. Septoria Lycopersici was also present, making it difficult to estimate which organism was causing the greater damage. Early blight caused considerable defoliation in Lincoln Co., but the damage was slight (J.K. Richardson). Early blight caused severe defoliation at Kentville, N.S. The disease was moderate and apparently caused little damage at Charlottetown, P.E.I.

SEPTORIA LEAF SPOT (S. Lycopersici) was less severe than in 1938 on the early tomato crop in the Essex and Kent Counties, Ont.; the disease was widespread, but generally mild. On the late crop this leaf spot became moderately severe in August in a few localities in Kent Co. (L.W. Koch). Septoria leaf spot was present in most of the 10 fields visited in the Montreal district, Que., although the affected plants were partially defoliated, the infection came too late to cause serious damage. (E. Lavallee)

VERTICILLIUM WILT (V. sp.). A slight amount of wilt was found in a few greenhouses in the Victoria district, B.C. Many growers sterilize their soil, thus reducing chances of infection. (W.R. Foster)

FUSARIUM WILT (F. Lycopersici) had affected about 50% of the plants in a greenhouse at Macdonald College, Que., on Dec. 4. It is probably common and quite destructive late in the season. (I.H. Crowell)

PHYTOPHTHORA ROT (P. Cactorum) was observed in a greenhouse at Freeman, Ont. Nearly all the fruits on the lower trusses showed the characteristic brown rot. When the fruits were placed in a moist chamber the conidiophores and conidia developed in abundance. Diseased material was sent to Dr. Donald Reddick, who reports that the organism was isolated and identified to be Phytophthora Cactorum. Two or three other lots of tomatoes affected by this rot were received this year, and in 1935, specimens were received from London, Ont. (J.E. Howitt)

GREY MOULD (Botrytis cinerea) caused heavy losses in several cars of fall crops shipped from B.C. to eastern points. (W.R. Foster)

TIMBER ROT (Sclerotinia sclerotiorum) was found affecting 1% of the plants in a greenhouse in May in Lincoln Co., Ont.; the soil was excessively moist and heavily manured. (G.C. Chamberlain)

NAILHEAD (Macrosporium tomato) was present on the early tomato crop in many plantations in Essex Co., Ont.; the damage was slight. One plantation showed 10% infection. (L.W. Koch)

ANTHRACNOSE (Colletotrichum phomoides). One canning company in Essex Co., Ont., reported that all loads of tomatoes contained a percentage of affected fruit. Damage was less severe than in 1938. (L.W. Koch)

PHOMA ROT (P. destructiva) has been observed occasionally on tomatoes in Ont., but it has never been found to be serious until this year. This fall, however, it was observed causing serious injury in 3 widely separated fields in the Brighton area. According to Mr. Sidney Simmons of this department, about 25% of the crop was affected in one field at at least 20% was destroyed in the other two. (J.E. Howitt)

BACTERIAL CANKER (Phytomonas michiganensis). A few diseased plants at least were found in most fields in the Okanagan, Kelowna and Vernon districts, B.C.; the average loss did not exceed 1%. (G.E. Woolliams)

BLOTCHY RIPENING (non-parasitic) caused a 30% reduction in the market value of the crop in 4 greenhouses at Gordon Head, B.C. (W.R. Foster). Tomato fruits showing this trouble were sent from a greenhouse at Colborne, Ont.; the owner reported a considerable portion of the fruit affected. (J.E. Howitt)

POTASH DEFICIENCY was observed at two points in P.E.I. and specimens were brought in from three others. (R.R. Hurst)

BREAKDOWN (non-parasitic). The tomato crop suffered serious losses from sun scald in some districts in the Okanagan Valley, B.C. The summer was particularly hot and dry. Breakdown was also present, but it was largely masked by the more serious damage caused by the sun scald. (R. Fitzpatrick)

CREOSOTE FUMES. About 40 beds of seedlings were seriously burned by fumes released from creosote paint in the Montreal district, Que. The paint was applied to the seed-bed frames during the winter. The seedlings in close proximity to the boards were especially affected. (E. Lavallee)

FRUIT CRACKING (non-parasitic) was severe, apparently due to environmental factors, at Morden, Man.

EELWORMS (Heterodera marioni) severely infected several individual plants in the greenhouse at Macdonald College, Que. (I.H. Crowell)

TURNIP

CLUB ROOT (Plasmodiophora Brassicae). About 5% of the roots were affected in a ton in storage at Metchosin, B.C. (W.R. Foster). The disease was reported from St. Nicholas, Que. All the turnips were infected in a small field at Pictou, N.S.; the crop was probably almost a complete loss (K.A. Harrison). A 30% infection was seen in Colchester Co., in a field of Ditmar. (W.K. McCulloch)

Club root was almost as severe in P.E.I. in 1939 as in previous years, although very little rain fell during the summer. All susceptible varieties were affected almost 100% in the club root area at the Laboratory. Infection probably took place early in the summer when moist conditions prevailed. Infection was slight on Laurentian swedes at Marshfield and it was severe on Ditmar at Union Road. (G.W. Ayers)

BROWN HEART (non-parasitic) was observed on 2 farms in Quebec; although the crop was not severely affected, it was unsaleable (C. Perrault). Brown heart was common on turnip in the southern and central part of N.B., where drought prevailed last year. (J.L. Howatt)

BORON INJURY was observed in seedlings in Queens Co., P.E.I., but all affected plants recovered later. (R.R. Hurst)

BLACK LEG (Phoma lingam). A few affected plants were found in two fields along Riviere des Prairies, Montreal Island, Que.; specimens received from two gardeners in Laval Co. indicate that black leg causes possibly a serious decay in this district. The disease is being studied by Mr. Roger Desmarteau, Quebec Plant Protection Service (E. Lavallee). Black leg caused slight to very severe damage in P.E.I. Of the varieties grown, Laurentian swedes showed the least infection. (R.R. Hurst)

SCAB (Actinomyces scabies). Traces were seen in Queens Co., P.E.I. (R.R. Hurst)

SOFT ROT (Erwinia carotovora) was found affecting 2 plants in a series of plots at Knoydart, N.S., in August.

BLACK ROT (Phytomonas campestris). During the winter of 1938-39, many samples of turnips were sent to the Department disfigured by a trouble, which the growers called "Dry Rot". It appeared first on the outer skin as a small dark spot, which enlarged and disfigured the roots when temperatures were favourable. Isolations and re-inoculations by the Department of Bacteriology here at the College showed the cause was Phytomonas campestris. (J.E. Howitt)

TYPHULA ROT (T. umbrina Remsberg). This rot has been briefly described by P.J. Salisbury (Proc. Canadian Phytopath. Soc. 9:10-11. 1940). It was found to be prevalent in spring on pit-stored turnips in the Pemberton district, B.C. The first evidence of the disease are sunken, circular, shallow brown dry-rot areas. Sclerotia develop under the epidermis and become erumpent. Secondary bacterial invaders cause an extensive wet rot, on which numerous dark brown sclerotia and white mycelium develop. The organism has recently been described by Miss Remsberg (Ruth E. Remsberg, Studies in the genus Typhula, Mycologia 32:52-96, fig. 1-58. 1940).

DOWNY MILDEW (Peronospora parasitica). Infection was a trace to heavy in P.E.I. in September. (R.R. Hurst)

POWDERY MILDEW (Erysiphe Polygoni) infected the leaves of some plants in a greenhouse, Macdonald College, Que. (I.H. Crowell)

MOSAIC (virus). Specimens of affected steckling material were received from the Station, Nappan, N.S. (J.F. Hockey)

WATERMELON

LEAF SPOT (Cladosporium cucumerinum). A slight infection was present in most plantations in Essex Co., Ont.; but the damage was negligible. (J.K. Richardson)

FRUIT ROT (Mycosphaerella citrullina). Several fruits were affected by the typical black blossom-end rot in a ½-acre patch in Essex Co., Ont. (J.K. Richardson)

IV. VIRUSES ISOLATED FROM POTATO VARIETIES IN CULTIVATION IN CANADA - 1939

by

D.J. MacLeod

The results of my investigation of the viruses found in potato varieties in Canada are presented in a series of tables.

Table 8. Isolations of Solanum Virus 1 obtained from commercial varieties.

Variety	Source	Strain
Bliss Triumph	N.B., N.S., P.E.I.	G, L
British Queen	N.B.	L
Chippewa	Que., N.B.	L, N, S
Dooley	Ont.	L, S
Earlaine	N.B.	L, N
Early Ohio	Alta.	L
Gold Nugget	Alta.	L
Green Mountain	Ont., Que., N.B., N.S., P.E.I.	G, L
Irish Cobbler	Ont., Que., N.B., N.S., P.E.I.	G, L
Katahdin	Que., N.B., N.S., P.E.I.	L, N, S
McIntyre	N.B., P.E.I.	G, L
President	Ont., N.B., N.S.	G, L, S
Sebago	N.B., Que.	G, S
Spaulding Rose	N.B., P.E.I.	G, L
Up-to-Date	Ont., N.B.	G, H, L
Warba	N.B.	G, L
White Rose	N.B.	G, L

Strains H, G, and L of Solanum Virus 1 were usually symptomless, while the D, N, and S strains gave a simple mosaic usually accompanied by a foliar necrosis. Strains H, D, G, L, N, and S were also isolated from a number of potato seedlings grown under field conditions. Potatoes grown from true seed were usually free from viruses, but readily acquired Solanum Virus 1 under field conditions. The seedlings that acquired the necrotic D, N, and S strains usually died in the 2nd or 3rd year. Those which became infected with strains H, G, and L usually showed no symptoms and were immunized against infection by the necrotic strains. A few seedlings were found in which the L strain was expressed as a simple mosaic.

A yellow strain of Solanum Virus 1 was isolated from the President and Earlaine varieties. This strain produced a characteristic yellow mottle on

Lycopersicon esculentum. Another strain which produces characteristic local lesions, ring spotting and a mottle on Solanum nodiflorum was isolated from a new potato seedling. The necrotic S strain was also isolated from a source of Solanum demissum grown under field conditions. An aberrant strain of Solanum Virus 1 resembling the S strain but apparently more potent in its reaction was found in a potato seedling grown in Saskatchewan. This strain produced marked circular brownish local lesions followed by a severe necrotic disease which usually destroyed the plant in the following hosts: Solanum nodiflorum, Capsicum annuum, Datura Stramonium, Lycopersicon esculentum, Hyocyamus niger, Nicotiana Tabacum (White Burley). In Lycium barbarum, numerous brownish local lesions, ranging from 1-2 mm. were formed on the inoculated leaves which resulted in collapse of the same. The virus did not become systemic in this host. This virus also gave rise to severe brownish local lesions on Arran Victory and President, followed by a distortion of the leaf blade and a foliar necrosis accompanied by an interveinal mottle. There was no reaction on Irish Cobbler, Green Mountain and Bliss Triumph.

Table 9. Isolations of Solanum Virus 2 obtained from commercial varieties.

Variety	Source	Strain
Bliss Triumph	N.B., N.S., P.E.I.	W, M, S
British Queen	N.B.	S
Dooley	Ont.	S
Epicure	N.B.	M, S
Gold Nugget	Alta.	S
Green Mountain	N.B., N.S., P.E.I.	W, M, S
Irish Cobbler	N.B., N.S., P.E.I.	W, M, S
Katahdin	N.B.	S
McIntyre	N.B., P.E.I.	S
President	N.B., N.S.	W, M, S
Spaulding Rose	N.B.	W, M, S
Up-to-Date	N.B.	W, M, S
Warba	N.B.	W, M, S
White Rose	N.B.	M, S

Strain W of Solanum Virus 2 is a weak almost symptomless one causing a faint waviness of the leaf blade; M is a medium strain causing a medium rugose mosaic, and S is a strong strain causing severe rugose mosaic and leaf drop streak.

All the varieties listed above, excepting Katahdin and Epicure, also carried without symptoms, a weak strain of Solanum Virus 1. The combination of Solanum Virus 1 and strong strains of Solanum Virus 2 gave rise to a severe rugose mosaic. When Solanum Virus 2 occurred alone in President, Katahdin and Epicure, it produced the characteristic chronic symptoms of this virus. The three strains of Solanum Virus 2 were also found in a number of potato seedlings grown under field conditions.

Table 10. Isolations of Solanum Virus 3 obtained from commercial varieties.

Variety	Source	Strain
Bliss Triumph	N.B., N.S., P.E.I.	W, M, S
Dooley	Ont.	M
Early Ohio	N.B., Alta.	M, S
Epicure	N.B.	M
Golden Wonder	N.B.	M
Green Mountain	N.B., N.S., P.E.I.	W, M, S
McIntyre	N.B.	M, S
President	N.B., N.S.	W, M, S
Spaulding Rose	N.B.	M
Up-to-Date	N.B.	W, M, S
White Rose	N.B.	W, S

Strain W of Solanum Virus 3 is a weak, almost symptomless one causing a faint diffuse interveinal mottle; M is a medium strain causing a mild mosaic; and S is a strong strain causing a crinkle mosaic. Golden Wonder is a symptomless carrier of the S and M strains. All the varieties except Epicure, also carried Solanum Virus 1. Combinations of Solanum Virus 1 and 3 give rise to a range of mosaics, the severity of the disease depending on the strains involved. The strong strain produced very definite mottling and distortion of the leaf blade. Solanum Virus 3 was also found in several new potato seedlings grown under field conditions. The varieties that harboured the weak strain appear to be resistant to the stronger strains. Plants affected by the weak strain are lighter in colour and slightly smaller than normal plants.

Green Mountain plants bearing Solanum Virus 3 were grafted on Irish Cobbler. In 13 days, the Irish Cobbler plants developed a severe top necrosis which was followed by a necrosis of veins and petioles of the middle leaves resulting in the destruction of the upper half of the plant. The tubers showed pin-point brownish lesions scattered throughout the flesh and severe necrotic areas around the eyes, which destroyed most of them. Plants grown from the surviving tubers appeared healthy and showed no trace of the virus.

