III. DISEASES OF VEGETABLE AND FIELD CROPS

ASPARAGUS

RUST (Puccinia asparagi). A heavy infection of rust was found in a garden at Marshall, Sask. The rust was almost completely parasitized by Darluca filum (T. C. Vanterpool, I. L. Conners).

BEAN

GREY MOULD (Botrytis cinerea). Sl. infections were quite common in several gardens at Ste. Anne de la Pocatiere, Que. (R. O. Lachance). Several cases were received by the Plant Protection Service. The earliest was on 14 Aug., when the disease was found causing damage to green beans on the market at Three Rivers; the pathogen was identified by the Laboratory at Ste. Anne de la Pocatiere (O. Caron). Traces were found in every field examined in Kings and Annapolis Counties, N. S.; it is present wherever the growth is heavy and humidity high (K. A. Harrison). Infection was heavy on several varieties in gardens in Queens Co., P. E. I. (R. R. Hurst).

ANTHRACNOSE (Colletotrichum lindemuthianum). Infection was tr. in the plots at Edmonton (L. E. Tyner) and mod.-sev. in those at Lethbridge (M. W. Cormack). In beans of the Brittle Wax types grown for seed in the Laprairie area, Que., 2 fields contained 2% of the plants infected and 6 others were free of Anthracnose. In one field grown for the market at St. Martin, Laval Co., 80-90% of the crop was infected and almost a total loss; the seed used was home grown (E. Lavallee). Two fields of Black Seeded Pencil Pod planted with the same lot, which had been supplied by the canners, was a total loss on 18 August at West Paradise, N. S., whereas other lots of seed of this and other varieties gave plants unaffected at this date (K. A. Harrison). In Cape Breton Co. infection in fields ranged from a tr. to 100% of the crop; the latter was in 1/2 acre field at Huntington (P. M. Grainger). Anthracnose was very destructive on wax beans in 1951, but the damage was less when home-grown seed was not used (R. R. Hurst). Infection was 50% in a garden plot of Improved Golden Wax at Topsail with small amounts in 2 gardens at Holyrood, Nfld. (G. C. Morgan).

HALO BLIGHT (Pseudomonas phaseolicola) was present on 16 July on several varieties in the test plots at the Station, Summerland, B. C.; its occurrence in the plot was apparently the result of sowing infected seed of Longreen, from which blight spread to the varieties, Idagreen, Plentiful, Ranger, Tendergreen, Supergreen and Rival, following a heavy rain. Several varieties were found infected by halo blight in August in the B. C. Interior, including Grand Forks, Kelowna, and Vernon when the crop was inspected under the Health Approval Plan by men of Plant Products Division (G. E. Woolliams). Infection was a tr. at Edmonton and sev. in plantings at Lacombe, Alta. (T. R. D.). The disease was general and sev. in several fields and gardens of garden varieties at Lethbridge; it was absent or a tr. in field beans (M. W. Cormack). Infection was mod. in several varieties at Fort Garry, Man. (W. A. F. Hagborg). Out of 8 fields of beans grown for seed in the Laprairie area,

Que., infection was 15-20% in 3, and about 2% in 2; the other 5 fields were free of the disease (E. Lavallee). The disease was general in Que. in 1951 (O. Caron). In a 8-acre field of Improved Logan at Caanan, N.S., infection was so severe that 5 acres were ploughed down. The other 3 acres were sprayed with Bordeaux, but not more than half a crop was harvested. This seed producing area has stopped growing beans following a second destructive outbreak (K. A. Harrison).

SCLEROTINIA ROT (Sclerotinia sclerotiorum) was very common in central Alta. on account of the moist conditions prevailing in 1951 (G. B. Sanford). A little rot was seen on stems and pods in a garden in Kings Co., N.S. Canners reported that there were cases of this disease developing in hampers of beans awaiting processing at the factory in Kentville (K. A. Harrison).

RUST (Uromyces appendiculatus). Rather heavily rusted specimens of lima bean (DAOM 28381) were received from Wainfleet, Ont. (G. C. Chamberlain). This is the first report of rust on lima bean in Canada (I. L. C.).

COMMON BLIGHT (Xanthomonas phaseoli). Infection was tr.-20% in the fields examined in Cape Breton Co., N.S. (P. M. Grainger). The disease affected 5% of the plants of Improved Golden Wax in a planting in Queens Co., P.E.I. Local gardeners also reported its presence (R. R. Hurst).

BACTERIAL BLIGHT (Xanthomonas phaseoli and Pseudomonas phaseolicola) affected 95% of the Clipper plants in a plot at Ottawa, Ont. (R. V. Clark). Some sev. infections were noted about Ste. Anne de la Pocatiere, Que., but when clean seed was used infection was often slight (R. O. Lachance).

MOSAIC (virus) was found occasionally in the Grand Forks area, B. C.; a tr. was also present in the plots at the Station, Summerland (G. E. Woolliams). Traces of mosaic were observed in many bean fields and gardens in the Montreal region, Que. (E. Lavallee). Mosaic (Phaseolus virus 1) infection was 2% of the plants of Stringless Green Pod and tr. of White Marrow Fat in 2 farm gardens in York Co. A 2% infection was also found in 1/8 acre field of wax variety in Carleton Co., N. B. (D. J. MacLeod). Varying percentages of mosaic-infected plants were seen in Inverness, Victoria and Cape Breton Counties, N.S. (P. M. Grainger).

YELLOW MOSAIC (virus) affected the occasional plant in Grand Forks area, B. C., and found in several varieties in the plots at Summerland, B. C. (G. E. Woolliams). Four Kentucky Wonder plants were found infected by yellow mosaic in 2 farm gardens in York Co., N. B. The beans were planted near rows of gladioli that were affected with Phaseolus virus 2. The gladioli showed a faint mosaic mottle (D. J. MacLeod). Mosaic severely affected 5% of the Kentucky Wonder beans in a small garden planting at Kentville, N.S., and the pods were useless; gladioli were growing near the beans (K. A. Harrison).

SUNSCALD (non-parasitic) severely affected beans in 3 fields (about 6 acres) at St. Urbain, and in a home garden at Ste. Martine, both in Chateauguay Co., Que. (E. Lavallee).

TIP BLIGHT (?non-parasitic) had caused mod. damage to a planting of Imperial Commander in Carleton Co., Ont. by 10 July; the plants were exposed to dry hot weather following a rain (K. M. Graham).

BEET

CROWN GALL (Agrobacterium tumefaciens) was general in one row in a home garden at Vancouver, B. C.; the organism was isolated and identified (I. C. MacSwan, W. E. McKeen).

LEAF SPOT (Cercospora beticola). Infection was mod. on several varieties in the Horticulture plots at Ottawa, Ont. (K. M. Graham). Infection was tr.-sev. on garden beets across P. E. I. in September (R. R. Hurst).

DOWNY MILDEW (Peronospora schachtii). Some 50% of the seed plants of Detroit Dark Red were showing systemic infection on 16 May at the Station, Saanichton, B. C.; infection was widespread in the steckling crop in 1950 (W. Jones).

SCAB (Streptomyces scabies). Affected specimens grown in Queens Co., P. E. I. were brought in; infection was reported to be a trace (R. R. Hurst). Infection was much lighter in Nfld. this year than in 1951; 5 fields (about 1/4 acre) at Conception Bay produced mod. infected roots (G. C. Morgan).

BROWN HEART (boron deficiency) caused sl. damage in a small well-limed garden in Charlottetown, P. E. I. (R. R. Hurst).

BROAD BEAN

LEAF SPOT (Cercospara fabae Fautrey). A 25% infection caused mod. damage to the leaves of broad bean (KP1712) growing on Tancook Island, N. S. This appears to be the first report for Canada (P. M. Grainger, D. Creelman). For a description of the disease see R. C. Woodward, Trans. Brit. Myc. Soc. 17:195-201. 1932 (I. L. C.)