Table 11. Isolations of Solanum Viruses, 4, 5, and 7, obtained from commercial varieties and other sources.

Variety	Source	Virus
Bliss Triumph	N.B., N.S., P.E.I.	4
Dooley	Ont.	4
Early Ohio	Alta.	4
Gold Nugget	Alta.	4
Green Mountain	N.B., N.S., P.E.I.	4
Irish Cobbler	N.B., N.S., P.E.I.	4
Spaulding Rose	N.B.	4
Up-to-Date	N.B., N.S., P.E.I.	4
White Rose	N.B.	4

Table 11. cont'd

Variety	Source	Virus
Di Vernon	N.B.	5
South American (?)	N.B.	5
New potato seedling	N.B.	5
King Edward	Ont., N.B.	7

Solanum Viruses 4, 5, and 7 were symptomless in the varieties listed above.

Solanum Virus 9 was found in the Green Mountain, Thorbeck, Bliss Triumph, Irish Cobbler and Irish Daisy varieties in which it produced a brilliant aucuba mosaic. The strain found in the Irish Daisy was a necrotic type giving rise to a necrosis in the tubers of the Green Mountain, Bliss Triumph, and Irish Cobbler varieties. This strain has been described by Dykstra, T.P. (Phytopathology 29: 917-933. 1939).

Solanum Virus 11 was identified in the Green Mountain, Irish Cobbler, Bliss Triumph, and White Rose varieties. The virus was almost symptomless in the Irish Cobbler and was expressed as a leafrolling mosaic in the other varieties.

Other Viruses

A disease of virus origin was found in the Katahdin variety, from New Brunswick and Maine, the latter of supposedly healthy stock. Affected plants showed a streaking of the stem extending in some cases along the lower side of the petiole and mid-rib and spreading along the courses of the smaller veins. The necrosis was confined to the epidermis, collenchyma and cortex. Affected leaves first developed a superficial, scattered, brownish, foliar necrosis, then became chlorotic and collapsed, but remained hanging on the stem. The advance of the disease was acropetal and starting with the lower or intermediate leaves, proceeded upwards until only the top leaves remained alive. The virus was transmitted by sap to the following hosts. In Datura Stramonium, Capsicum annuum, Nicotiana Tabacum (Samsun), Lycopersicon esculentum, and Nicotiana glutinosa, it produced a severe foliar necrosis and scattered ring spotting. In Solanum nodiflorum the virus produced light brown, circular, local lesions and a number of characteristic small, regular, ring spots on the lower and middle leaves. There were faint light grey local lesions on Lycium barbarum but no apparent systemic reaction. There was no reaction in Nicotiana rustica. The virus was transmitted by graft to healthy Katahdin plants in which it produced characteristic symptoms.

A disease of virus origin was found in some tubers from the Argentine; some of them appear to be Green Mountain. When affected plants were from 3

to 5 in. high, a top necrosis developed which destroyed from 1½ to 2 in. of the top of the plant. In some cases the entire stalk was killed back to within ½ in. of the seed piece. New shoots arose at the junction of the necrotic area and the unaffected portion of the stem which grew normally until a height of from 10 to 12 inches was attained. These new shoots showed no symptoms of the disease. The affected portion of the stems showed a necrosis of the epidermis and collenchyma which assumed the form of brownish superficial streaks and roundish to oval lesions, ranging from 1 to 5 mm. in diameter. There was also a necrosis of the vascular system and pith, which appeared as scattered brownish streaks and spots when the same was cut longitudinally. The leaves were not mottled or distorted. The tubers showed a faint necrosis of the vascular system at the stem end and a few brownish spots distributed irregularly throughout the flesh. The virus was transmitted by sap inoculation to Datura Stramonium, Solanum nodiflorum, Nicotiana Tabacum (Samsun), Nicotiana Tabacum (White Burley), Nicotiana glutinosa, Nicotiana rustica, Capsicum annuum, Lycium barbarum, Lycopersicon esculentum. A severe necrotic disease developed in all of these excepting Lycium barbarum which showed a distinct mottle. All but the Lycium died in about two weeks. The virus was also transmitted by sap inoculation to President, Arran Victory, Epicure, Up-to-Date, British Queen, Green Mountain, Katahdin, and U.S.D.A. Seedling 41956. All of these varieties excepting U.S.D.A. Seedling 41956 developed irregular brownish local lesions, ranging from 1 to 6 mm. in diameter. The inoculated leaves became chlorotic in about 12 days and dropped off. All the infected plants remained stunted. In the case of the Green Mountain the reaction was more severe than in the other varieties. The local lesions increased rapidly in size and coalesced involving the greater part of the blade, resulting in collapse of the leaf. This virus does not seem to correspond to any found so far in Canada.

A disease of virus origin was found in the Duke of York, Irish Cobbler, Bliss Triumph and Green Mountain varieties, as well as in several new potato seedlings growing in test plots and greenhouses at Fredericton. The stems of affected plants developed brownish, longitudinal lesions which extended in some cases along the petioles and mid-ribs of the leaves. The lesions usually appeared first in the intermediate section of the stem and extended upwards and downwards until the whole stalk was involved. The affected leaves developed a fine, superficial, irregular, brownish, foliar necrosis, then rolled upwards and died slowly. The dead leaves remained hanging on the stem. Longitudinal sections of affected stalks showed scattered irregular necrotic brownish coloured spots in the pith, cortex and xylem, and longitudinal, necrotic streaks in the epidermis and collenchyma, corresponding to the lesions on the stem. The disease spreads fairly rapidly in the greenhouse and reduces the yield about 30 per cent. Attempts to transmit the virus by sap inoculation to Datura Stramonium, Nicotiana Tabacum (Samsun), Capsicum annuum, Solanum nodiflorum, Lycopersicon esculentum and Lycium barbarum were unsuccessful. The disease was transmitted by graft to Irish Cobbler, Green Mountain, Duke of York, and Dunbar Yeoman, in which it gave rise to characteristic symptoms.

A condition resembling purple top was found in a plot of Katahdin, 17 per cent of the plants being so affected. The disease appears widespread in this variety. The first symptoms were a dwarfing and rosetting of the top of the plant, followed by a fading of the foliage on the margins of the younger leaflets. The stem also assumed a purplish tinge. Eventually all the leaflets rolled upwards giving the plant the appearance of being severely affected with rhizoctonia. Axillary shoots were sent out and aerial tubers were formed in some cases. The first tubers were soft, smooth with shallow eyes. The affected plant had many fibrous roots. In a few cases the terminal eye continued to grow with the result that two or more tubers were formed on the same stolon giving a beaded effect. The yield was reduced from 30 to 50 per cent. The condition resembles that described by C.R. Orton and L.M. Hill (Jour. Agr. Research 55: 153-157. 1939).

A disease of virus origin was found in President growing near Saint John. Affected plants showed a diffused, interveinal mottle accompanied by a slight waviness of the leaf blade. Old plants developed a marked rustiness on the lower and middle leaves. A virus was found associated with this disease that is readily sap transmitted to Nicotiana Tabacum (White Burley and Samsun strains) in which it produces a faint vein-clearing followed by vein-banding resembling that produced by Solanum Virus 3. Attempts to transmit the virus by sap to Nicotiana rustica, Nicotiana glutinosa, Datura Stramonium, Capsicum annuum, Solanum nodiflorum, Lycopersicon esculentum were unsuccessful. On Lycium barbarum, faint brownish local lesions with purple margins were produced on the inoculated leaves. When grafted to Arran Victory the virus produced a diffused interveinal mottle accompanied by a marked waviness and faint rusting of the leaf blade. There was no reaction in Epicure, Katahdin, Irish Cobbler, Up-to-Date and Arran Crest, but a mild mosaic was produced in Green Mountain when the virus was introduced by graft in these varieties. President plants affected with this virus were not protected against the strong strains of Solanum Virus 2 and 3. This virus was transmitted by Myzus persicae to Nicotiana Tabacum (White Burley and Samsun).

V. DISEASES OF FRUIT CROPS

APPLE

SCAB (Venturia inaequalis) was more prevalent than in 1938 in the Fraser Valley, B.C., but it was less general on Vancouver Island (W. Jones). Although weather conditions in May and June were ideal for scab infection in the North Okanagan and Salmon Arm districts, very little disease developed and 90% of the fruit at least was clean. Scab was exceedingly light in 1938 and it is thought that there was insufficient inoculum overwintering to cause infection this year (G.E. Woolliams). In general, scab was unimportant in the Niagara Peninsula, Ont. Some late infection of the fruit took place during rains in August, but it was of minor importance. The fruit of unsprayed McIntosh trees in the Laboratory plots, St. Catharines, showed 35% scab infection, 20% being very light, while the fruit of sprayed trees showed light scab infection, ranging up to 9%. Several cases of severe infection, traceable to poor spraying practises or to unusual or unfavourable conditions, were observed.

The first discharge of ascospores occurred on May 9, when the trees were in the pre-pink and pink stages. Primary infection was noted June 9. Weather conditions were unfavourable for infection in the spring; in consequence primary infection was light. Secondary infections began to appear at the end of June, but further development was checked by the weather until late August, when further light infections occurred (G.C. Chamberlain). In other parts of Ontario, apple scab was prevalent in unsprayed orchards. On unsprayed McIntosh trees practically 100% of the fruit were disfigured by scab. In well sprayed orchards, scab was kept well under control. (J.E. Howitt)

Ascospores matured in south-western Que., about the usual time, the trees being in the green tip stage. However, the first ascospore discharge did not occur until May 22-23, when the trees were in the pink stage, for no rain fell before this date. On the other hand, this dry period was followed by rainy weather, especially in the hilly section of Missisquoi district, where scab was kept under control only by frequent and thorough applications of spray. In some orchards, especially where the pre-pink spray was omitted, as many as 50% of the fruits were spotted. In all other districts, the crop was remarkably clean. (Fernand Godbout)

Scab was severe again in Eastern Que., particularly in orchards where late applications of lime sulphur were omitted. The disease was favoured by the extremely wet weather in late summer. First ascospore discharge took place on June 1; several discharges occurred subsequently, the last one July 17. Primary infection was noted on June 30 at Ste. Anne de la Pocatiere. The more susceptible commercial varieties showed the following percentages of fruit affected: McIntosh, 28%; Lobo, 24%; Canada Baldwin, 22%; Scarlet Pippin, 15%; Cortland, 15%; North Star, 15%; Wealthy, 14%; Melba, 13%. Lesser amounts of scab were observed on: Newtosh, 9%; Charlamoff, 7%; Miltosh, 5%; Keetosh, 5%; Hume, 4%; Duchess, 3%; Winton, 2%; Milwaukee, 1%;

Elmer, 1%. No scab was seen on: Afghanistan; Alexander; Manda; N.W. Greening; Pensaukee; Russett; Sandow; and Stonehenge. (C. Perrault)

First ascospore discharge occurred at Fredericton, N.B., on May 27. Although the ascospores were mature on May 18, conditions were unfavourable for spore discharge due to the lack of rain from May 9 to May 27. A heavy discharge took place on May 29, when the early varieties were in full bloom and most of the others were in the advanced pink stage. The last discharge occurred on June 8. Primary infection was observed on the leaves on June 22. Apple scab was very prevalent on unsprayed trees of McIntosh and Fameuse, although, in general, scab was more easily controlled than in 1938. (S.F. Clarkson)

The early part of the season was favourable for scab development in the Annapolis Valley, N.S., but dry weather in July, August and early September prevented further spread of the disease. The perithecia were mature early in May, but no ascospore discharge was recorded until May 18-19, when a moderate ejection took place. The main and most serious infection period was May 28-31. The trees were in the pink stage and new leaf growth was plentiful. A moderate infection period occurred on June 6-9. Subsequent minor discharges of ascospores were recorded until July 13.

Scab control was fair to good on the foliage and good on the fruit. Many of the earlier affected leaves dropped during the summer and ceased to be sources of inoculum. At harvest, 20-70% of the crop showed scab lesions on unsprayed trees. Less than 1% of the fruit was scabby on sprayed trees in many orchards. Late season infections were observed in a few instances. (J.F. Hockey)

In general, scab caused little damage in sprayed orchards in P.E.I. The fruit was rather severely infected in one or two orchards, where the first sprays were improperly timed. The main ascospore discharge took place on June 14. Orchards receiving the recommended sprays from that date on were practically free from scab. Others not receiving sufficient spray showed considerable leaf and fruit infection. It was particularly noticeable in one orchard of McIntosh. (G.W. Ayers)

FIRE BLIGHT (Erwinia amylovora) caused slight damage at Saskatoon, Sask. A severe attack, which required very heavy pruning to remove, was reported from Winnipeg, Man.; a slight infection occurred on crab apple at Morden. Twig blight was prevalent in many orchards throughout Ont. (J.E. Howitt). The disease was much less prevalent than usual in Lincoln Co. (G.C. Chamberlain). Fire blight was severe in a nursery of one to four year old stock of the Horticultural Division, Central Experimental Farm, Ottawa; some valuable breeding material was practically wiped out. This epidemic seemed to offer a clear-cut instance of the dispersal of inoculum by wind and rain. A row of large, old, severely infected crab apple trees stood but a short distance to the northwest of the nursery (F.S. Thatcher). To a casual observer fire blight appeared to be more than usually prevalent in Eastern

Ont., for the blighted twigs were conspicuous in both orchards and wild trees from the road. (I.L. Conners)

Fire blight was severe in southwestern Que. in small, poorly kept orchards where Alexander and certain varieties of crab apples were present (H.N. Racicot). In general fire blight was of little importance because Alexander, the most susceptible variety, has been nearly all cut down in the apple growing districts. This disease is observed mostly in home orchards outside these districts (F. Godbout). Very few orchards were free from fire blight around Quebec City. On the Island of Orleans, considerable loss was suffered in several orchards, nearly half the limbs and foliage being affected as well as the young fruits. The disease was apparently present in a few orchards in 1938 and it has spread rapidly to all orchards in the neighbourhood. (C. Perrault)

Less than 0.5% of the Wagner stock was affected by fire blight in a nursery in Annapolis Co., N.S.; 10% were affected in 1938. A trace was also found in McIntosh (J.F. Hockey). Fire blight was not seen in well cared for orchards in P.E.I., but it was destructive to hawthorns and in abandoned orchards. (R.R. Hurst)

APPLE RUST (Gymnosporangium Juniperi-virginianae) caused considerable damage in southwestern Ont. in 1939. Greening and Bladwin appear to possess some resistance, McIntosh was somewhat less resistant, while Wealthy, Starking (Red Delicious), Golden Delicious, Jonathan, King David, Melba, Duchess, and Rome Beauty appeared to be completely susceptible (L.W. Koch). Leaves of Betchels Crab heavily infected by this rust were received from Toronto; the tree was adjacent to infected red cedar. Red cedar was also found heavily infected in a neglected orchard near Picton, Ont., infection was just beginning to show on the apple. (I.L. Conners)

HAWTHORN RUST (Gymnosporangium globosum) was heavy on red cedar specimens collected by Mr. C.G. Riley, on a private estate near Hull, Que. A few old apple trees were planted in close proximity to the red cedar and were thought to be the alternate host rather than hawthorn, which was growing at some distance. (I.L. Conners)

QUINCE RUST (Gymnosporangium clavipes) was not controlled effectively by the regular spray programme against apple scab in operation below Quebec City, Que. Alexander, N.W. Greening, Yellow Transparent, and McMahon were among the most severely affected varieties at Ste. Anne de la Pocatiere this year (C. Perrault). A trace of rust was observed on Stark at Lakeville, N.S. (R.J. Baylis)

BLACK ROT (Physalospora Malorum) was general in an orchard at Pemberton Meadows, B.C. (W. Jones). Black rot was common in York and Queens Counties, N.B. At French Lake, infection was found on leaves of Crimson Beauty on June 8, when the trees were in full bloom. From 30% to 75% of the fruit, with an average of 45% was infected on September 11. The spray programme does not

control the disease (S.F. Clarkson). Affected fruit was brought in from Wood Islands, P.E.I. (R.R. Hurst)

POWDERY MILDEW (Podosphaera leucotricha) was fairly general on Vancouver Island and in the Fraser Valley, B.C.; the damage was moderate (W. Jones). Powdery mildew caused considerable russetting of the fruit in some orchards in the southern Okanagan, but it was slight to absent in most orchards. Immature perithecia were found on both the fruit and young suckers of McIntosh this fall (G.E. Woolliams). A scattered infection was seen on new growth of unsprayed Baldwin trees in June in Lincoln Co., Ont. (G.C. Chamberlain)

ANTHRACNOSE (Neofabraea malicorticis) was general and caused considerable damage in most orchards in the Fraser River Valley, B.C.; very little effort is made to control the disease (W. Jones). Anthracnose has recently been slowly increasing in the Salmon Arm area, especially on McIntosh, Rome Beauty, and Grimes. In some orchards, the majority of the trees have developed limb cankers. In the district as a whole, however, not over 5% of the trees would be affected. (G.E. Woolliams)

PERENNIAL CANKER (Neofabraea perennans Kienholz (Gloeosporium perennans Zeller and Childs) J.R. Kienholz (Jour. Agr. Res. 59:635-665. 1939) has described the perfect stage of Gloeosporium perennans.

EUROPEAN CANKER (Nectria galligena) was general on the King variety in an orchard in the Alberni district, B.C.; the damage was moderate. (E. White)

SILVER LEAF (Stereum purpureum). A trace was noted on the apple seedlings at the Station, Fredericton, N.B.; it was not as prevalent as last year (S.F. Clarkson). Silver leaf was quite common in some abandoned orchards in Kings Co., P.E.I. (R.R. Hurst)

DROUGHT SPOT, CORKY CORE and DIE-BACK (Boron deficiency). There have been no commercial losses from this disease since soil applications of boric acid were made to affected orchards in 1936 in the Okanagan district, B.C. The disease can only be found on check plots in the Kelowna Experimental Orchard. (H.R. McLarty)

Corky core was observed in apples from 2 orchards in Eastern Ontario. One grower reported that practically all his McIntosh apples had developed corky core and every apple in a basketful he submitted was so affected. (J.E. Howitt)

Cork disorders vary greatly in severity from season to season in Ontario. Although soil moisture is not directly responsible, it evidently greatly influences their prevalence and severity in a given season.

Average percentage of fruit affected on untreated trees:

Variety	1936	1937	1938	1939
McIntosh	85	0	46	58
Fameuse	72	0.33	18	19
Wealthy	75	0.85	6.5	12
Stark	37	0	8	29
Ben Davis	91	0	7	9
Northern Spy	51	0	2	

For these four years, cork disorders were at their peak in 1936, when rainfall was subnormal during the months of May, June and July. In 1937, moisture was more uniform throughout the season and cork disorders were much less severe. In 1938, a considerable percentage of fruit from untreated trees was affected, with another slight increase in 1939.

Incidence of Cork in Orchards Surveyed in Northumberland and Durham Counties

Year	No. of Orchards	Orchards with Cork %
1937	103	15
1938	57	42
1939	37	37.8

A single soil application of 1 lb. of borax or boric acid made in the fall of 1936 or in the spring of 1937, or spraying, in 1937, of the foliage at the calyx and second cover spray with 2.5 lb. of borax per 100 gallons of liquid effectively controlled cork disorders in 1937, 1938 and 1939.

Incidence of Cork Reported by Horticultural Inspectors in Orchards in Prince Edward County

No. Orchards Inspected	Orchards with Cork							
	Number				Percentage			
	1936	1937	1938	1939	1936	1937	1938	1939
148	69	4	5	35	42.6	2.7	3.3	23.6

Some of these orchards were treated with boron in 1937, but we have not detailed information. The trend in the different years is shown, however.

In Quebec no detailed records have been secured. Recommendations re boron applications have been generally followed and control has been good. From the few scattered samples that were sent in, it is obvious that cork was rather severe on some varieties such as Fameuse and McIntosh, where boron treatments had not been made. (H. Hill)

About 1,000 barrels of apples grown in York and Sunbury counties, N.B., were affected by cork. In one lot of 500 barrels of Cortland about 90% of the apples were affected. Both internal cork and corky core were found in Cortland while corky core only was present in McIntosh. The trouble was found in several orchards which had previously been free. The disorder was apparently more prevalent on account of the dry weather, which occurred throughout almost the entire growing season (S.F. Clarkson and J.L. Howatt). Drought spot was observed on individual trees at the Station, Kentville, N.S., and in different parts of the Annapolis Valley on Cox Orange, McIntosh and Rome Beauty. Corky core was severe on Fameuse at the Kentville Station. (J.A. Boyle)

CHLOROSIS (non-parasitic). The Olga crab apple was affected by a severe chlorosis at Beaverlodge and Edmonton, Alta.

BITTER PIT (non-parasitic) affected not over 5% of the fruit on the experimental trees of Cox Orange and Northern Spy at Summerland, B.C. Actually losses cannot be determined until the end of the storage period and even then it is difficult to get accurate figures. However, it is considered among the shippers to be one of the most serious diseases in the Okanagan Valley, especially on susceptible varieties - Northern Spy, Cox Orange, Newton Pippen (H.R. McLarty). Bitter pit affected 10% of the Baldwin fruit, 12% of Northern Spy and 3% of Delicious in the Laboratory orchard, St. Catharines, Ont. It was reported to be severe at Forest (G.C. Chamberlain). Stippen or bitter pit was observed on Baldwin and Northern Spy apples in many parts of Eastern Ont.; 25% of the fruit were affected on some trees (J.E. Howitt). Bitter pit was more prevalent and severe in fruit still on the tree in Ont. in 1939 than in the previous two years (See table below). Its appearance was not limited to any specific soil type, although it appeared to be most generally distributed on deep, heavy soils supporting vigorous trees. (H. Hill)

The Incidence of Bitter Pit on the Tree in Northumberland and Durham Counties

Year	Orchards surveyed	Orchards affected	
		Number	Percentage
1937	103	12	11.6
1938	57	20	35.0
1939	37	24	64.8

Bitter pit affected about 65% of the Baxter apples in Sunbury and Queens counties, N.B.; trace was noted in Wealthy (S.F. Clarkson). Bitter pit developed later than usual in the Annapolis Valley, N.S. It was first noticed in the orchard on Sept. 13. In 10 orchards examined Oct. 1-7, the average percentage of fruit affected was 7.2%, the highest 22%. (K.A. Harrison)

MOSAIC (virus). A single Delicious tree which was reported last year, is the only one known to be affected in the Okanagan district, B.C.(T.B. Lott)

CROWN ROT (cause unknown) is the most serious apple tree disease in the Okanagan valley, B.C., and it annually takes a heavy toll. A number of orchards were seriously affected in the Oyama district this year and in two at least one third of the trees were diseased. The abnormally high incidence of the rot in Oyama was definitely associated with an increase in the amount of irrigation water used in that district coupled with a poor system of water distribution. Crown rot is not to be confused with the collar rot of R.C. Baines (Jour. Agr. Res. 59: 159-184. 1939). The latter disease is an above-ground rot affecting the trunk and main limb crotches, while crown rot, on the other hand, affects the tree crown just below the surface of the ground and usually extends down the main roots. We have substantial evidence that, at least, some of our crown rot is caused by Phytophthora sp. (probably Phytophthora Cactorum of Ashby). This is particularly interesting since Baines has found that his "collar rot" is caused by a similar organism. (R. Fitzpatrick)

ROT due to Fusarium sp., Botrytis cinerea, and Trichothecium roseum was noted in orchards in York Co., N.B. The latter was found following scab at Charlottetown, P.E.I.

BITTER ROT (Glomerella cingulata) affected 10% of the apples from McIntosh and Fameuse trees showing winter injury in an orchard in York Co., N.B. (S.F. Clarkson and J.L. Howatt)

STORAGE ROTS at the Station, Fredericton, N.B., were principally due to 3 organisms as follows: Penicillium sp. caused 50% of the rot, Gloeosporium album 40%, and Alternaria Mali, 5%. (S.F. Clarkson)

TWIG BLIGHT (Nectria cinnabarina). A trace was noted on a few trees of Fameuse at Keswick Ridge, N.B. (S.F. Clarkson)

Phomopsis sp. was found associated with dead branches and twigs in Carleton and York Counties, N.B.; infection was slight (S.F. Clarkson). A canker (Phomopsis sp.) affected 1% of newly planted seedlings in an Annapolis Valley nursery in N.S. (J.F. Hockey)

HEART ROT (probably a member of the Polyporaceae) is slight in the southern Okanagan Valley as a whole; the disease is usually confined to certain orchards or sections of orchards, where several trees in a block may be affected. (G.E. Woolliams)

A trace of Schizophyllum commune was noted on Fameuse trees that had suffered winter injury in Queens Co., N.B. (S.F. Clarkson)

WATER CORE (non-parasitic). A trace was observed in McIntosh in York and Queens Counties, N.B. (S.F. Clarkson)

HAIL INJURY occurred over much of the orchard area in the Saint John River Valley, N.B.; 75% of the fruit as damaged in the Station orchard, Fredericton, on July 12. (S.F. Clarkson)

LEAF SPOT (Coniothyrium pyrinum) was moderate on the hybrid, Rosy Reoka, at Morden, Man.

SPRAY INJURY. Injury from lime sulphur was much less severe in south-western Quebec than usual. Severe burning was noticed in a few orchards only early in the growing season. Damage was apparently due to poor spraying methods, particularly in drenching the trees. Russetting of the fruit was observed in an orchard at Oka where a copper oxychloride spray was used previous to the calyx application (F. Godbout). Russetting was severe in one orchard in N.B., where Bordeaux mixture 3-10-40 was applied in the calyx stage; pressure was insufficient to give a fine spray particle. In general, little russetting occurred. A trace of injury from lime sulphur was noted at Gagetown (S.F. Clarkson). Russetting of fruit was very slight in the area about Kentville, N.S. Cox orange in the plots was slightly russetted. Typical lime sulphur injury was observed on the foliage in a spray plot at Kentville, where the trees were sprayed with a lime sulphur-catalytic sulphur spray mixture under humid weather conditions; the damage was negligible. A slight amount of arsenical injury of the calyx end type was noted on several varieties in the spray plots (J.A. Boyle). A spotting of the bark was observed on March 30, on two-year-old wood from an orchard at Rockland, N.S. Delicious and Golden Russett were severely affected. The injury was probably caused by D.N.T. oil applied in April, 1938 (J.F. Hockey). Typical lime sulphur injury was observed at Charlottetown, P.E.I. (R.R. Hurst)

APRICOT

FRUIT SPOT (Coryneum Beijerinckii) affected 5% of the fruit at Creston, B.C. (G.E. Woolliams)

FRUIT and LEAF SPOT (cause unknown) was unusually severe in the southern Okanagan, B.C., this year. It was formerly considered to be a form of Drought Spot caused by a deficiency of boron, but we are now certain that this is not the cause. It is the most serious and virtually the only fruit spot of apricot in this district. (R. Fitzpatrick)

BLACKBERRY

ORANGE RUST (Gymnoconia Peckiana) affected 10% of Eldorado in a planting in Lincoln Co., Ont.