BRUSSELS SPROUTS

WIRE STEM (Rhizoctonia solani). Affected specimens received from Windsor, N. S., 28 Sept., showed poor development of sprouts. The stem was girdled at or below ground level and in some the cortex was sloughed off; mycelium of R. solani was present (D. W. Creelman).

CABBAGE

GREY MOULD (Botrytis cinerea). Cabbage stored on the beams of a storage cellar at Barton, N. S., became completely covered by grey mould. Spores drifted down and caused a severe infection of swede turnips stored below (K. A. Harrison).

SOFT ROT (Erwinia carotovora) destroyed about 2 tons of cabbages in storage in 3 warehouses in St. John's, Nfld. The storage rooms were damp and unprotected from frost (G. C. Morgan).

YELLOWS (Fusarium oxysporum f. conglutinans) was found in 4 fields of Copenhagen cabbages on the same farm at St. Vincent de Paul, Que. About 50% of the plants were more or less affected resulting in about 20% loss. Although the grower claims the disease has been present on his farm for 3 years, this is the first time that we have observed the disease in the Montreal district (E. Lavallee). Wilt infected 80% of the plants and caused severe damage in planting in the Hull district; diseased plants were confined to that portion of the field that had been in crucifers the previous year (K. M. Graham).

DOWNY MILDEW (Peronospora brassicae). Sl. infection on the outer leaves of Danish Ballhead at Logy Bay, Nfld. (G. C. Morgan).

BLACK LEG (Phoma lingam) infected about 25% of 50,000 plants being grown in 4 seed beds in the Avalon Peninsula in 1951. The disease is troublesome every year in Nfld. (G. C. Morgan).

CLUB ROOT (Plasmodiophora brassicae) continues to be the problem in the growing of cabbages and cauliflower in the Montreal district, Que., especially on Isle Jesus; this year frequent rains permitted a greater number of plants to survive and to produce heads than usual (E. Lavallee). Numerous affected specimens were received by the Plant Protection Service at Quebec (O. Caron). Traces of club root were recorded at Upper Margaree, Inverness Co., at Huntington, Cape Breton Co., and on Tancook Island, Lunenburg Co., N. S. (P. M. Grainger). One case of severe damage to winter cabbage was reported in Queens Co., P. E. I.; a trace was found in another planting (R. R. Hurst). Club root is a serious disease in small garden plots in many areas along the coast in Nfld. Heavy losses were noted in 25 home gardens (G. C. Morgan). According to the head gardener of the International Grenfell Association it was long a problem at St. Anthony, but it has been quite well controlled recently by a 3-year rotation (D. B. O. Savile).

WIRE STEM (Rhizoctonia solani). On account of adverse weather, wire stem was very severe on cabbage and cauliflower seedlings in beds in the Montreal district, Que. Arasan-treated beds were free of disease, whereas many untreated beds had to be discarded (E. Lavallee).

BLACK ROT or BACTERIAL WILT (Xanthomonas campestris). The causal organism was isolated from diseased cabbages from Strathroy, Ont. (E. H. Garrard).

CARROT

LEAF SPOT (Cercospora carotae). Carrot fields were uniformly defoliated in Kings and Annapolis Counties, N. S., causing 75% defoliation and average loss of 15% of the crop. In many fields the crop had made considerable growth before defoliation occurred. In a few late sown fields, the crop was so poor that only part of the crop was harvested. (K. A. Harrison). This (DAOM 27327) appears to be the first record of its occurrence in N. S. (I. L. Conners, J. A. Parmelee).

SOFT ROT (Erwinia carotovora). Four tons of roots from one grower began to break down badly after delivery to the wholesale merchant at Sydney, N. S. ; over 25% were affected on 24 Sept. (D. W. Creelman).

VIOLET ROOT ROT (Rhizoctonia crocorum). Caused mod. damage in harvested carrots from a garden at Outlook, Sask. Its occurrence in this same garden was noted in 1949 (P. D. S. 29:42) (R. J. Ledingham).

BLACK ROT (Stemphylium radicinum) infected 5-20% of the stecklings set out for seed production and caused the death of plants in some fields in the B. C. Interior (G. E. Woolliams).

BACTERIAL BLIGHT (Xanthomonas carotae) affected 5-10% of the plants in several seed-producing fields in the Grand Forks area, B. C. (G. E. Woolliams).

YELLOWS (Callistephus virus 1). A tr. was present on several varieties in the Horticulture plots, Ottawa, Ont. (K. M. Graham). The disease was common in Albert, Queens, Westmorland, Charlotte, Victoria and Madawaska Counties, N. B. ; infection was tr. -31%. In one home garden in York Co. , 81% of the carrots were affected. Affected plants were often severely damaged (D. J. MacLeod). Yellows was less in evidence in Kings and Annapolis Counties, N. S. , than usual. Possibly defoliation by the Cercospora leaf spot may have been a factor (K. A. Harrison). Yellows was observed in several gardens in Queens Co. , P. E. I. ; in one, all the plants were affected and severely damaged (R. R. Hurst). About 5% of the plants were affected in 5 fields in Conception Bay and 3 in Trinity Bay, Nfld. (G. C. Morgan).

CAULIFLOWER

SOFT ROT (Erwinia carotovora). A single sev. - affected plant was received from Queens Co. , P. E. I. (R. R. Hurst).

YELLOWS (Fusarium oxysporum f. conglutinans) sev. injured 5-10% of the plants in a planting in Hull, Que. (K. M. Graham). See also under Cabbage.

CLUB ROOT (Plasmodiophora brassicae) caused sl. damage to 2% of the plants in a garden in Queens Co. , P. E. I. (R. R. Hurst). The disease slightly infected six small plantings in the Conception Bay and Trinity Bay areas, Nfld. (G. C. Morgan).

BACTERIAL SPOT (Pseudomonas maculicola). Affected specimens were received from Montreal, Que. , 25 Sept. (H. N. Racicot).

WIRE STEM (Rhizoctonia solani). A tr. was observed in flats of transplants in a few greenhouses in the Leamington area, Ont. (C. D. McKeen). A severe outbreak occurred in part of a seed bed, about 15% of the plants dying at Glenmont, N. S. (K. A. Harrison). The disease affected 50% of the transplants in the same greenhouse in St. John's, Nfld. , where last year it caused a 25% loss (G. C. Morgan).

BROWNING (boron deficiency) caused severe damage to the odd head in a market garden in Queens Co., P. E. I. (R. R. Hurst).

CELERY

BROWN SPOT (Cephalosporium apii) of celery was found by W. B. Fox in a field of the green variety Salt Lake near Burlington, Ont. It was first noticed as the celery was being lifted for storage in early November. Damage was largely confined to an area 30 ft. in diameter. Specimens were sent to Ottawa, Toronto and Guelph. Isolations were made and the organism independently identified as C. apii Smith & Ramsay (Bot. Gaz. 112(4):393-400. 1951). Since these authors (Phytopathology 38(1):23. 1948) first observed the disease in green pascal celery from Colorado in 1943, brown spot has been reported in New York State by R. Segall (U. S. D. A. Pl. Dis. Reporter 35(3):164. 1951), who found it there in 1949 but not in 1950 (K. M. Graham, B. H. MacNeill). It should be noted isolations received from Dr. D. L. Bailey produced chlamydospores in culture as described by the authors, but the Ottawa isolations failed to do so. The disease has not been recognised elsewhere, but J. K. Richardson reported a mod. infection of early blight (Cercospora apii) and a tr. of late blight (Septoria apii) in one planting of Salt Lake in Lincoln Co. this year. Moreover, the same author recorded in 1944 "A moderate infection of early blight developed late in the season in the Laboratory plots, St. Catharines, but late blight was not observed", (P. D. S. 24:44) and when the original record was checked it was found that the variety was given as "Salt Lake". It may be only concidence that Salt Lake was the variety upon which the early blight was reported, but because brown spot may be easily confused with the former disease, infected material, particularly of the green pascal varieties, should be examined under the dissecting microscope when it reaches the laboratory or after holding over night in a moist chamber. The Cephalosporium heads are quite distinct from the tufts of conidiophores and conidia of Cercospora (I. L. Conners).

EARLY BLIGHT (Cercospora apii) was prevalent on 3 neighbouring farms on muck soil at Ste. Dorothee, Laval Co. Que. Dusting with fixed coppers kept the disease under fairly good control (E. Lavallee).

SOFT ROT (Erwinia aroideae). Plants received from the Thedford district, Ont., showed pronounced rot in the roots. Infection was reported to have been quite severe. Although it was not proved that the rot was entirely due to bacteria, the type of rot was typical and repeated tests resulted in the isolation of E. aroideae (E. H. Garrard).

SOFT ROT (Erwinia carotovora) affected the fleshy tap root and crown of scattered plants, possibly following insect injury, in a field at Kelowna, B. C. (G. E. Woolliams).

LATE BLIGHT (Septoria apii-graveolentis). Owing to a very dry growing season, late blight was not observed in fields where it has been present in previous years in the Kelowna district, B. C. (G. E. Woolliams). A very severe infection was seen in a commercial planting at Edmonton, Alta. (L. E. Tyner). Late blight was quite

general in Lincoln Co., Ont., but it was only a problem where the applications of fungicide were inadequate (J. K. Richardson). It caused a heavy infection in one small field at Leamington (C. D. McKeen). Late blight was present in most celery beds and in all fields visited in Laval Co., Que. The level of infection and the amount of damage was greater than usual (E. Lavallee).

YELLOWS (Callistephus virus 1, Western strain). A tr. was found in 2 fields in Sunbury Co. and in a garden in York Co., N. B. (D. J. MacLeod).

FROST DAMAGE. A sharp frost in early October destroyed several thousand unharvested crates of late celery in the Kelowna area, B. C. (G. E. Woolliams.)

CHINESE CABBAGE

CLUB ROOT (Plasmodiophora brassicae). "My oriental cabbage all died this summer" wrote M. Yoshida, Cap St. Martin, Que. Specimens revealed that the cause was club root (H. N. Racicot).

CUCUMBER

LEAF SPOT (Alternaria sp.). Infection was heavy in a garden, at Waterville, N. S., where cucumbers had been grown for several years; the disease was not evident in nearby fields under regular rotation (D. W. Creelman).

FRUIT ROT (Alternaria sp.). A few fruits were severely affected and covered with a sporulating growth of Alternaria (K. M. Graham).

GREY MOULD (Botrytis cinerea). As in former years, grey mould appeared in several greenhouses in Essex Co., Ont., from March to May. Although blossoms and fruits are attacked, the stem rot phase is the serious one; losses in 1951 ranged up to 8% of the crop. Growers, who spray periodically with ferbam have prevented the disease becoming established in their greenhouses (C. D. McKeen).

SCAB (Cladosporium cucumerinum) was present as usual in both greenhouses and field crops in Essex Co., Ont., but the damage caused was negligible (C. D. McKeen). In the Montreal district, Que., scab was unusually severe. On account of the epidemic most fields contained no sound fruit by the end of August (E. Lavallee). The crop was a total loss in two gardens at Ste. Anne de la Pocatiere in July (R. O. Lachance). Scab was very prevalent this season in the Maugerville and Grand Lake areas, N. B. In some plantings 50% of the fruit were unsaleable (J. L. Howatt). Grading stations found that scab was severe in a few fields of pickling cucumber in Kings Co., N. S., by mid-September. This is the first outbreak in the newly-developed cucumber area and if the disease were to start earlier in the season it would be very serious (K. A. Harrison). Scab became very destructive in fields of Chicago Pickle across P. E. I. by 10 Sept. Because of the susceptibility of this variety to scab it is proposed to discontinue its growing commercially and to replace it in 1952 by Maine No. 2, which has so far proven immune to the disease (R. R. Hurst).

ANTHRACNOSE (Colletotrichum lagenarium) and COTTONY LEAK (Pythium aphanidermatum) were each affecting about 25% of a carload of cucumbers from Arkansas when examined in Montreal on 11 July (J. E. Jacques).

BACTERIAL WILT (Erwinia tracheiphila) appeared to be more prevalent than usual. Specimens received from Strathroy, Ospringe, Guelph, Hamilton and Oakville, and from St. Isadore, Que. were found affected by the disease. The causal organism was also isolated from a melon plant received from Highland Creek, Ont., (E. H. Garrard). Some 3-4% of the plants were destroyed in several early cucumber fields in Essex Co. (C. D. McKeen).

POWDERY MILDEW (Erysiphe cichoracearum). A sl. infection was observed on a few stems of Niagara and Sure Crops in the University plots, Vancouver, B. C. (H. N. W. Toms). Powdery Mildew was less severe in greenhouse crops in Essex Co., Ont., than in some recent years. It appeared near the end of the harvesting period in many fields crops at Harrow (C. D. McKeen). The disease was general and caused a marked reduction in yield in a several acre planting of pickling cucumbers in Norfolk Co. (G. C. Chamberlain).

FOOT ROT (prob. Fusarium, Pythium, etc.) was encountered in many greenhouse crops where the soil had not been steamed for one or more seasons. Losses about Leamington, Ont., varied from a tr. to 4% (C. D. McKeen).

WILT (Mycosphaerella citrulina). Only a tr. was seen in one greenhouse crop in Essex Co., in 1951 (C. D. McKeen).

ANGULAR LEAF SPOT (Pseudomonas lachrymans). A sl. leaf infection was observed in 3 commercial plantings at Medicine Hat, Alta.; the fruit was unaffected (M. W. Cormack). A sev. infection was observed at St. Eustache, Man. (W. A. F. Hagborg). The disease caused extensive foliage damage in a 2-acre field crop at Harrow, Ont. (C. D. McKeen).

WILT (Pythium spp., Fusarium spp.) caused severe damage in many gardens in Sask. in late August following a prolonged period of cool wet weather. At the Station, Scott, cucumbers, muskmelons and watermelons were virtually wiped out in August and the Stations at Melfort and Swift Current reported severe damage (R. J. Ledingham).

STEM ROT (Sclerotinia sclerotiorum) became prevalent in one greenhouse at Leamington, Ont. The fungus was found fruiting abundantly on sucker growth that had been broken off and left lying on the soil. A few stems were attacked at the nodes near the ground line. As soon as the disease was observed, the crop was sprayed twice with ferbam; the disease was arrested and only 10 plants were destroyed (C. D. McKeen).

WILT (Verticillium albo-atrum) was affecting about 10% of the plants of Marketer and Cubit in a field at Kamloops, B. C. on 31 July (G. E. Woolliams).

MOSAIC (virus). No crops were affected by mosaic in the Leamington area, Ont., in 1951. The growing of highly resistant varieties in recent years has relegated this disease to one of little importance in either greenhouse or field crops in Essex Co. (C. D. McKeen). A trace was observed in planting in Sunbury Co., N. B. (D. J. MacLeod). Infection was heavy in a field of Chicago Pickle and other varieties in Queens Co., P. E. I. (R. R. Hurst).

EGGPLANT

WILT (Verticillium albo-atrum) was observed in a plot of eggplant at Summerland, B. C.; the pathogen was isolated (G. E. Woolliams). The odd plant was severely affected in the Horticulture plots, Ottawa, Ont. It also caused sev. damage in 5-10% of the plants in a planting in Hull, Que. (K. M. Graham).

LEAF YELLOWING and WILT (?virus). Both in 1950 and 1951 several small plots of eggplant near Harrow, Ont., have shown a yellowing and wilting of the leaves and a stunting of the plant. These plants lack the symptoms of Verticillium wilt and preliminary investigations have indicated that trouble is caused by a virus (C. D. McKeen).