FROST caused considerable injury to the new growth in some plantings of blackberry, loganberry, and boysenberry on Vancouver Island, B.C., in May. (W.R. Foster)

CHERRY

SHOT HOLE (Higginsia hiemalis (Cylindrosporium hiemale) was severe on Marjolet and Guigne Rivers varieties at the Sidney Station, B.C. (J.E. Bosher). Shot hole was general late in the season in the younger sour cherry orchards in Lincoln Co., Ont., where the full spray programme was omitted; scattered infections only occurred on older trees (G.C. Chamberlain). Shot hole caused slight to moderate damage on unsprayed trees in N.B. Infection was a trace to heavy in Queens Co., P.E.I.

SHOT HOLE (Coniothyrium sp. associated) was severe at Brandon, Man.; there was no evidence of Cylindrosporium. (W.L. Gordon)

SHOT HOLE (physiological) was severe on 2, moderate on 8, slight on 49, and a trace on 209 out of 3,047 trees surveyed in the Okanagan Valley, B.C., in 1939. (T.B. Lott)

FALSE SHOT HOLE (?virus) was found here and there throughout a 6-year-old sour cherry orchard at Virgil, Ont.; the leaves were stunted and dried up, while some showed distinct rings. (G.H. Berkeley and H.T. Gussow)

BLACK KNOT (Dibotryon morbosum) was so abundant in a small young sour-cherry orchard in Queens Co., P.E.I., and the knots were so located that pruning was not feasible and the trees had to be cut down (R.R. Hurst). A specimen of black knot on Prunus demissa was collected at Cawston, B.C., by Mr. R.P. Murray. This is the first record, of which I am aware, from the Dry Belt. (G.E. Woolliams)

BROWN ROT (Sclerotinia americana) was severe in a few home orchards in the Chilliwack area, B.C.; the disease was more general and severe than usual due to continuous rains in June (W. Jones). Brown rot was severe in a sweet cherry orchard at Southport, P.E.I.; in previous years the infection was slight in this orchard. (G.W. Ayers)

BLOSSOM BLIGHT (Sclerotinia cinerea) was severe on several varieties in the Station orchard, Sidney, B.C., while it was moderate in the Chilliwack area. (J.E. Bosher)

POWDERY MILDEW (Podosphaera Oxyacanthae) was rather general in several orchards near Lake Ontario in Lincoln Co., Ont. (G.C. Chamberlain)

YELLOW LEAF (non-parasitic) was prevalent around Fenwick and Fonthill, Ont., but was less below the escarpment; in general, it was less prevalent than in 1938. (G.C. Chamberlain)

DIE-BACK (cause unknown). A condition characterized by a delay in leafing out, and stunted variously mottled leaves was found in Lincoln Co., Ont. Later the leaves showed necrotic spots, which drop out. The leaves fall and the twigs die back. This condition was observed in 3 widely separated orchards, the trouble being scattered in the orchards. Late in the season

new, apparently normal leaves developed at the bases of the dead twigs and the trees appeared to recover. Its possible virus nature is being investigated. (G.C. Chamberlain)

CHERRY VIRUS DISEASE. A disease which caused delayed maturity, a tendency towards off-colouring and off-shape and bitterness in flavour in the fruit was found in an Olivet orchard, near Saanichton, B.C. The foliage, however, was almost normal in appearance, although there was a tendency for the leaves to be abnormally leathery to the feel and to develop red pigmentation, especially when transferred to Mazzard seedlings. Cross and longitudinal sections of the stems revealed marked necrosis of the vascular system in the advanced stages of the disease, but it was often confined to one side of the stem.

The disease appeared to be highly infectious to judge by the spread in the past four years. Although the disease appears to be most serious in the Olivet variety, Morello trees are likewise affected.

The disease was readily transferred to normal Olivet trees by budding. One year after the buds were inserted the characteristic symptoms appeared. In addition to the symptoms above described, there was a tendency for clusters of small leaves to appear on the trees budded with diseased material.

On Mazzard seedlings artificially infected with the disease the most conspicuous symptom was the red pigmentation, especially along the veins on the underside of the leaves. Recovery has not been observed. The disease on the inoculated trees gets steadily more severe, until finally the tree bears hardly any leaves or fruit. (W. Newton)

SILVER LEAF (Stereum purpureum) was moderate in sour cherries near Orwall, P.E.I. (R.R. Hurst)

WOOD ROT (Armillaria mellea) killed a few trees at the Station, Sidney, B.C. (W. Jones)

LITTLE CHERRY (cause unknown) is a serious disorder affecting cherry, especially the Lambert variety, about Nelson, B.C. Loss varies from 5% to 75% of the crop in different orchards. (G.E. Woolliams)

MOTTLE LEAF (virus) was not observed during the survey of 3,047 cherry trees in the Okanagan Valley, B.C. (T.B. Lott)

INTERVEINAL MOTTLE (physiological) was observed as follows: Trace on 221 trees, slight on 171, moderate on 39, and severe on one out of 3,047 trees surveyed in 1939 in the Okanagan Valley, B.C. (T.B. Lott)

RING SPOT MOTTLE (physiological) was observed during the same survey as follows: Trace on 34 trees, slight on 32, moderate on 10, and severe on one. (T.B. Lott)

CRINKLE (genetic weakness). A total of 3,047 cherry trees of all varieties were surveyed in 1939 in the Okanagan Valley, B.C. The results are given in Table 12.

When the whole tree was affected, the damage was estimated as 20-95%, while in trees affected in part, damage was 1-50%. One of the trees affected in part showed a white form of crinkle, which has been observed in Black Tartarian only. Crinkle was not observed in other than the Bing and Black Tartarian varieties. (T.B. Lott)

Table 12. Occurrence of Crinkle in the Okanagan Valley, 1939

Variety	Whole tree affected	Part of tree affected	Suspected of crinkle
Bing	47	9	2
Black Tartarian	13	3	0
Undetermined (Probably Bing)	9	1	1
Total	69	13	3

CRANBERRY

RED GALL (Synchytrium Vaccinii) caused severe damage in a single bog at Port Mouton, N.S. Infection of the unopened terminal buds took place previous to or on May 23. Infection occurred again on July 5 and 6, when the bog was reflooded for 48 hours, and was evident on July 15. The disease was present on Kalmia latifolia, Chamaedaphne calyculata, Rhodora canadense, Andromeda glaucophylla, and Ledum groenlandicum (R.J. Baylis and J.W. McLellan). Specimens of a Synchytrium on Rubus hispidus, Amelanchier sp., Ilex sp. and Spirea sp. were also collected in the same bog, and while it might be referred to S. Vaccinii, Dr. Groves believes that it agrees better with the closely related species, S. aureum. (I.L. Conners)

LEAF SPOT (Gibbera compacta) is common everywhere in N.B., but the damage is insignificant. (J.L. Howatt)

CURRANT

WHITE PINE BLISTER RUST (Cronartium ribicola) was general in the Fraser River Valley, B.C. (W. Jones). The amount of rust present in the variety plots of the Horticultural Division, Central Experimental Farm, has been recorded by Mr. H.J. Read for the past 5 years, 1935-39. Black currants were considerably to badly affected in 1935 and 1936, while in 1939 the infection was slight. Red and White currants, which showed considerable rust in 1935 and 1936, were all clean. In fact, there has been a progressive reduction in

the amount of rust, particularly in the last two years. Previous to 1937 no special attention was given to spraying the currants; as a rule, they received an application of Bordeaux containing poison in late May or early June, and unless the currant worm became troublesome, they were not sprayed again. Since 1937, 3-6-40 Bordeaux plus 1 quart of nicotine sulphate was applied on the following dates: June 5, 13, 25, 1937; May 5, June 1, 11, 20, 1938; and May 13, 18, 23, June 2, Aug. 2, 1939. It has been found that applications of Bordeaux after June 5, deposit a residue on the fruit, that does not wash off before picking time. Due to an outbreak of green aphids this year, the bushes were sprayed with a solution of nicotine sulphate and soap on June 20. According to Mr. Read the programme followed this year is the most satisfactory yet devised.

By controlling the rust, spraying appears to have led to a definite improvement in yields of the highly susceptible black currants (Table 13). This fact is best appreciated by comparing the percentage yields of the black currants in the last three years, since a definite spraying programme

Table 13. Yield of Principal Varieties of Currants Under Test in the Horticultural Plots, Central Experimental Farm, Ottawa, 1935-1939.

Year	Yield of Currants			
	Black		Red & White	
	Actual 1/	Percentage 2/	Actual 1/	Percentage 2/
	lb.	%	lb.	%
1935	5.32	100	25.4	100
1936	3.12	60	15.2	60
1937	6.89	130	18.1	71
1938	5.91	111	16.0	63
1939	8.66	163	20.9	82

1/ Average yield of 4 plots of 15 varieties; each plot contains 3 bushes.

2/ Yield expressed as a percentage of the yield in 1935.

was commenced, with the corresponding figures for red and white currants. Indeed, the black currants have yielded nearly twice as well as the red and white varieties, although the actual yield of black currants is much less than that of the red and white, and the yield fluctuates widely from year to year. (I.L. Conners)

Black currant bushes imported in 1938 and planted at Ste. Famille, Island of Orleans, Que., were so badly rusted on Sept. 22 that "the buds were developing prematurely and in all probability they will freeze during the approaching winter. White pines occur in the neighbourhood. The same condition was found in other gardens in the area and I fear that the growers

will obtain nothing on account of the rust" (Omer Caron). A heavy infection was also observed at Macdonald College, Que. This rust was prevalent in N.B.; premature defoliation was observed in Restigouche and Charlotte counties (S.F. Clarkson). The rust was heavy in several gardens on red and black currants in P.E.I.

ANTHRACNOSE (Depranopeziza Ribis (Gloeosporium Ribis) was slight on most varieties at Lacombe, Alta. It was common and heavy on the lower leaves of red currant at Muenster, Sask.

POWDERY MILDEW (Sphaerotheca mors-uvae) was present as usual in the University plots, Saskatoon, Sask.; the damage was slight. The plants are not sprayed. (T.C. Vanterpool)

SEPTORIA LEAF SPOT (Mycosphaerella Ribis (Septoria Ribis) was generally slight at Morden, Man.

GOOSEBERRY

POWDERY MILDEW (Sphaerotheca mors-uvae) was reported to have caused severe damage to leaves and fruit at Medicine Hat and Smoky Lake, Alta. Infection was slight on the leaves at Beaverlodge and moderate at Lacombe. Powdery mildew was severe at Saskatoon, Sask., and diseased specimens were received from Rosthern. The disease was severe on the fruit sent from St. Pascal, Que. (D.B.O. Savile). Traces were found in a garden at Charlottetown, P.E.I.

RUST (Puccinia Pringsheimiana) was heavy on the berries at Wawota, Sask.

GRAPE

DOWNY MILDEW (Plasmopara viticola) was especially abundant on the petioles and larger veins of certain varieties at Macdonald College, Que., causing the wilting and death of the leaves. The disease was not common on the blades. (I.H. Crowell)

BLACK ROT (Guignardia Bidwellii) would apparently destroy the entire crop of 22 acres at St. Thomas, Ont., according to a correspondent. (F.S. Thatcher)

DEAD ARM (Fusicoccum viticola) was observed in several vineyards mostly of Concord in Welland Co., Ont.; it was more prevalent than for several years, up to 10% of the vines being affected. (G.C. Chamberlain)

LOGANBERRY

DRY BERRY (Haplosphaeria deformans) was general but less prevalent on Vancouver Island, B.C., than in 1938, possibly due to the dry early spring checking infection. (W.R. Foster)

PEACH

LEAF CURL (Taphrina deformans) infection was very slight this year in the Niagara Peninsula, Ont.; the damage was negligible (R.S. Willison). Two trees were severely affected at Gilbert Cove, N.S. (J.A. Boyle)

BROWN ROT (Sclerotinia americana). In the Laboratory orchard, St. Catharines, Ont., brown rot was serious on unsprayed Rochester trees - a probable consequence of blossom blight (q.v.) - but it was of less importance in late varieties. Satisfactory orchard and post-harvest control was obtained with the spraying schedule recommended. (R.S. Willison)

BLOSSOM BLIGHT (Sclerotinia americana). It was estimated that 10% of the blossoms were blighted on the unsprayed check trees of Rochester in the Laboratory orchard, St. Catharines, Ont. The average number of affected blossoms per tree was determined by count in each block of six, 3-year-old trees as follows: Lime sulphur 1:40, 59.3 blossoms (43.4% control), wettable sulphur 13.3, (87.2% control) and check, untreated 104.3 (no control). Some blossom blight occurred in the other varieties in the orchard, but it was considerably less than in Rochester. (R.S. Willison)

"CANKER" (Sclerotinia americana). One or two cases of "canker" were observed in the Laboratory orchard, St. Catharines, Ont.; in which current season's twigs of Rochester were girdled by a lesion, on which S. americana was fruiting. The lesions were centred around the leaf base. The leaf presumably came in contact with a rotting fruit. (R.S. Willison)

POWDERY MILDEW (Sphaerotheca pannosa) was slight compared with previous years in the southern Okanagan Valley, B.C. Powdery mildew was observed in several orchards in Lincoln Co., Ont.; about 5% of the fruit was spotted.

YELLOWS and LITTLE PEACH (virus). According to G.G. Dustan and from my own more limited observations, the number of trees affected by yellows or little peach was markedly less than last year. The tabulation below gives the number of trees found affected by yellows and little peach in the last three years in the Niagara Peninsula, as the result of the survey conducted by Mr. G.G. Dustan.

County	Township	Number of tree affected 1937	1938	1939
Welland	Stamford	88	96	81
Lincoln	Niagara	670	350	86
"	Grantham	244	42	22
"	Louth	496	x168	276
"	Clinton	580	502	162
"	North Grimsby	x748	1031	342
Wentworth	Saltfleet	x214	793	226
	Control Zone 1/	706	434	72
	TOTALS	3746	3416	1267

x Surveys incomplete

1/ The control zone is a 2 square mile block in North Grimsby Township rigorously inspected by G.G. Dustan with my occasional assistance.