GARLIC

WHITE ROT (Sclerotium cepivorum Berk.) was found causing considerable damage in patches in a small planting (100 ft. x 75 ft.) at Steveston, B. C. The garden area was situated between the crowded habitations of the Chinese fishing settlement and probably has been cultivated for 40 years. The fungus was isolated and its identity confirmed in Ottawa. As this appears to be the first record of the occurrence of the disease in Canada, the owner agreed to destroy all plants not needed for his own use and to refrain from growing a susceptible crop on this ground for several years (I. C. MacSwan, W. Jones). Because of the similarity of the climate on the coast of B. C. to that in many parts of Europe it is possible that white rot could become of some importance in B. C. The disease is known in the United States, but after careful investigation it was considered to be of minor importance (I. L. C.).

GINSENG

DISAPPEARING ROT (Cylindrocarpon spp.). A grower at Middle Church, Man. lost his entire crop of 20,000 plants from the disease, which was identified by Dr. A. A. Hildebrand (B. Peturson, W. L. Gordon).

HOPS

ROOT ROT (cause uncertain) moderately infected hops growing at the Sub-Station, Fournier, Ont., causing severe damage to the individual plants. A species of Cydindrocarpon was isolated (K. M. Graham).

HORSERADISH

WHITE RUST (Cystopus candidus) was very prevalent on a planting of horseradish at St. Catharines, Ont. on 7 Aug.; leaves were distorted and the growth unthrifty (G. C. Chamberlain).

LETTUCE

MARGINAL LEAF SPOT (Pseudomonas marginalis). Infection was severe at Brandon, Man. on 27 July (W. A. F. Hagborg). A typical sample of bacterial rot of lettuce was submitted from Bloomfield, Ont. (E. H. Garrard).

DROP (Sclerotinia sclerotiorum) caused mod. damage at the Station, Melfort, Sask. (H. W. M.). Numerous fields were affected in the Montreal district, Que. As the average infection was about 30%, damage was heavy. The weather was cool and wet (E. Lavallee). The disease caused a 1% loss in a planting at Ste. Anne de la Pocatiere (R. O. Lachance). Probably the same disease caused a 10-20% loss in several varieties in the University plots, Vancouver, B. C. (H. N. W. Toms).

MOSAIC (virus) mod. infected a few plants in a planting of Great Lakes in Carleton Co., Ont. (K. M. Graham).

YELLOWS (Callistephus virus 1) was common in gardens in York and Sunbury Counties, N. B.; infection was tr.-7% (D. J. MacLeod).

MELON

LEAF SPOT (Alternaria cucumerina). A mod. infection was observed in several fields in the Leamington area, Ont., towards the close of the harvesting period (C. D. McKeen).

SCAB (Cladosporium cucumerinum). A 2-acre field of early melons in Essex Co., Ont. were almost a total loss on account of a severe outbreak of scab. Large blemishes appeared on the developing fruits as well as long lesions on the stems, killing the terminal growth (C. D. McKeen).

ANTHRACNOSE (Colletotrichum lagenarium) developed on several varieties in a plot at the Laboratory, Harrow, Ont., causing lesions on the stem, leaves and fruits; the disease completely destroyed the crop in a 8-acre field near London (C. D. McKeen).

WILT (Fusarium bulbigenum var. niveum). In many fields in the Harrow-Leamington area the soil of which is known to be infested by the pathogen, heavy losses were suffered when wilt-susceptible varieties were planted. The variety Iroquois still shows complete resistance to wilt in this area, although it has been reported susceptible elsewhere in Ont. (C. D. McKeen). In an acre field in Lincoln Co., Ont., about 10% of the plants were affected when examined in July and the disease appeared to be still increasing (J. K. Richardson).

WILT (Verticillium albo-atrum) affected 10-25% in plantings of Hales Best cantaloupe in the Kelowna and Osoyoos areas, B. C. ; the pathogen was isolated from plants growing in both areas (G. E. Woolliams).

MOSAIC (virus). Virtually all the melon fields at Leamington, Ont. , showed a high incidence of mosaic. Large populations of the cotton aphid, Aphis gossypii, were found in these fields and were presumably responsible for the spread of the cucumber mosaic virus (C. D. McKeen).

BREAKDOWN (cause unknown) is a serious problem in commercial cantaloupe growing in the Osoyoos district, B. C. A few fields were free of the trouble, but in most fields it caused serious loss and in a few 75% or more of the fruit were unsaleable (G. E. Woolliams).

ONION

NECK ROT (Botrytis allii) was present on bulbs of Yellow Globe Danvers, Ebenezer, etc. , in common storage in March throughout the B. C. Interior. Losses varied with the area and storage house, ranging from 2-25% (G. E. Woolliams). A sl. infection was observed in a commercial field at Medicine Hat, Alta. ; several reports were received of damage to stored bulbs (M. W. Cormack). The pathogen was the only organism isolated from specimens from Churchill, Man. , brought in by Dorothy K. Brown, Botanist, National Defence Board, who stated that onions grown from sets became decayed, whereas those grown from seed, at Churchill, were sound (H. N. Racicot). As usual, neck rot caused damage to stored bulbs in s. w. Ont. , but no extensive losses were reported (C. D. McKeen). About 3% of the onions in a carload of the 1951 crop grown on the Holland Marsh were found affected when inspected in Montreal on March 3 (H. N. Racicot). Neck rot was severe in red onions in storage warehouses in Que. in January 1951. The onions appeared not to have been ripe when harvested and were improperly cured. Complaints have already been received concerning the 1951 crop (O. Caron).

DOWNY MILDEW (Peronospora destructor) caused a 5% systemic infection in a seed crop of White Portugal at the Station, Saanichton, B. C. Affected plants were dwarfed and a paler colour than healthy plants on 16 May. The disease was general in the 1950 crop that produced the sets (W. Jones). Owing to a dry growing season downy mildew, usually quite heavy on the seed crop in recent years was only a trace in the B. C. Interior in 1951. In one field of Silverskin at Kelowna infection covered a 15-20 foot circle in a 1/2 acre field before dry weather halted its spread (G. E. Woolliams). The disease was severe in a field containing several varieties near Ottawa, Ont. on 1 Aug. (K. M. Graham). Most onion fields in the Montreal area, Que. , were affected by 1 Aug. Infection was almost 100% and loss was estimated at 30% of the crop. The epidemic was heaviest for many years (E. Lavallee).

PINK ROT (Pyrenochaeta terrestris) was prevalent on onions in many fields located on muck soils at Leamington, Ont. The disease has been found to affect the same areas in the fields year after year (C. D. McKeen).

SMUT (Urocystis cepulae) was confined to a small part of a commercial field of Yellow Globe Danvers at Kelowna, B. C. According to the grower a small amount of onion smut was present in the same field 10-12 years ago. He also claims that the soil in the affected part is alkaline and the onion plants are not quite so thrifty as in the rest of the field (G. E. Woolliams). A very light infection developed on onion seedlings grown from Dutch sets in Bosanquit Twp., Lambton Co., Ont. The soil was treated with formalin, as the seed was sown, but control was not complete. (C. B. Kelly). Smut was severe in several fields in s. w. Que., especially around Ste. Clothilde, Chateauguay Co. Also in one field at St. Cesaire, Rouville Co., every plant was affected (L. Cinq-Mars).

YELLOWS (Callistephus virus 1) was found affecting an occasional plant in several fields planted for seed in the Grand Forks area, B. C. (G. E. Woolliams).

STORAGE BREAKDOWN. An estimated 23% of the bulbs in a carlot of onions grown in the Holland Marsh, Ont., showed a physiological breakdown when examined on 6 March in Montreal. Some of the scales were brown but free from micro-organisms. The onions were rather soft and spongy as if they had been grown very rapidly and were immature when harvested. A small amount of neck rot (q. v.) was also present (H. N. Racicot).

PARSNIP

SCAB (Streptomyces scabies) heavily infected a planting of parsnips in Queens Co., P. E. I. (R. R. Hurst).

YELLOWS (Callistephus virus 1) infected a tr. and 0. 5% of the plants in 2 gardens in York Co., N. B. (D. J. MacLeod).

PEA

LEAF and POD SPOT (Ascochyta pisi). Sl. -mod. infections were observed at Brooks, Lethbridge, and Medicine Hat, Alta. (M. W. Cormack). Infection was sl. -sev. in the plots at Edmonton (S. G. Fushtey). Traces were recorded on some varieties and strains in the plots at Charlottetown, P. E. I. (J. E. Campbell).

POWDERY MILDEW (Erysiphe polygoni). A sl. infection was recorded on Alderman in the Univ. plots, Vancouver, B. C. (H. N. W. Toms). Infection was sl. in fields and plots at Lethbridge (M. W. Cormack), and tr. -sl. at Edmonton (S. G. Fushtey). Infection was sev. on most varieties in Sept. in the plots at Charlottetown, P. E. I. (J. E. Campbell).

ROOT ROT (Fusarium spp.) destroyed all the plants in low spots in a field of Chancellor at Ste. Anne de la Pocatiere, Que. (R. O. Lachance). The disease was very common at Kentville in gardens where peas have been grown previously. In one garden patch 20% of the plants died (K. A. Harrison).

MYCOSPHAERELLA BLIGHT (M. pinodes). A survey of field peas in the Portage la Prairie, Poplar Point, and St. Eustache districts in Man. on 9-10 August revealed blight in all 17 fields examined (7 Arthur and 10 Dashaway). Infection varied from a trace to 8% of the leaf surface. Early fields probably escaped damage, but late fields would have suffered considerable reduction in yield. Ascochyta pinodes was isolated from 11 out of 13 collections of lesioned leaves (W. A. F. Hagborg).

BACTERIAL BLIGHT (Pseudomanas pisi). Infection was a tr. at Meadows and Morris, Man., and sev. in patches at Portage la Prairie and St. Eustache (W. A. F. Hagborg).

DOWNY MILDEW (Peronospora pisi) was found on the basal leaves of an occasional plant in a 5-acre field of Gradah peas being grown for seed at Mara, B. C. (G. E. Woolliams). A mod. infection was observed in a field at Taber, Alta., in July (F. R. Harper).

ROOT ROT (Rhizoctonia solani and other fungi). Infection was tr. -mod. in 5 fields in the Coaldale-Taber area, Alta. (F. R. Harper).

RUST (Uromyces fabae). All plants were infected in a small patch in a late sowing at Kentville, N. S. (K. A. H.) Tr. observed on American Wonder in a planting in Queens Co., P. E. I. (R. R. Hurst).

MOSAIC (virus) affected 15-20% of the plants in a home garden at South Burnaby, B. C.; a single plant was seen in the test plots at the University, Vancouver, (H. N. W. Toms). Mosaic (Pisum virus 1) infection was tr. -6% in gardens and fields in York and Sunbury Counties, N. B. (D. J. MacLeod).

ROOT ROT (various fungi). Fields of canning peas were quite severely affected in St. Jean, Napierville, and Chateauguay Counties, Que. Many fields were a total loss. The spring was cool and rains heavy (E. Lavallee).

PEPPER

GREY MOULD (Botrytis cinerea). A general infection appeared in plots of seedlings in one greenhouse at Harrow, Ont. The tips of the cotyledons were attacked and the fungus fruited abundantly thereon. Only a few seedlings were killed. The disease was arrested by applying a ferbam spray (C. D. McKeen).

SOFT ROT (Erwinia carotovora). Several bushels of peppers from a farm at Harrow, Ont., were reported to be showing considerable soft rot when the peppers arrived on the Toronto market. Corn-borer larvae had burrowed in the fruits about the peduncle; insect damage was unnoticed when the peppers were shipped. Soft rot develops in such wounds and under certain conditions rapidly destroys the fruit (C. D. McKeen).

DAMPING-OFF (Pythium spp. and Rhizoctonia solani). Traces were observed in a few greenhouses at Harrow, Ont.; losses did not exceed 5% in any greenhouse. A fungus identified as Aphanomyces cladogamus Drechsler (Jour. Agr. Res. 38:335. 1929), was isolated from some 5% of the damped-off seedlings in one greenhouse. Experiments revealed that it was capable of causing the death of the seedling before or after its emergence. A paper describing the fungus and its pathogenicity is being prepared (C. D. McKeen).

LATE DAMPING-OFF (Rhizoctonia solani) developed in small spots in a few beds at Harrow, Ont. The use of Arasan as a soil fungicide has markedly reduced the losses caused by R. solani in recent years (C. D. McKeen).

VERTICILLIUM WILT (V. albo-atrum). Infection was often heavy on peppers in the Okanagan Valley, B. C. in 1951. The pathogen was isolated from affected plants from several places including Summerland, Kelowna, and Vernon. The pathogen was also isolated from the weeds Chenopodium album, Solanum sarachoides and Xanthium canadense on a farm at Vernon (G. E. Woolliams). See also under tomato.

BACTERIAL SPOT (Xanthomonas vesicatoria) was found in about 25% of the fields in the Harrow area, Ont. It caused defoliation and stunting of plants early in the season, but the plants outgrew the disease and produced a heavy crop with few fruits bearing spots later in the season (C. D. McKeen).

STREAK (Solanum virus 1, S strain). Two plants showing a severe streak were found in a field in Sunbury Co., N. B. (D. J. MacLeod).

The virus diseases, TOBACCO ETCH, CUCUMBER MOSAIC and TOBACCO MOSAIC were again epidemic in the pepper growing area about Harrow, Ont. All three virus diseases were identified. The green peach aphid, Myzus persicae, was the chief vector causing the spread of tobacco etch and cucumber mosaic. Losses varied from 5% to 70% in the affected fields (C. D. McKeen). A 10% infection was observed in a 1/4 acre planting of Hamilton Market in Lincoln Co. (J. K. Richardson).

BLOSSOM-END ROT (non-parasitic). Specimens showing blossom-end rot were received from a Chinese market garden, Steveston, Lulu Island, B. C., in 1950 (cf. P. D. S. 30:63). Isolations were made from the affected tissue. Stemphylium consortiale (Thüm.) Groves & Skolko, apparently a weak parasite, was isolated from within the fruit (H. N. W. Toms, J. W. Groves). The disorder appeared in August in all pepper fields observed in Essex Co., Ont.; losses were light (C. D. McKeen).

POTATO

The Division of Plant Protection, Science Service, has again supplied the data in Tables 4-7 on Seed Potato Certification. All fields entered for certification were planted with Foundation or Foundation A seed.

Table 4. Seed Potato Certification:
Fields and Acres Inspected and Passed in 1951

	Number of Fields		Fields Passed %	Number of Acres		Acres Passed %
	Entered	Passed		Entered	Passed	
P. E. I.	5,871	5,209	88.7	21,771.5	19,502.0	89.6
N. S.	387	352	91.0	659.5	596.2	90.4
N. B.	3,074	2,888	93.9	15,542.8	14,159.7	91.1
Que.	1,035	617	59.6	2,738.6	1,488.6	54.4
Ont.	677	578	85.4	2,105.5	1,786.9	84.9
Man.	128	111	86.7	572.0	462.0	80.9
Sask.	53	47	88.7	93.7	76.4	81.5
Alta.	212	183	86.3	924.5	731.7	79.1
B. C.	656	595	90.7	1,767.9	1,598.8	90.4
Total	12,093	10,580	87.5	46,176.0	40,402.3	87.5
Previous Yearly Totals						
1950	16,203	13,292	82.0	75,352	61,933	82.2
1949	15,476	13,739	88.8	72,706	65,051	89.5
1948	15,635	12,504	80.0	70,561	57,392	81.3
1947	14,616	12,605	86.2	60,385	53,474	88.6

Acres Entered		Acres Passed	
1951	46,176	1951	40,402
1950	75,352	1950	61,933
Decrease of 29,176 or 39%		Decrease of 21,531 or 35%	

In 1945, the last year of World War II, there was a very large increase in the acreage entered for Seed Potato Certification. Comparison of figures given in Table 5 with those given in 1947 (P. D. S. 27:57) show that these levels have been increasing or at least maintained until the present year, when the acreage fell somewhat below that planted in 1945. This curtailment was a direct result of the poor potato prices the previous year. The percentage of fields rejected on account of disease is much higher in Que. than elsewhere, being 40%, whereas the average for the rest of Canada was 10%. In that province ring rot alone caused the rejection of 22% of the fields on account of ring rot in the field or on the farm.