This reduction is probably due to the scarcity of the vector, Macropsis trimaculata in the summer of 1938, as reported by the Entomologists. (R.S. Willison)

The leaf hopper, Macropsis trimaculata, varies greatly in abundance from year to year in the Niagara Peninsula, Ont. The population of Macropsis trimaculata during the four years, 1936 to 1939 inclusive was largest in 1936. The insect was found in considerable numbers on wild and cultivated plum, and a few were feeding on peach. Prior to 1936 for four or more seasons very cursory observations indicated that the insect was quite common on wild plum and to a lesser extent on peach. In 1937, Macropsis trimaculata was so scarce in the Niagara Peninsula that continued search in all the localities where the insect had been abundant the previous year, as well as in many new areas resulted in the collection of approximately 25 specimens. The leaf hopper simply was not present. In 1938, Macropsis trimaculata was again extremely rare, but in 1939, the insect increased slightly in a few localities, although still very scarce. These specimens were found on wild plum only (T. Armstrong). Macropsis trimaculata has not been recorded from Lambton or Kent counties, Ont., or from B.C. (C.R. Twinn)

No virus diseases were observed on peach in the Okanagan Valley, B.C., in 1939, when 1,257 trees were surveyed. (T.B. Lott)

SUTURE SPOT (cause unknown). Several fruits were found with an elongated spot along the suture in an orchard at Ridgeville, Ont. The spot was bright red, brownish or abnormally green with a red border. The flesh below the spot was brownish or discoloured in the shape of a wedge, sometimes reaching the pit. This spot corresponded closely to the description of a

spot in peaches in orchards said to be affected by smoke in 1937 and 1938. In this case, however, smoke damage can be ruled out. The crop was harvested before the condition was brought to our attention, but no apparent leaf abnormalities were present on one tree, under which affected fruit were found. (R.S. Willison & G.H. Berkeley)

POTASH DEFICIENCY was found in many, particularly young, orchards in Lincoln Co., Ont., following hot, dry weather in June. (G.C. Chamberlain)

PEAR

SCAB (Venturia pyrina) was general and caused moderate damage on Vancouver Island and in the Fraser Valley, B.C. Some 15-20% of the fruit were infected in an orchard of Flemish Beauty in Lincoln Co., Ont. Scab was moderate to severe on unsprayed trees in York Co., N.B. Scab was slight to moderate in an orchard at Southport, P.E.I., although the trees had been sprayed; it was quite common this year throughout the province.

FIRE BLIGHT (Erwinia amylovora) caused little damage in Okanagan Valley, B.C. Traces were observed in Queens Co., P.E.I.

RUST (Gymnosporangium clavariaeforme) severely infected the fruit, twigs, and spurs of young unsprayed pear trees at Kentville, N.S. Juniper was growing within 200 yards of the trees. (J.F. Hockey and I.L. Conners)

STONY PIT (virus) appears to be present in all Bosc trees at the Experimental Station, Sidney, B.C.; about 10% of the fruit was affected. Stony pit has also been found in a considerable number of Clairgeau and D'Anjou trees and in a few of Bouscock and Bartlett (E.M. Straight). Stony pit rather severely affected 7 Bosc trees, and was found in 14 others out of 55 examined in the southern Okanagan; the trouble was severe in one Winter Nellis tree, and present in 4 others out of 6 examined. The condition was of little importance in any of 263 Barlett, 22 Flemish and 13 D'Anjou trees inspected. (G.B. Lott)

POWDERY MILDEW (Podosphaera leucotricha) was general on most varieties of commercial pears in the southern Okanagan district, B.C., wherever sprays were not applied. (G.E. Woolliams)

LEAF SPOT (Entomosporium maculatum) was heavy at Brackley Beach, P.E.I. (G.W. Ayers)

DROUGHT SPOT (boron deficiency). Most of the pear orchards in the Okanagan Valley, B.C., have been treated with boric acid, consequently boron deficiency diseases have been eliminated. (R. Fitzpatrick)

CHLOROSIS (?iron deficiency). Lime induced chlorosis (iron deficiency) occurs annually on certain types of soil in the Okanagan Valley, B.C. Iron salt injections have not given consistent results; sprays with solutions of iron salts promise to be more effective, but this work is still in the experimental stage. (R. Fitzpatrick)

POTASH DEFICIENCY was rather severe in a young orchard of Bartlett in Lincoln Co., Ont. The leaves on the affected trees showed a purplish discoloration with an upward rolling followed by scorch and death of leaves and drying out and death of twigs. Interplanted corn and nearby peach trees were similarly affected. (G.C. Chamberlain)

BLACK END (cause unknown) is a physiological disorder, which is most serious on Bartlett in the Okanagan Valley, B.C. At one time it was thought to be a form of drought spot, but this has been disproved. (R. Fitzpatrick)

PLUM

BLACK KNOT (Dibotryon morbosum) was conspicuous in one orchard requiring considerable pruning on Reine Claude in Lincoln Co., Ont. The disease can be found rather frequently in wild plums and individual trees in gardens (G.C. Chamberlain). Black knot was general and severe on unsprayed trees in N.B. It was also severe in Queens Co., P.E.I.

PLUM POCKETS (Taphrina Pruni) was reported in an orchard at Knowlton, Que. Specimens were also received from Arthabaska, Quo., and Greenwich, N.S.

SHOT HOLE (Higginsia prunophorae (Cylindrosporium prunophorae). The Combination and Santa Rosa varieties have been severely affected for several years at the Station, Sidney, B.C.; it was also severe on Mallard and Burbank (J.E. Bosher). Shot hole was severe at Brandon, Man., while infection was slight to moderate on some trees at Morden. The disease was severe on unsprayed trees throughout N.B. Traces were observed in Queens Co., P.E.I.

BROWN ROT (Sclerotinia americana). A trace was noted in Westmorland Co., N.B. Brown rot affected 20% of the fruit of Green Gage trees in an apple orchard at Greenwich, N.S., while the fruit of Lombard trees in the same orchard were clean. The trees were sprayed with the standard orchard fungicides (J.A. Boyle). About 30% of the blossoms were blighted and many of the newly formed plums were rotted in P.E.I., due to heavy rains and humid weather. Many growers removed these and no further spread took place during the dry summer. The fruit was harvested and marketed with little or any brown rot developing. (G.W. Ayers)

PRUNE MOSAIC (Prunus virus 6) was first observed in 1937 on Damson top worked with Italian Prune. Tissue transfers were made at that time, but there were no signs of transmission to peach until 1939, when a few leaves on the

inoculated tree developed a slight mottle suggestive of vein banding. Later angular necrotic spots with red borders developed. The disease on the prune was identified by Dr. E.M. Hildebrand as due to this virus. In one of the orchards half the Damson trees were top worked with Grand Duke, which displayed no symptoms of disease. The trouble is being studied further on the plum and peach. (R.S. Willison)

PLUM MOSAIC (?virus) was first observed in Sept. 1938, in Shiro trees, 30 years old, in Lincoln Co., Ont. The grower first noticed it in 1937. Three years ago the orchard was top worked with First, in which symptoms are faint. It would appear that the disease was introduced by grafting, for it has been found in both Shiro and First in a second orchard, from which the First material was secured to make the grafts in the former. The disease has also spread in the former because trees not top worked now are affected. The virus nature of the disease was demonstrated by inoculations made in the autumn, 1938, to peach which exhibits a distinct line pattern and minute ring spotting. Symptoms appear on the early leaves only, and a pronounced oak leaf pattern is also present on plum. Growth and fruit so far have appeared to be little affected. This disease is distinct in symptoms from plum and peach mosaic, although further investigations may prove it to be a form of the latter. (R.S. Willison and G.H. Berkeley)

CHLOROSIS (suspected virus). In 1937, tissue grafts from an Imperial Epineuse plum in the Laboratory orchard, St. Catharines, Ont., showing slightly dwarfed, somewhat chlorotic leaves were made on four peach seedlings. One of these seedlings showed in 1939, a ring-spotting and line pattern wider than and distinct from those described for the Shiro trouble (q.v.). Further work is in progress. (R.S. Willison)

PEACH YELLOWS (virus) was found affecting about 50% of the trees in a plum orchard in Wentworth Co., Ont.; the foliage was off colour and the fruit was ripening prematurely. (R.S. Willison)

LITTLE PEACH (virus) affected about 25% of the Burbank trees in an orchard in Lincoln Co., Ont.; the foliage was chlorotic, the leaves were cupped downward slightly, and the fruit matured 2-3 weeks late. (R.S. Willison)

QUINCE

CORKY CORE (boron deficiency). About 25% of the fruit were affected in a 6 quart basketful picked in the orchard at the Station, Kentville, N.S. The symptoms were very similar to those seen in Wolf River apples affected by drought spot. (K.A. Harrison)

RASPBERRY

ANTHRACNOSE (Elsinoe veneta) was found in plantations of Newman and Lloyd George at Sumas and Agassiz, B.C., respectively (W. Jones). Anthracnose was found on Taylor and Marcy in several nurseries in Ont. (G.C. Chamberlain). Traces of anthracnose occurred on Lloyd George and Viking in a planting in Queens Co., P.E.I. (R.R. Hurst)

SPUR BLIGHT (Didymella applanata) was prevalent on Latham and Everlasting at Sumas, B.C., in March. The latter variety was severely affected and seems more susceptible than other commercial varieties in B.C. (W. Jones). Spur blight was common in York Co., N.B.; it caused slight to moderate damage (S.F. Clarkson). Spur blight damage varied from slight to severe in P.E.I.

MOSAIC (virus) is common in Alta.; several plants were affected at Lacombe. About 10% of the plants were affected in a garden at Muenster, Sask. Mosaic can readily be found in most commercial plantings of Cuthbert and Viking in Ont.; infection ranged from a trace to 30%. Most nursery plantings of Cuthbert had small percentages of mosaic and in one nursery planting of Viking at Bowmanville, 30% of the plants were affected. Mosaic was found for the first time in the comparatively new Taylor variety (G.C. Chamberlain). Mosaic was noted in several varieties in York Co., N.B. Mosaic affected 60% of the plants in a Viking planting and 35% in one of Newman (S.F. Clarkson). Mosaic was found on Latham, Cuthbert and Viking in P.E.I.; in one planting 75% of the plants were affected. (R.R. Hurst)

MOSAIC (virus) is fairly prevalent in the Fraser Valley, on Vancouver Island, and in the Interior of B.C. Infection ranged from 5 to 50%. It is most serious in Lloyd George (W. Jones). Although mosaic has not been reported to any extent in B.C. in recent years, it would appear that it is much more prevalent than has been supposed, for, according to Dr. Berkeley, mosaic was present in all varieties examined by him in B.C. in 1935 and in one plantation at Salmon Arm 100% of the plants were affected. While Dr. Berkeley did not consider it the chief cause of the decline of raspberries in B.C. at that time, he was of the opinion that there was sufficient mosaic present in some plantations to warrant serious attention being given to the disease. (I.L. Conners)

LEAF CURL (virus). A trace was found at Lacombe, Alta. Leaf curl was encountered in several commercial plantings of Cuthbert in Ontario and in one, 15% of the plants were affected. Leaf curl was found for the first time in the Taylor variety (G.C. Chamberlain). A trace of leaf curl was noted in York Co., N.B.

YELLOW BLOTCH CURL (virus). Most Cuthbert nursery plantings show small percentages of yellow blotch curl in Ont. Its natural occurrence was noted for the first time in Viking and Taylor (G.C. Chamberlain). Yellow blotch curl was also reported in B.C. by Mr. W. Jones in 2 Cuthbert plantings, approximately 4% of the plants being affected. Whether the disease is identical with yellow blotch curl remains to be established. (I.L. Conners)

CANE BLIGHT (Leptosphaeria Coniothyrium) affected all the hills of Cuthbert in a plantation at Mission, B.C. The disease is more general in the Cuthbert than in other varieties and is often associated with lesions on the canes caused by yellow rust. The percentage of hills affected is usually low (W. Jones). Cane blight caused the death of 20% of canes in a planting of Cuthbert and over 50% in a Latham planting in Norfolk and Wentworth Counties, Ont., respectively; in both places the rows were thick and cultural practices were poor (G.C. Chamberlain). Cane blight was severe in some gardens on Viking about Charlottetown, P.E.I. According to Mr. G.C. Chamberlain the canes had already been weakened by the winter. (R.R. Hurst)

ASCOSPORA CANE SPOT (Ascospora Ruborum). Raspberry canes received from Agassiz, B.C., showed numerous lesions of Hendersonia Rubi. On account of the abundance of teliospores of Phragmidium Rubi-Idaei on the stems, it is suspected that the cane spot followed the rust. The symptoms agreed well with Zeller's description (Mycologia 17:33-41. 1925). No Leptosphaeria Coniothyrium was found. (D.B.O. Saville)

CROWN GALL (Phytomonas tumefaciens) was found on a few plants in Agassiz, B.C. (W. Jones). A shipment of raspberry canes received at Edmonton, Alta., in the fall of 1938 from a Minnesota nursery developed crown gall swellings on 68% of the canes by the following spring, when it was time to plant them. As many as 15 galls of all sizes occurred on some canes. Although crown gall has been observed previously in the experimental plots at Edmonton, where it was probably introduced on imported stock, it has not been observed or reported elsewhere in Alta. (G.B. Sanford). A trace was seen on Viking in a garden at Charlottetown, P.E.I.

YELLOW RUST (Phragmidium Rubi-Idaei) caused slight damage in commercial plantings in B.C., but it is prevalent in all Cuthbert and Viking plantings visited. At the Agassiz Farm, rust infection was moderate on Cuthbert, Viking, Herbert, Rochesters Red; slight on Winona; trace on Newman, Baumforth Seedling; and absent on Lloyd George, Latham, Franconia, Count, Chief, Ontario, Marcy, Taylor, Indian Summer, Denmark, and Norfolk Giant. Lesions on the young growing canes at the soil level develop into small oval cankers and may be followed by cane blight. Rust caused severe damage in a Herbert plantation at Terrace about 80 miles east of Prince Rupert according to Mr. J.D. Menzies. (W. Jones)

LATE RUST (Pucciniastrum americanum) occurred in variable amounts in many plantings of Viking in Central Ont.; it causes yellowing and scorch of the leaves and premature defoliation (G.C. Chamberlain). Leaves and fruit on an everbearing variety severely affected by rust were received from the Gatineau district, Que. (I.L. Conners). Late rust damaged severely the fruit of Viking and Newman in the same plantation in York Co., N.B., as last year (S.F. Clarkson). A slight attack of rust occurred in Queens Co., P.E.I., on Viking, where it was destructive last year; the grower has not removed the blue spruce from the area. (R.R. Hurst)

POWDERY MILDEW (Sphaerotheca Humuli) was most prevalent and severe on Latham east of Toronto, Ont., this year. On the whole it was probably less prevalent than in 1938. One 4-acre patch at Woodstock in an unfavourable location was severely affected in July; new growth was seriously stunted and infection occurred on the fruit (G.C. Chamberlain). Powdery mildew was present earlier than usual on Latham in Western Que. (H.N. Racicot)

DECLINE and DIE BACK (Armillaria mellea). Several plants were affected in a Cuthbert planting at Hatzic, B.C. (W. Jones)

WILT (Verticillium sp.) was not common or serious in the Niagara Peninsula, Ont., this year; 1% of the plants were affected in one planting of Viking. (G.C. Chamberlain)

SEPTORIA LEAF SPOT (S. Rubi) was general and conspicuous in a planting of Marcy at Stayner, Ont. The disease is common, particularly on Viking. (G.C. Chamberlain)

SCORCH (potash deficiency) was moderate on Brighton in a planting in Lincoln Co., Ont.

STRAWBERRY

LEAF SPOT (Mycosphaerella Fragariae) was fairly general and caused slight damage on Vancouver Island and in the Fraser Valley, B.C. In the plots at Agassiz, the varieties most severely affected were Lavergne, Simcoe, and Louise, while only a trace occurred on British Sovereign and Marshall (W. Jones). Leaf spot was common throughout N.B.

Leaf spot infection varied widely with the variety in N.S. At Kentville, Glen Mary and Abbot were the most severely spotted, while Premier was relatively free from the disease (D. Creelman). Leaf spot was heavy on Senator Dunlop near Montague, P.E.I. (R.R. Hurst). A slight infection was noted at Macdonald College, Que.

POWDERY MILDEW (Sphaerotheca Humuli) caused damage in the Horticultural plots, Saskatoon, Sask., according to Dr. C.F. Paterson. Traces were noted in 2 plantings near Montague, P.E.I.

LEAF SCORCH (Diplocarpon Earliana) was general on British Sovereign, the most susceptible commercial variety, on Vancouver Island and in the Fraser Valley, B.C., and it caused moderate damage in some plantings at Agassiz, the disease was moderate on British Sovereign, Cartier, Kawano, and Saito. At Sidney, it was severe on British Sovereign and Jubilee, while none was found on Lemieux and Simcoe. (W. Jones)

ROOT ROT or BLACK ROOT (cause unknown) was very prevalent in Wentworth, Wellington, and Waterloo counties, Ont.; in some plantations over 60% of the plants were killed (J.E. Howitt). A survey of 34 different strawberry areas in the Grand Lake - Washademoak district, N.B., on July 3-6 was made, and again on Oct. 16. The survey revealed that 18% of the plantations were clean, 6% were slightly affected, 41% moderately and 35% severely affected by black root. The plants bloomed freely and set a good crop of fruit, but the berries failed to grow and ripen according to nearly all growers visited. Fibrous roots were almost completely lacking where black root was present. The blackened roots were soft and the cortex pealed off under slight pressure. The centre of the root appeared to be the only living tissue. Black root was found on one and two year old plants. The yield was estimated to have been reduced 450,000 quarts and one grower reported his crop was cut from 5,000 and 150 boxes. (S.F. Clarkson)

GREY MOULD (Botrytis cinerea) caused a slight amount of blighting of the lower leaves in a planting at White Cane, N.B. It also caused a trace of damage to the fruit. Grey mould was reported causing damage to the fruit in 4 plantings in P.E.I.

WINTER INJURY. In plots mulched on November 1 at St. Catharines, before the freeze-up, 75% of the plants came through the winter with uninjured crowns. Where the plots were mulched on Dec. 15, only 15% of the plants escaped injury to the crown and roots. (G.H. Berkeley)

FROST INJURY. Frost caused moderate injury to the blossoms in several plantings in the Fraser Valley, B.C. Frost injury was rather severe about Charlottetown, P.E.I., causing an imperfect development of the fruit.

HAIL INJURY. Hail caused considerable injury on June 5 in Queens Co., and on July 12 in York Co., N.B.

VI. DISEASES OF FOREST AND SHADE TREES

ABIES BALSAMEA - Balsam Fir

Witches' Broom (Melampsorella Caryophyllacearum) was rather heavy in Kings Co., P.E.I.

?Canker (Dasyscypha Agassizii). A few apothecia were found on stems of fir on Ile Perrot, Que. (I.H. Crowell)

Needle Cast (Bifusella Faullii Darker) was found on Ile Perrot, Que., on June 22. (I.H. Crowell)

ACER - Maple

Tar Spot (Rhytisma acerinum) was rather severe on A. rubrum in Kings Co., P.E.I. (R.R. Hurst)

Leaf Spot (Gloeosporium apocryptum) caused extensive damage to the leaves of maples in Madawaska and Kings counties, N.B. (J.L. Howatt)

Powdery Mildew (Uncinula Aceris) was observed in North Saanich, B.C., in October (W. Jones). The appendages are bifid and thickwalled and thus are totally unlike those of U. circinata (I.L. Conners)

Massaria inquinans (Tode) Fr. was seemingly parasitic on a few small trees on Ile Perrot, Que. (I.H. Crowell)

AESCULUS - Horse Chestnut

Leaf Blight (Guignardia Aesculi) was very destructive in P.E.I. in 1939 (R.R. Hurst). Infection was moderate on trees sprayed with Bordeaux at the Station, Kentville, N.S., but it was quite heavy on some trees in the town. (D.W. Creelman)

AILANTHUS GLANDULOSA - Tree of Heaven

Butt Decay (Armillaria mellea). One tree is gradually dying at the Station, Sidney, B.C. (W. Jones)

ARBUTUS MENZIESII

Rust (Thecopsora sparsa) was found on a few trees in the Victoria district, B.C. (W. Jones)

CARYA - Hickory

Schizophyllum commune seems to be parasitic on branches of some trees of C. cordiformis on Ile Perrot, Que. (I.H. Crowell)

CATALPA

Drought. Two trees at Kentville, N.S., showed conspicuous large spots on the foliage; no pathogen was isolated from the spots. Apparently the wilt and leaf spot were due to drought. (J.F. Hockey)

CORYLUS AVELLANA - Filbert

Canker (Phomopsis revellens v. Höhn.) appears to be of some importance in the Fraser Valley, B.C., according to Mr. E. Clark, District Horticulturist. Isolations made from cankers received from Sumas Prairie yielded a Phomopsis, the A and B spores of which agreed with those of P. revellens. Dr. L.E. Wehmeyer confirmed the determination, although in the absence of the perithecial

stage it was impossible to be positive. The growing of filberts is hardly an industry in B.C., but it is becoming increasingly important. (W.R. Foster)

FAGUS - Beech

Canker (Nectria, following Cryptococcus fagi). Traces were seen at Falconwood Farm, Linkletter Road, and Miscouche, P.E.I. (R.R. Hurst)

FRAXINUS - Ash

Rust (Puccinia peridermiospora) was collected at Senneville, Que., on F. americana. Rust was severe on several trees of F. nigra at Liverpool, N.S. It was heavy on two small trees and light on a larger one of the same species near Delhaven.

JUGLANS REGIA - Walnut

Bacterial Blight (Phytomonas Juglandis) was general at the Station, Sidney, B.C., and caused a 10-20% loss of the crop; it was also present in the Fraser Valley.

JUNIPERUS

Rust (Gymnosporangium Juniperi-virginianae) has been observed occasionally in Eastern Ont. on J. virginiana, but this year it was observed in Lambton and Essex counties in Western Ont. A serious outbreak was reported in the Essex Peninsula (J.E. Howitt). A heavy infection was observed close to one apple orchard near Picton, Ont. (I.L. Conners)

Gymnosporangium globosum was severe on J. virginiana in an old garden near Hull, Que. (I.L. Conners)

Gymnosporangium clavariaeforme was heavy on J. communis var. hibernica at Charlottetown, P.E.I.

LARIX - Larch

Needle Cast (Hypodermella Laricis) was first noted during July on L. occidentalis in the Grand Forks area, B.C.; the infection was moderate to severe. Again around Bridesville and Rock Creek the infection was heavy.

No further observations were made until August. At that time the larch was throwing a second set of apparently healthy needles. The Bridesville - Rock Creek infection now appeared mild. In the Monashee Pass the disease was very slight, increasing to moderate at Edgewood, Redlands and the Arrow Lakes. Infection was slight at New Denver and Slocan, moderate to severe at Balfour and Kaslo and slight to moderate at Sunset. To sum up, the infection was moderate to severe in the Southern Interior of B.C. with a gradual lessening of the disease at the northern limit of larch. (W.D. Touzeau)

PICEA - Spruce

Witches' Broom (Peridermium coloradense). Several brooms were seen on a few trees at Oka, Que., on P. glauca. (I.H. Crowell)

Needle Rusts (Chrysomyxa spp.) occurred across the entire northern forest belt from the Yukon to eastern Newfoundland. It was particularly conspicuous in northern Sask. and Man. and throughout northern Ont. Its unusual prevalence may be associated with high midsummer humidities. Although its aspect is striking, damage may be expected only if infection should continue over

several consecutive years (A.W.A. Brown). While these rusts are reported here and there across Canada every year, the above note gives the first comprehensive statement of their distribution in any one year.

Needle Rust (?Pucciniastrum americanum)was moderate on three blue spruce adjacent to a raspberry patch at Southport, P.E.I., while an occasional needle was affected on a white spruce hedge at the same place. (G.W. Ayers)

PINUS - Pine

White Pine Blister Rust (Cronartium ribicola). A reconnaissance trip was made June 5-22 through a 10 to 30 mile strip along the north shore of the Ottawa River in Pontiac and Temiskaming counties, Que., a white pine area once famous in the Ottawa valley. Blister rust was present fairly generally but in no instance was the degree of infection heavy, which condition was accounted for by the scarcity of Ribes. However, for a country, which originally bore heavy trees, the amount of young growth is disappointingly small. Probably several factors are operating, the most important being the practical elimination of seed trees by logging and fire (A.W. McCallum). White pine blister rust was found at Charlottetown, P.E.I. (R.R. Hurst)

Needle Cast (Lophodermium nitens) was abundant on P. Strobus on Ile Perrot and at Rowden, Que. (I.H. Crowell)

Needle Cast (Lophodermium Pinastri), was also common but not abundant on P. resinosa at the same places. (I.H. Crowell)

Cenangium acuum Cke. & Pk. was collected in small quantities on Ile Perrot, Que. (I.H. Crowell)

POPULUS - Poplar

Ink Spot (Sclerotium bifrons) was severe on P. tremuloides near Brainard, in the Peace River District, Alta. Some trees lost 90-95% of their foliage. Dr. J.W. Groves confirmed the identification of the fungus (M.W. Cormack). It was observed on P. tremuloides at several points in Balkley Valley, central B.C. It occurs in definite patches ranging from a few trees to several acres. The general appearance of the disease is similar to the effects of severe frost. (J.D. Menzies)

Leaf Spot (Cladosporium subsessile) was found on small trees of P. tremuloides, 1 to 4 ft. in height at Senneville, Que. (I.H. Crowell)

Cenangium populneum was abundant on a few small fallen trees of P. tremuloides at Senneville, Que. (I.H. Crowell)

QUERCUS - Oak

Leaf Blister (Taphrina caerulescens) was slight to moderate at Beaverlodge, Alta.

Leaf Blotch (Marssonina Martini). Several roadside trees of Q. alba were scorched conspicuously on July 15 at Senneville, Que., and they were partially defoliated by Aug. 1. (I.H. Crowell)

SALIX - Willow

Scab (Fusicladium saliciperdum). Early infection was general in Kings Co., N.S., but dry weather during the summer checked the disease to such an extent that it had almost disappeared by August. At Grand Pre Memorial Park, 5 applications of Bordeaux mixture completely controlled scab. Large French willows are becoming scarce in N.S. Several survivors of the severe epidemic

of 1926-28 were further weakened by the severe epidemic in 1937 and failed to survive the winter of 1938-39. (K.A. Harrison)

Black Canker (Physalospora Miyabeana). A slight scattered infection was present in Kings Co., N.S., during the summer, but it caused little damage. (K.A. Harrison)

Powdery Mildew (Uncinula Salicis) literally covered the leaves of Salix cordata growing in crowded situations about Macdonald College, Que.