Table 5. Seed Potato Certification
Acreage Passed by Varieties

Variety	P. E. I.	N. S.	N. B.	Que.	Ont.	Man.-Alta.	B. C.	Total
Katahdin	2135. 5	140. 6	9392. 0	52. 3	1208. 5	26. 0	11. 3	12966. 2
Sebago	9260. 3	50. 6	317. 0		46. 1	1. 1	6. 0	9681. 1
Irish Cobbler	4550. 0	73. 7	807. 0	66. 6	123. 9	64. 5		5685. 7
Green Mountain	2644. 0	87. 1	1263. 0	1344. 2	31. 9	20. 0	83. 6	5473. 8
Netted Gem	61. 0	23. 8	85. 0	1. 0	1. 2	723. 3	1068. 1	1963. 4
Bliss Triumph	82. 0	133. 8	1252. 0			43. 4		1511. 2
Pontiac	475. 0	2. 3	659. 0			88. 0	2. 2	1226. 5
Warba	52. 3	10. 5	11. 0	1. 2	11. 0	139. 4	145. 5	370. 9
Chippewa	38. 5	25. 0	75. 0		226. 2	0. 2	4. 2	369. 1
Canso	92. 5	18. 5	79. 0	14. 0	49. 0	18. 0	13. 0	284. 0
White Rose			95. 0					117. 8
Rural Russet			90. 5		54. 5			145. 0
Keswick	41. 7	3. 3	27. 7	9. 3	5. 2	5. 0	6. 7	98. 9
Early Epicure	1. 5						84. 3	85. 8
Others*	67. 7	27. 0	6. 5		29. 4	141. 2	56. 1	327. 9
Total	19502. 0	596. 2	14159. 7	1488. 6	1786. 9	1270. 1	1598. 8	40402. 3

* These varieties with the acreage of each were: Early Ohio 62. 7, Sequoia 57. 5, Columbia Russet 49. 2, Canus 43. 3, Kennebec 21. 7, Early Rose 21. 1, Rural New Yorker (Dooley) 13. 1, McIntyre 10. 9, Garnet Chili 8. 8, Great Scot 8. 3, Mohawk 7. 8, Pawnee 5. 7, Gold Coin 5. 6, Burbank 4. 8, Carter's Early Favorite 4. 4, Sir Walter Raleigh 1. 0, Arran Victory 0. 9, Up-to-Date 0. 5, Wee McGregor 0. 5, and Clarks #3 0. 1.

EARLY BLIGHT (Alternaria solani) was observed in only 10. 7% of the 565 fields inspected in B. C. For a second year infection was low, never being more than mod. in individual fields (H. S. MacLeod). The disease became general in central and n. Alta. infection being sl. -mod. at Edmonton and Lacombe; it was observed as far south as Calgary in August. As it is unnecessary to spray for late blight or Colorado beetle in n. Alta., no spraying is done. In the last few years the area affected by early blight has increased as well as the severity of infection; it may be necessary to spray (J. W. Marritt, T. R. Davidson). Early blight was rather sev. in Sask. in 1951 and undoubtedly was responsible for some reduction in yield of potatoes (R. J. Ledingham). Sev. defoliation of some early varieties occurred by late August at Saskatoon, Prince Albert, and Norquay (A. Charlebois). Infection was sl. -mod. on early varieties about Winnipeg and Brandon in August and mod. -sev. in many areas in Man. in early September if the crop had not been adequately protected by fungicides (D. J. Petty).

Table 6. Seed Potato Certification: Fields Rejected on Field Inspection, 1951

Province	Leaf Roll	Mosaic	Ring Rot in field	Ring Rot on farm	Black Leg	Wilts	Adjacent Diseased Fields	Foreign Var.	Misc.	Total
P. E. I.	36	200	-	-	131	31	32	80	152	662
N. S.	2	11	-	-	4	-	2	9	7	35
N. B.	27	60	42	7	11	-	10	24	5	186
Que.	6	80	162	65	52	-	19	14	20	418
Ont.	15	17	17	9	9	6	4	8	14	99
Man.	4		3	2	1	1	-	-	6	17
Sask.	-	1	-	-	3	1	-	-	1	6
Alta.	3	-	-	-	21	2	1	-	2	29
B. C.	6	-	-	-	2	-	5	4	44	61
Total	99	369	224	83	234	41	73	139	251	1,513
Rejections as a percentage of fields:										
Entered	0.8	3.1	1.8	0.7	1.9	0.3	0.6	1.2	2.1	12.5
Rejected	6.5	24.4	14.8	5.5	15.5	2.7	4.8	9.2	16.6	100

Table 7. Seed Potato Certification: Average Percentages of Diseases found in Fields, 1951

Average percentage of disease found in	P. E. I.	N. S.	N. B.	Que.	Ont.	Man.	Sask.	Alta.	B. C.
	%	%	%	%	%	%	%	%	%
Fields entered: (first inspection)									
Black Leg	.33	.06	.09	.25	.04	.07	.13	.44	.06
Leaf Roll	.11	.04	.08	.03	.04	.02	.11	.06	.04
Mosaic	.21	.09	.16	.21	.07	.01	.14	.01	.01
Fields passed (final inspection)									
Black Leg	.15	.04	.08	.09	.03	.02	.01	.08	.03
Leaf Roll	.04	.04	.06	.03	.04	.00	.06	.02	.01
Mosaic	.04	.07	.11	.04	.06	.01	.03	.00	.00

Early blight infection was generally light throughout s. w. Ont. (F. J. Hudson, W. L. S. Kemp). About Harrow, the disease occurred in 1951, as in recent years, in only tr. amounts in most fields (C. D. McKeen). In district 3, early blight was generally less prevalent than in 1950. Even Keswick and Canso, which were severely affected in that year, were only lightly infected in 1951. Early blight was fairly prevalent in central and e. Ont. and w. Que. Keswick seems quite susceptible to early blight and insect injury. Because of its minor nature, it is unlikely any growers spray or dust to control it specifically (E. H. Peters). Early blight was found in 27. 6% of 1035 fields inspected in Que. ; infection was usually sl. -mod. except in 3 fields, one being Canso, where the disease was sev. Late infection was noted in the lower St. Lawrence and Lake St. John districts (B. Baribeau). Early blight was observed in all parts of N. B. , but infection was usually only sl. except in a few Canso fields, which were sev. infected. Tuber rot was rarely observed during the winter season and the loss negligible (C. H. Godwin). Early blight was sev. in N. B. in some fields of Keswick and Canso, which were not sprayed (J. L. Howatt.) Mod. infection was noted in N. S. in most fields of early varieties by mid-August, the first report being on 24 July in the Scotts Bay area of Kings Co. The disease probably never developed fully because late blight became epidemic early in the season (R. C. Layton). Early blight again caused only the lightest of infections in P. E. I. (H. L. McLaren). A light infection was fairly widespread on potatoes in Nfld. (G. C. Morgan).

GREY MOULD (Botrytis cinerea). A sl. infection was observed at Ste. Anne de la Pocatiere, Que. The lesions can easily be mistaken for those of early blight (A. Payette). About 25% of the plants were severely affected in a small area of a field in Queens Co. , P. E. I. (R. R. Hurst).

BLACK DOT (Colletotrichum atramentarium) was observed in a garden at Edmonton, Alta. (A. W. Henry).

BACTERIAL RING ROT (Corynebacterium sepedonicum) was found in April 1951 for the first time in a crop grown for certification from seed produced in B. C. Tuber inspection also revealed the disease in two other crops, but they had been planted with seed produced elsewhere in Canada. No ring rot was found during field inspection of the 1951 crop. However, 7 cases of the disease have been reported in B. C. in table stock potatoes at widely separated points, 5 being in fields of commercial growers. The 10 farms on which affected crops were grown in 1950 and the 4 farms to which the disease may have been spread were inspected at harvest and all were found free of ring rot. A similar inspection of the Pemberton Seed Control area also revealed no ring rot (H. S. MacLeod, W. R. Foster). Four carlots of commercial potatoes imported into B. C. were found affected: 1 each from U. S. A. and Ont. and 2 from Alta. (W. Jones).

Although the crop was slow maturing in Alta. in 1951, the symptoms of bacterial ring rot were advanced and well defined in all fields where the disease was found. Of the 7473 acres of potatoes on 771 farms inspected in the pest control areas of Edmonton, Calgary, Brooks and Lethbridge ring rot affected 474 acres on 59 farms. Thus, ring-rot incidence was reduced considerably as the percentage of inspected farms upon which ring rot was found decreased from 10. 5% in 1950 to

7.7% in 1951. Moreover, the survey has not only reduced the incidence of ring rot in Alta., but it has also contributed considerably to an improvement in the quality of potatoes being grown in the province (W. Lobay). No ring rot was found in fields entered for certification in Alta. (J. W. Marritt).

Ring rot was not found in seed potato fields in Sask. but sl.-mod. infections were seen in table potatoes grown at Lumsden. It was also severe in a field of Irish Cobbler for table use in the Pike Lake district (A. Charlebois). Fewer specimens of ring-rot infected tubers than usual were received this fall at Saskatoon (R. J. Ledingham). A trace of ring rot was found in 3 fields in Man. and 2 other fields were also rejected because of the disease in the same stock (D. J. Petty).

Ring rot was found in 3 fields in the London district, Ont., and because of its presence in them, 6 additional fields were refused certification (F. J. Hudson). No ring rot was found in district 2 (W. L. S. Kemp). In all 16 fields (40.6 acres), chiefly of Katahdin, were rejected for ring rot in district 3. Infection in most fields was very low except in one of Green Mountain at North Bay. The explanation for its high incidence appears to be that the organism may have been carried from other fields in the area by pickers who used their own equipment to harvest the 1950 crop. To combat the disease all growers were advised by circular before harvest and planting of the importance of disinfecting all machinery and storage space. The staff supervised the disinfection of 36 farm storage spaces and advised on disinfection of harvesting equipment (H. W. Whiteside). One small field of Canso was rejected for ring rot in e. Ont. (O. W. Lachaine). No information is available on the number of fields inspected during the annual survey in Ont. in 1951. Of the 154 samples submitted 125 were found to be positive and it would appear that ring rot was less prevalent than in 1950. However, of the 125 farms found to be infected in 1951, 40 farms (32%) had been infected previously. Of the 40, 11 were infected for 2, 6 for 3, and one for 4 consecutive years (H. N. Racicot).

Ring rot was found in 162 fields (15.8%) of the 1035 entered for certification in 1951 in Que. compared with 10% in 1950. Lack of disinfection and the use of second-hand bags is believed to allow the disease to persist. A 1-5% infection was noted in 3 fields of Canso. On many farms, where Teton is grown instead of other varieties, ring rot has disappeared completely (B. Baribeau). Ring rot was again the major cause of rejection in N. B. although it was less prevalent than in 1950. Of the 3,074 fields inspected in 1951, 49 (1.5%) were rejected (C. H. Godwin). Because late blight was epidemic in N. S. ring rot was not easy to diagnose this year. No ring rot was observed in any seed crop. The only farm on which ring rot was found was one of a former grower of certified seed, whose crop was affected in 1950; only a tr. was present (R. C. Layton). Bacterial ring rot has not been found in the 1951 crop in P. E. I. However, 5 cases were found in table stock of the 1950 crop early in the year. The source of infection is unknown but it is suspected that it came from second-hand bags brought into the province and used by one of the growers (H. L. McLaren).

SOFT ROT (?Erwinia carotovora). Several specimens received in October from the market, Toronto, Ont., showed lesions varying from sunken areas around the lenticels to almost complete soft decay of the whole tuber (J. K. Richardson).

The disease was less prevalent in district 3 than in previous years and was noticed only where the tubers had suffered severe mechanical injury at harvest (H. W. Whiteside). Many samples of potatoes affected by soft rot were received at the Laboratory, Fredericton, N. B. The infection is usually associated with mechanical injury at the stem especially where hollow heart has developed and the cavity extends close to the stem-end. Canso seems to have this defect more frequently than other varieties (J. L. Howatt).

BLACK LEG (Erwinia phytophthora) was found in 103 (15. 7 %) of the fields inspected in B. C. and caused the rejection of 2 fields. Although almost as many fields were infected as last year, the number showing 2% or more of black leg was greatly reduced. It may be noted that the 1951 season was one of the driest ever experienced in B. C. In the Fraser Valley only 0. 2 inches of rain fell between 1 June and 25 August (H. S. MacLeod).

Climatic conditions were ideal for the development of black leg in Alta., particularly in the southern part under irrigation. The disease was recorded in 106 (50%) of the fields inspected and caused 21 to be rejected. Most of these fields were located in s. Alta. Experience has shown that it is almost impossible to clear up black leg in a stock once it has become infected. If care is taken in cutting and handling a seed stock until it is planted, growers have little difficulty in keeping the stock free of disease. Treating the seed stock with Spergon after it is cut for planting is helpful. (J. W. Marritt). Sev. infection was observed in some fields in the Edmonton district (G. B. Sanford). In spite of excessive roguing 3 fields were rejected for black leg at Norquay, Sask. The disease was seen infrequently in seed potato fields (A. Charlebois). Black leg was seen in 18% of the fields inspected in Man. and one field was rejected (D. J. Petty). Numerous plants affected by black leg were seen in 3 fields of Sebago inspected in the London district, Ont. Other varieties affected were Irish Cobbler and Katahdin (F. J. Hudson). Black leg caused sl. damage in a few fields at Leamington, Ont. (C. D. McKeen). A 10-acre field planted with certified Sebago seed in Waterloo Co., showed considerable disease (J. K. Richardson). Four fields were rejected for black leg in district 2; it occurs most frequently in fields planted with Maritime seed (W. L. S. Kemp). The disease was less prevalent than in 1950 in district 3; 5 fields were rejected. It occurred most frequently in the early varieties Irish Cobbler, Warba, and Chippewa and was most prevalent in the n. Ont. areas inspected (H. W. Whiteside). The disease was found in 22 fields in central and e. Ont. and in 13 in w. Que. (E. H. Peters).

Black leg was noted in 394 (37. 1%) of the fields inspected in Que. and caused the rejection of 52 fields. Most of the rejected fields were in Chicoutimi Co. and the Lake St. John district or in Temiscouata Co. In some fields of Canso 6-7% of the plants were affected by the disease (B. Baribeau). Black leg was generally distributed in N. B., but it appeared to be more prevalent in the northern parts of Victoria and Madawaska Counties. The acreage rejected in 1951 was 0. 6%, compared with 0. 3% in 1950. The growing season was cool and wet (C. H. Godwin), Black leg was found in 72 of the 387 fields inspected in N. S. and caused 4 fields to be rejected. The disease was most frequently noticed in Sebago. Seed treatment with formaldehyde or Semesan Bel is no longer practised (R. C. Layton). In 4 fields in Cape Breton Co.

infection was 5-10% (P. M. Grainger). Although black leg was present in about the usual number of fields in P. E. I., it caused the rejection of 131 fields in 1951, compared with 245 in 1950 (H. L. McLaren). Black leg was much more prevalent in Nfld. this year than in 1950. Sev. infections of the disease was seen in 45 fields in the St. John's area and in 25 plots at Conception Bay. In some fields of Canso, infection was 5-15% (G. C. Morgan).