Rust (Melampsora Abieti-capraearum). A moderate infection was observed on Salix prob. discolor, in Kings Co., N.S. (D. Creelman)

SORBUS - Mountain Ash

Rust (Gymnosporangium Juniperi) was fairly heavy on leaves of S. americana at Murray Bay, Que. (I.H. Crowell)

Rust (Gymnosporangium clavipes) was collected at Kentville, N.S. This is the first time this rust has been found on Mountain ash in N.S. (J.F. Hockey and I.L. Conners)

Canker (Nectria cinnabarina). Several scattered twigs showing die-back and canker were found at Kentville, N.S. (J.F. Hockey)

Fire Blight (Erwinia amylovora) killed a tree of S. americana, 12 in. in diameter at Macdonald College, Que. (I.H. Crowell)

ULMUS - Elm

Black Spot (Gnomonia ulmea). Fine perithecial material was found fully mature on May 4 at Macdonald College, Que. Many trees were prematurely defoliated at the College and in the vicinity. (I.H. Crowell)

Specimens of Chinese elm affected by Nectria cinnabarina were collected at Liverpool, N.S. (J.F. Hockey)

WOOD PRODUCTS

Monilia sitophila was found affecting birch veneer in N.S. (J.F. Hockey and I.L. Conners)

Rhizopus nigricans affected 25-92% of the berry boxes from one factory in Ont. After preliminary trials with 25,000 boxes, over 500,000 boxes, which had been found contaminated in April, were successfully disinfected with formaldehyde under the direction of Dr. L.W. Koch. (G.H. Berkeley)

Boxes from another factory were found affected by a blue stain fungus by Dr. Berkeley. The causal organism was identified as Endoconidiophora adiposa by Dr. J.W. Groves.

TIMBER

Dry Rot caused apparently more damage than usual to floor joists, etc., in northern Sask.; four or five enquiries (with specimens) were received. The spring and early summer were wet. (T.C. Vanterpool)

INSECTS

About 20 dead larvae of Diacrisia virginica, the yellow bear, were collected at St. Michel, Bellechasse Co., Que., in a small field in about a quarter of an hour by N.J. Baillairge; only one live caterpillar was found. The larvae were parasitized by Entomophthora Grylli Fries. (I.L. Conners and H.G. Crawford)

VII. DISEASES OF ORNAMENTAL PLANTS

ALTHAEA ROSEA - Hollyhock

Rust (Puccinia Malvacearum) was again severe in the same garden at Edmonton, Alta., in which it was reported last year (G.B. Sanford). Rather severe outbreaks were reported in N.B., from Liverpool and Brookfield, N.S., and in P.E.I.

AMYGDALUS - Almond

Shothole (Coniothyrium sp.) infection was moderate on Siberian almond at Brandon, Man.; the above fungus was associated with the shothole, no trace of Cylindrosporium being present. (W.L. Gordon)

ANTIRRHINUM - Snapdragon

Root Rot and Wilt was reported causing damage in a garden at Lloydminster, Alta.; a species of Fusarium was isolated (R.A. Ludwig). Scattered plants of Rich Crimson were wilted at Brandon, Man.; isolations yield Fusarium spp. and Alternaria. (W.L. Gordon)

Rust (Puccinia Antirrhini) was moderate to severe at Edmonton and Camrose, Alta. It was severe on 10% of the plants in a garden at Saskatoon, Sask. Practically every plant was ruined by rust in a greenhouse at Weston, Ont.

BEGONIA

Grey Mould (Botrytis cinerea) destroyed 4 tuberous begonias in a garden at Charlottetown, P.E.I. (R.R. Hurst)

BERBERIS - Barberry

Rust (Puccinia graminis) had been fairly heavy on bushes of B. vulgaris discovered near Cornwall, Vankleek Hill, Almonte, and Hawkesbury, Ont. (I.L. Conners). Rust was general on B. vulgaris in Charlotte, York and Carleton counties, N.B.; 110 bushes were located in Charlotte Co., in the past summer. (S.F. Clarkson)

CALENDULA

Yellows (virus) severely affected scattered plants in several gardens in Edmonton, Alta.

CALLISTEPHUS - China Aster

Wilt (Fusarium conglutinans var. Callistephi) caused severe damage in one large planting and in several gardens in Edmonton, Alta. In one garden infection was moderate to severe on all varieties except the new wilt-resistant Early Giant Light Blue, which was not affected. Scattered plants were destroyed at Winnipeg and Morden, Man.; the organism was isolated from the Winnipeg material and identified. (W.L. Gordon)

Yellows (virus). About half the plants were affected in one garden at Edmonton, Alta., and slight damage occurred in several others (M.W. Cormack). Yellows was general and moderately severe at Morden, Man.

Yellows was common and severe in York and Sunbury counties, N.B., on the ornamentals, Callistephus Chinensis, Calendula officinalis, Centaurea

macrocephala, Phlox Drummondi and P. paniculata, and the weeds, Leontodon autumnalis, and Plantago major. In two areas kept under observation at the Fredericton Station, 8 to 10% of the Leontodon plants died from the disease, while about 5% of the Plantago plants succumbed. The vector, Macrosteles divisus, was very common and active this year. In addition to the severely affected plants, yellows was common, although causing only slight damage on the ornamentals, Chrysanthemum maximum, Clarkia elegans, Coreopsis, Dianthus sp., Dimorphotheca, Gaillardia, Helichrysum, Matthiola, Petunia hybrida, Statice, Tagetes erecta, Veronica spicata, and Zinnia multiflora; on the weeds, Chrysanthemum leucanthemum, Cirsium arvense, Erigeron canadensis, Eupatorium perfoliatum, Rudbeckia hirta, Rumex acetocella, R. crispus, Sonchus arvensis, Spergula arvensis, and Taraxacum officinale; and spinach. (D.J. MacLeod)

Yellows was more prevalent than usual on China aster at Kentville, N.S.; in one small garden all plants were affected (K.A. Harrison). Yellows was severe throughout P.E.I. on China asters. It is also severe on Calendula, Gaillardia, Tagetes, Zinnia, etc. (R.R. Hurst)

The vector, Macrosteles divisus, has been reported as a common or abundant species from B.C. to Que.; it has not, however, been recorded from the Maritimes. (C.R. Twinn)

CARAGANA

Leaf Spot (Septoria Caraganae) caused slight damage at Edmonton, Alta. Damage was moderate at Saskatoon, Sask. Leaf spot was slight at Brandon and Winnipeg, Man., while it was moderate at Morden.

CHRYSANTHEMUM

Yellows (virus). A few plants were moderately affected in a greenhouse at Medicine Hat, Alta.

Powdery Mildew (Erysiphe Cichoracearum) was reported as abundant on young plants in a greenhouse in Winnipeg, Man.

CLARKIA

Rust (Pucciniastrum pustulatum). A trace was observed on C. elegans at Saskatoon, Sask.

CLEMATIS LIGUSTICIFOLIA

Leaf Spot (Septoria Clematidis) infections were severe at Brandon and Morden, Man.

COTONEASTER

Dark Berry (Phytophthora Cactorum) badly affected C. horizontalis at Vancouver and Victoria, B.C., and considerably reduced its ornamental value. The following species were practically free, C. adpressa, C. divaricata, C. Francheti, C. frigida, C. humifusa, C. microphylla, C. nitens, C. pannosa, C. racemiflora, C. rotundifolia, C. salicifolia, C. Simonsii, and C. thymifolia. (W.R. Foster)

Twig Blight (Cytospora ambiens) was fairly general on Vancouver Island and the occasional plant was killed. An organism resembling Cytospora ambiens was isolated. (W.R. Foster)

DAHLIA

Powdery Mildew (Erysiphe Polygoni) was general in October in Lincoln Co., Ont.; Incadescent, J. Trimbel, and Grand Soleil appeared to be the most susceptible varieties in the planting at the Laboratory, St. Catharines. (G.C. Chamberlain)

Stunt (virus) is very destructive in P.E.I. in all types of dahlias. (R.R. Hurst)

Spotted Wilt (virus). Several plants in the beds at the Laboratory, St. Catharines, Ont., showed a distinct ring spotting of the foliage. Dr. F.O. Holmes, Rockefeller Institute, noted these plants and stated that he believed it to be Spotted Wilt. No experiments have been made to confirm his diagnosis. While the disease resembles spotted wilt, the rings are more faint and not so widely bordered as photographic illustrations suggest. (G. C. Chamberlain)

DELPHINIUM - Larkspur

Powdery Mildew (Erysiphe Polygoni) was severe on specimens received from Renown, Sask. Several large plants were apparently killed by July 31 at Macdonald College, Que.; all leaves were completely covered with cleistothecia. (I.H. Crowell)

Mosaic? Mosaic-like symptoms were observed on about 80% of King Arthur plants grown from imported seed at Edmonton, Alta. (G.B. Sanford)

Crown Rot (Sclerotinia sclerotiorum) infected a few plants, but those affected were killed in a garden in Queens Co., P.E.I.

DIANTHUS

Rust (Uromyces caryophyllinus) affected about 80% of the plants of carnation, D. caryophyllus, in a commercial greenhouse at Hanley, B.C., and caused moderate damage; the disease is quite common in greenhouses. A severe infection occurred in the University greenhouses, Winnipeg, Man.

Foot Rot. Odd plants of pink, D. chinensis, were killed at Winnipeg, Man.; isolations yielded Fusarium Scirpi var. acuminatum and F. spp. of the elegans section. (W.L. Gordon)

GLADIOLUS

Scab (Phytomonas marginata). A trace of scab was present in the 7 plantings inspected on Vancouver Island, B.C.; the plantings average an acre apiece (R. Hastings). Several plantings were slightly affected at Edmonton, Alta. About 75% of the corms of the 1938 crop from several gardens at Kentville, N.S., showed scab lesions when they were examined before planting this spring (K.A. Harrison). Occasional lesions were seen on several lots at Charlottetown, P.E.I.

Hard Rot (Septoria Gladioli). A trace was seen in one planting of the 7 inspected on Vancouver Island, B.C. (R. Hastings). Hard rot was seen on an occasional plant in Queens Co., P.E.I.

Dry Rot (Sclerotinia Gladioli). An average of 0.5% of the corms were affected in 7 plantings in Vancouver Island, B.C.

Bacterial Blight (Phytomonas gummisudans). About 1% of the plants were moderately affected in a planting at Lacombe, Alta.

Corm Rot. A trace of two different corm rots were noted at Winnipeg, Man. From a soft corm rot Fusarium Solani and F. ?oxysporum v. Gladioli were isolated, while from a reddish rot F. Scirpi var. acuminatum was cultured. (W.L. Gordon)

Yellows (Fusarium sp.) was much less common in the Winnipeg area, Man., than in 1937. (J.E. Machacek)

Yellows (Cause unknown) was present in practically all varieties about Charlottetown, P.E.I. The varieties of Picardy and Bagdad were planted with or without disinfection in pots of sterilized or unsterilized soil. In addition some of the pots received small quantities of the minor elements. Yellows was present under all conditions of the experiment. Yellowing of the leaves seems to be associated in most cases with poor root development.

GODETIA

Rust (Pucciniastrum pustulatum was light at Saskatoon, Sask. on G. amoena.

HYDRANGEA

Powdery Mildew (Oidium sp.) was general on a pink variety in a commercial greenhouse in Victoria, B.C. (W. Jones)

IRIS

Leaf Spot (Heterosporium gracile). Infection was slight in 2 out of 7 plantings of bulbous iris inspected on Vancouver Island and the Fraser Valley, B.C. (R. Hastings). On rhizomatous iris, leaf spot was general causing slight to severe damage to the foliage on Vancouver Island and in the Fraser Valley, B.C.; found at several points in Alta. and damage was severe in at least 2 gardens at Edmonton; severe on 7 and light on 2 varieties in the Horticulture Department plantings at Saskatoon, Sask.; an early and severe infection on many varieties at Winnipeg, Man., slight at Morden and slight to severe at Brandon; light infection at Kentville, N.S.; and infection slight to severe in Queens Co., P.E.I.

Rhizome Rot (Erwinia carotovora) destroyed several plants at Senneville, Que.; the trouble was present in a few plants last year (I.H. Crowell). Soft rot affected one clump at Wolfville, N.S.; infection was associated with borer injury. (R.J. Baylis)

Ink Disease (Mystrosporium adustum). A trace was usually found in 2-year-old plantings on Vancouver Island and in the Fraser Valley, B.C. (R. Hastings)

Eelworm (Ditylenchus dipsaci) slightly infected 4 out of 7 large plantings in B.C. (R. Hastings)

LATHYRUS ODORATUS - Sweet Pea

Powdery Mildew (Microphaera diffusa) was fairly prevalent in P.E.I.

Streak (?virus) caused moderate to severe damage in a planting at Lethbridge, Alta. It was observed fairly commonly in Queens Co., P.E.I.

Mosaic (virus). Traces were seen in a planting in Queens Co., P.E.I.; the leaves of the affected plants were yellowish, curled and mottled. The peduncles were short and the flowers showed colourless streaks. (R.R. Hurst)

Root Rot (Fusarium sp.) about 2% of the plants were killed in a garden at Edmonton, Alta. (M.W. Cormack). Wilt and root rot affected a few plants at Saskatoon, Sask.

LILIUM - Lily

Blight (Botrytis elliptica). Observations were made on the occurrence of blight in a private garden at Agassiz, B.C. No blight was seen on Lilium Brownii, L. japonicum, and L. Maximowiczii, infection was slight on L. cernuum, L. Henryi, L. princeps, L. pumilum, L. speciosum, L. sulphureum and L. tigrinum; moderate on L. regale; and severe on L. aurantiacum, L. candidum, L. Davidii, L. elegans, L. testiceum, L. umbellatum, and L. Willmottiae (W. Jones). Blight infection was severe on L. alutaceum and L. philadelphicum at Brandon, Man. It was also severe on a few plants of Lilium candidum in Queens Co., P.E.I.

Rust (Puccinia Sporoboli Arth.). A single aecial pustule was found on Lilium princeps var. Geo. C. Creelman, Winnipeg, Man., July 2, 1939. This appears to be the first definite record of this rust in Man. (J.E. Machacek and A.M. Brown)

LOBELIA

Damping-Off (cause unknown) caused a 90% loss in flats in a greenhouse at Gordon Head, B.C. (W.R. Foster)

LONICERA - Honeysuckle

Blight (Glomerularia Lonicerae) was reported to be severe in a nursery in Kings Co., N.B. (J.L. Howatt)

MATTHIOLA - Stock

Damping-Off (Rhizoctonia Solani) affected 5% of the plants in several flats of M. incana annua, Ten Weeks Stock, at Kentville, N.S. (D.W. Creelman)

NARCISSUS

Smoulder (Botrytis narcissicola) is always present on Vancouver Island, B.C., in the early varieties, causing at least 10% damage; the disease was negligible in the late varieties. (R. Hastings)

Leaf Scorch (Stagonospora Curtisii). A trace was found in the majority of plantings on Vancouver Island and in the Fraser Valley, B.C. (R. Hastings)

Mosaic (virus) affected about 1% of the plants in plantings on Vancouver Island, B.C. (R. Hastings)

Grey Streak (virus) affected 3% of the plants on the average in the same plantings. (R. Hastings)

Eelworm (Ditylenchus dipsaci) caused slight damage in B.C.; it was found in 6 out of 15 plantins (55 acres) on Vancouver Island, B.C., and in 2 out of 20 plantings (25 acres) in the Fraser Valley. (R. Hastings)

NEMESIA

Yellows (virus). Infection was general at Brandon, Man.

NIGELLA - Love-in-a-Mist

Foot Rot destroyed scattered plants at Morden, Man.; isolations yielded Fusarium spp. (W.L. Gordon)

PAEONIA - Peony

Blight (Botrytis Paeoniae) was slight at the Station, Sidney, B.C., and was less prevalent then in 1938 probably on account of the dry weather in the early spring. The disease was moderate at the Agassiz Farm (W. Jones). Bud blight and crown rot were prevalent and caused severe damage in a large planting at Edmonton, Alta. Bud blight caused slight damage at Saskatoon, Sask. Blight was severe, as a crown rot on some plants of P. officinalis and P. tenuifolia at Morden, Man., while it was generally slight on the leaves. Bud and crown rot was severe on P. tenuifolia at Winnipeg, while a trace of bud rot occurred in other varieties. Blight was less prevalent than last year in York Co., N.B., due to lack of rain in the spring and summer; some blight developed after the blooming period at the Fredericton Station (S.F. Clarkson). Blight was very destructive at the Station, Charlottetown, P.E.I., and diseased specimens were brought in from Souris, Borden and Summerside. (R.R. Hurst)

Ring Spot (virus). A few plants were severely damaged and many others were slightly affected in a large planting at Edmonton, Alta.

Ring Spot caused slight damage at Saskatoon, Sask., and a trace of infection was reported from Brandon and Morden, Man. A single affected plant was observed in a garden in Lincoln Co., Ont.

Leaf Blotch (Cladosporium Paeoniae) was slight at Agassiz, B.C.

Lemoine's Disease severely affected a few plants at Edmonton, Alta.

PELARGONIUM - Geranium

Leaf Curl (virus) was present in several gardens at Victoria, B.C.; the ornamental value of the geraniums was reduced considerably. (Wm. Newton)

PENTSTEMON

Leaf Spot (Ramularia sp.) moderately infected the leaves of some plants of P. grandiflorus at Morden, Man.

PHLOX

Powdery Mildew (Erysiphe Cichoracearum). Traces were found in Queens Co., P.E.I.

PHYSOSTEGIA

Wilt (Sclerotinia sclerotiorum) caused serious damage in a clump of P. virginiana rosea compacta in the perennial border at Kentville, N.S. (J.F. Hockey)

PYRUS - Apple

Fire Blight (Erwinia amylovora). A diseased specimen of flowering crab was received from Toronto, Ont. (F.S. Thatcher)

RHAMNUS - Buckthorn

Rust (Puccinia coronata). Aecia were found on June 23 at Fredericton, N.B. About 400 large buckthorn bushes were located in York and Charlotte

counties this year; some were small trees (S.F. Clarkson). Aecia were observed on June 22 at Kentville, N.S. (D. Creelman). The aecial stage was abundant at Charlottetown, P.E.I., this year. (R.R. Hurst)

About 300 bushes of R. Frangula growing in a rough pasture were infected by P. coronata on June 22. The aecia were used to inoculate Cartier and Victory oats, but the results were negative. Several grasses growing within 100 yards of the bushes were examined for telia on Oct. 22, but without success. (J.L. Howatt)

RHODODENDRON

Leaf Spot (Diplodina eurhododendri) was found at Courtenay, B.C. (W.R. Foster)

Leaf Spot (Pestallozia sp.) caused slight damage to a few shrubs in a nursery at Victoria, B.C. (W.R. Foster)

RIBES - Currant

Septoria Leaf Spot (S. aureum) was moderate on the lower leaves of Ribes odoratum at Muenster, Sask.

Powdery Mildew (Sphaerotheca mors-uvae) caused moderate damage to Ribes odoratum at Saskatoon, Sask.

ROSA - Rose

Rust (Phragmidium spp.) was severe on Banshee and light on Betty Bland at Saskatoon, Sask. It was severe on some varieties at Morden, Man. A specimen of rose affected by P. speciosum was received from Montreal, Que. (H.N. Racicot). The aecial stage of P. speciosum was collected on wild rose at Kentville, N.S. (D.W. Creelman)

Crown Gall (Phytomonas tumefaciens). Several 3-year-old hybrid tea plants died in a planting in Lincoln Co., Ont., and were found to be heavily galled (G.C. Chamberlain). Crown gall was very severe on a plant of Dorothy Perkins at Charlottetown, P.E.I. The galls reached some distance above ground; the plant was saved by careful pruning. Several other cases were reported. (R.R. Hurst)

Powdery Mildew (Sphaerotheca Humuli). A slight infection was reported on some plants at Brandon, Man. Powdery mildew was very common and most serious on the Ramblers, Crimson and Dorothy Perkins, and also on hybrid teas and perpetuals in Lincoln Co., Ont. (G.C. Chamberlain). Powdery mildew became rather severe late in the season on Paul Scarlet, Crimson Rambler, and Dorothy Perkins at Charlottetown, P.E.I. Several other cases were reported. Sulphur dusting seems to be beneficial. (R.R. Hurst)

Black Spot (Diplocarpon Rosae) infection was moderate and general at Morden, Man., while it was moderate on some varieties at Brandon. Black spot again disfigured hybrid teas to a marked extent about Guelph, Ont., this year. Several rose gardens were observed where the bushes were almost completely defoliated by it before fall (J.E. Howitt). A serious outbreak of black spot occurred in gardens in Lincoln county during the cool evenings and rains of August. Hybrid teas and hybrid polyanthas were defoliated. This is the first time I have noticed Poulsen Polyantha severely attacked (G.C. Chamberlain). Black spot occurred commonly in gardens at Fredericton and Saint John, N.B.

Slight to moderate damage resulted from defoliation (J.L. Howatt). The disease caused slight to moderate damage in P.E.I. on many varieties. (R.R. Hurst)

Cercospora Leaf Spot (Mycosphaerella rosicola B.H. Davis) Cercospora rosicola Pass.) infection was slight and general at Brandon, Man., while only a trace occurred on some plants at Morden.

Mosaic (virus) was recorded at Saskatoon, Sask.

Die-Back (Valsella sp.?). Last year's stems on 2 bushes of R. Helenae were killed either by winter injury or by this fungus at Saskatoon, Sask.

SALPIGLOSSIS

Foot Rot. Odd plants were dead due to a foot rot at Morden, Man.; isolations yielded Fusarium spp. (W.L. Gordon)

SAMBUCUS

Leaf Spot (Septoria sambucinum). A slight infection was observed at Brandon, Man., on Sambucus sp.

SYRINGA - Lilac

Powdery Mildew (Microsphaera Alni) was reported from N.B. and P.E.I.

Grey Mould (Botrytis cinerea) caused slight damage to the leaves and twigs of lilac in Saint John Co., N.B. It is associated with Blight (Phytomonas Syringae). (S.F. Clarkson)

Blight (Phytomonas Syringae) caused slight to severe damage in York and Saint John counties, N.B. The young shoots were blackened and many were killed by the disease. This year blight was first noted on June 12. In general, blight is favoured by a wet spring, when the leaves become infected. During the summer, if the weather is dry, the blight spots become corked off and fall out and the disease spreads no further. (S.F. Clarkson)

TAGETES - Marigold

Wilt. Scattered plants were infected at Brandon, Man. Isolations yielded a Fusarium sp. (W.L. Gordon)

TROPAEOLUM - Nasturtium

Eelworm (Ditylenchus dipsaci) was found at Vancouver, B.C., in 2 shipments of T. polyphyllum from Haarlem, Holland, 25% and 100% of tubers respectively being affected. This is the first report of its occurrence on the above host. (R. Hastings)

TULIPA - Tulip

Fire (Botrytis Tulipae) caused severe damage (5-20% loss of bulbs) in 10 plantings out of 30 inspected on Vancouver Island and the Lower Mainland, B.C. The disease was severe in all plantings that had not been rogued and in two-thirds of those where the roguing had been done poorly and late, while in only one planting out of 17, where the roguing had been done well did the loss of bulbs exceed 0.5% and in 10 plantings the loss was not over 0.1%. A scattered infection was seen in the Laboratory beds, St. Catharines, Ont. Fire was general on many varieties in P.E.I.; damage was most severe in old plantings. (R.R. Hurst)

Break (virus) increased in 2 plots of tulips of Harry Veitch and Whistler at the Station, Sidney, B.C., from 12% and 30% in 1938 to 20% and 60% respectively in 1939; these plots were not rogued. On the other hand, in plots which have been rogued consistently for 5 years, no break appeared in the current year. In commercial plantings, where roguing has been practised, break has been practically eliminated.

Topple (non-parasitic). A "break over" occurred in forced tulips in a greenhouse, Winnipeg, Man. The stem broke over when the colour began to appear in the perianth. This "break over" was apparently due to a hollow-stem condition half way up the stem. About 25% of the plants of Couronne d'Or and 10% of Wm. Pitt and Ibis were affected. (J.E. Machacek)

The trouble described above appears to be Topple, which occurs in forced tulips and only rarely out of doors. The early varieties, especially the doubles, are very apt to suffer from this trouble, but it also occurs in certain Darwin varieties.

Sorauer attributed this condition to over rapid forcing. Later, excessive atmospheric humidity or wide variations of temperature in the greenhouse were blamed. More recent work suggests that any factor which tends to disturb the normal development of the young flower bud is likely to predispose the plants to topple. The general recommendations for the control of the trouble is to keep the temperature and humidity of the houses as low as possible and to avoid wide and rapid variations in temperature. (F.L. Drayton)

Sclerotinia Bulb Rot (S. sp.). Specimens affected by this destructive bulb rot were received from Sherbrooke and Chateauguay, Que., and were collected in a garden at Westmount. Frequently newly planted bulbs decay before they develop roots or shoots. Affected narcissi were also collected in this garden (See also P.D.S. 18:110)

Tulips collected at Strawberry Vale, B.C., showed lesions and sclerotia on the stem at the ground line, and only the occasional bulb was partially decayed. The fungus appears to be distinct from but closely allied to the above species. (F.L. Drayton)

Root Rot (Apparently Cylindrocarpon radicicola). A severe root rot causing extensive damage developed in tulips grown in the garden of the Laboratory, Winnipeg, Man. Isolations yielded predominantly Cylindrocarpon radicicola. Fusarium Poae was also isolated. The disease was most destructive to Flamingo, Herman Schlegel, van der Neer, and Fred Moore. (W.L. Gordon)

Bulb Rots. The following organisms were isolated from various rots of tulip bulbs at Winnipeg, Man.: Fusarium Scirpi var. acuminatum, F. redolens, F. sp. (Elegans section), Penicillium sp., and Rhizoctonia Solani. (W.L. Gordon)

A Leaf-Tip Decay occurred to a slight extent in tulips at Winnipeg, Man.; isolations, when they were made, yielded Fusarium Scirpi var. acuminatum and F. redolens. (W.L. Gordon)

VIOLA

Rust (Puccinia Violae) was general on plants in a garden at Agassiz, B.C. A heavy infection was recorded at Kentville, N.S.

Powdery Mildew (Sphaerotheca Humuli var. fuliginea) was reported on pansy from Hibbard and Preeceville, Sask.

YUCCA

Leaf Spot (Coniothyrium concentricum) infection was heavy at Kentville, N.S., causing the leaf tips to dry up and the plants to appear unsightly. (D.W. Creelman)

ZINNIA

Wilt (Fusarium Solani var. Martii) affected from 5-25% of the plants in some plantings in the Okanagan district, B.C., while in other plantings the disease was absent. The causal organism has been compared with authentic cultures of the above and appears to be an undescribed form of this species. (G.E. Woolliams)

Foot Rot infected odd plants of Z. linaria at Brandon, Man.; isolations yielded Fusarium spp. (W.L. Gordon)

Leaf Mottle (virus). A virus was isolated from Z. elegans. It was found to be sap transmissible to Datura Stramonium, Nicotiana Tabacum (Samsun), and Capsicum annuum, in which it produced a vein clearing, followed by a diffused interveinal mottle. In N. Tabacum slight ring spots were produced on the lower leaves. In C. annuum there was a slight unevenness and an upward rolling of the top leaves. The virus does not appear to be sap transmissible to Lycopersicon esculentum, Solanum nodiflorum, and Lycium barbatum. The symptoms on the zinnia are a diffused pallid interveinal mottle involving the whole leaf blade. The foliage and flowers of affected plants were reduced in size and the flowers failed to develop their normal colour, ranging from a faded red to a pale green. In a few cases the flowers finally assumed a rusty appearance. (D.J. MacLeod)

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