WILT (Fusarium oxysporum) was found in 53 (8.1%) of the fields inspected in B. C. and no fields were rejected (H. S. MacLeod). Wilt appeared to be less prevalent in Sask. than usual. It caused the rejection of one field, but this field had been frequently cropped to potatoes (A. Charlebois). Wilt was less sev. in Man. in 1951 than in the last two years. Wilt was recorded in 7% of the fields but one, with 20% wilt, was rejected (D. J. Petty). Wilt seemed more prevalent in the London district, Ont., than last year, but the percentage of affected plants was low (F. J. Hudson). Wilt was observed in district 3 in several fields on the lighter soils and mostly of the Chippewa variety; 6 fields were rejected. Stem-end browning, etc., associated with wilt, were almost absent (H. W. Whiteside). Wilt affected 17 fields in central Ont. (E. H. Peters). It was observed in small amounts in Canus and Irish Cobbler in e. Ont. (O. W. Lachaine). A single affected specimen was received from a grower at Ste. Christine, Bagot Co., Que. (H. N. Racicot). A few cases were observed in N. B., but it appeared to be less prevalent than in previous years (C. H. Godwin). Wilt affected about the same number of fields in P. E. I. as last year, but only 31 fields were rejected in 1951, compared with 124 in 1950 (H. L. McLaren). It seems quite probable that some of the wilt attributed to F. oxysporum may be caused by Verticillium albo-atrum (I. L. C.).

WILT (Fusarium oxysporum and Verticillium albo-atrum) was found in 14 (6.6%) of the fields inspected in Alta. and 2 were rejected for wilt. The affected fields were chiefly in s. Alta. (J. W. Marritt). Infection was mod. in a field at Medicine Hat and in the plots at Lethbridge (M. W. Cormack).

DRY ROT (Fusarium spp.). Dry rot (F. solani) was found affecting 20% of the tubers in a lot of certified Warba in a store in North Saanich, B. C. (W. Jones). F. redolens Wr. was isolated from affected tubers of Canso, which were sent in from Sardis, in October. The rot was quite hard (H. N. W. Toms, W. L. Gordon). Some storage rot developed in most lots of seed potatoes in storage in Alta. following injury from frost in the fall of 1951. Ordinary storage rot following mechanical injury was uncommon (J. W. Marritt). Better harvesting and handling procedures in district 2, Ont., appears to have noticeably reduced the amount of bruising and the subsequent development of dry or soft rot in the stored crop (W. L. S. Kemp). Several growers who had imported P. E. I. seed stock of Irish Cobblers brought in samples to the Harrow Laboratory. Probably less than 1% of the tubers were affected in any one shipment (C. D. McKeen). Storage rot was negligible in district 3 (H. W. Whiteside). A few affected tubers were reported during bin inspection in Que.; infection was usually well under 1%. In one lot of table stock 12% of the tubers were affected (B. Baribeau). Storage rot affected less than 1% of the tubers in 1950-51 in P. E. I. (H. R. McLaren). Dry rot was more prevalent than usual in the 1950 crop and the loss in some bins was fairly heavy. Storage conditions tended to be poor because early field frost caused some breakdown and the fall and winter were mild (C. H. Godwin).

Fertile perethecia of Gibberella cyanogena, the perfect stage of the tuber-rot fungus, Fusarium sambucinum f. 6, have never been found in nature in Canada, although they develop readily in artificial culture when the two required mating types are brought together. Studies on a limited number of mass cultures of F. sambucinum f. 6, each from a different source, has revealed that each culture consisted of a single mating type. For instance, mating type a was found in mass cultures that originated in B. C., Sask., and N. B. and mating types A and a occurred separately in mass cultures from Man. and P. E. I. Failure to find perthecia in nature is attributed in part at least to the separation of the two mating types that are essential for perithecial production (W. L. Gordon).

SKIN SPOT (Oospora pustulans). Two tubers of Irish Cobbler severely affected were brought to the Laboratory, Charlottetown, P. E. I. (R. R. Hurst).

RHIZOCTONIA (Pellicularia filamentosa (Rhizoctonia solani). Infection was 387-sl. 122-mod. 22-sev./656 fields inspected in B. C. and was about as prevalent as last year. Tubers showed sclerotia in fields where the crop was left undug for some time after they were mature (H. S. MacLeod). A mod.-sev. infection was seen in 64 (30%) of the fields inspected in Alta. with sl. infection in most other fields. Due to late maturity of the crop, few sclerotia developed on the tubers (J. W. Marritt). Rhizoctonia was particularly severe in fields on heavy soil in Sask. in 1951, with the heaviest loss in the early planted fields (A. Charlebois). A specimen was sent from a severely infected garden at Prince Albert on 7 Aug. The fungus was fruiting at the base of the stems (T. C. Vanterpool). Rhizoctonia caused no appreciable loss in Man. (D. J. Petty). Light infections only were observed in the London district, Ont., except on Irish Cobbler on black loam (F. J. Hudson). In district 2, the disease causes considerable damage where a suitable crop rotation is not practised or where the tubers are left for some time in the ground after the death of the vines (W. L. S. Kemp). In one field of Irish Cobbler on poor land in Wellington Co., the primary stems were girdled and killed and as a result the plants were late (J. K. Richardson). Rhizoctonia was less prevalent than usual in district 3. As usual the disease was more active in the Cochrane area than farther south. The growers planted early in 1951 and there was no delay in harvesting the crop. The tubers were unusually free of sclerotia (H. W. Whiteside). Rhizoctonia was observed in 44/87 fields examined in central and e. Ont., only sl. sclerotial development was seen on the tubers. A few growers treat their seed with Semesan Bel and some use formaldehyde (E. H. Peters). Rhizoctonia was noted in 98 (9.4%) of the fields inspected in Que., infection being sl. in all. Tubers were sl.-mod. infected in Labelle and Chicoutimi Counties (B. Baribeau). The disease was fairly general in the fields throughout N. B., but infection was rarely more than sl. Sl. sclerotial development was noted in a few tuber lots (C. H. Godwin). Rhizoctonia was not noticed to any extent in the field in N. S. this year. However, in the Scotts Bay area in Kings Co., scurf was so severe on the tubers from 3 fields that it was impossible to grade the crop. These fields have been planted almost continuously to potatoes for several years (R. C. Layton). Only negligible amounts of rhizoctonia developed in P. E. I. in 1951 (H. L. McLaren). Rhizoctonia was found to have severely infected about 25% of the sprouts in a field of Green Mountain in Prince Co. on 20 June resulting in most cases in the decay of seed piece. Six other cases were seen in Queens Co. (R. R. Hurst). A light infection was observed in 12 fields in Nfld. (G. C. Morgan).

LATE BLIGHT (Phytophthora infestans) was reported in only one seed field in B. C. in 1951. This field at Westham Island had been irrigated by sprinkler. The dry growing season was unfavourable for its development and spread. After field inspections were completed some rain fell and a little blight made its appearance. During a bacterial ring rot survey of some fields after digging, a few affected tubers were noticed (H. S. MacLeod, I. C. MacSwan). No late blight was found in Alta. in 1951 (J. W. Marritt). A sl. infection was seen in several fields in the Norquay district, Sask., in late August, but it is believed low temperatures prevented the disease from spreading (A. Charlebois). Traces of late blight were found in late August or early September at several points in Man. The disease spread little in the next 2-3 weeks in spite of moist cool weather, but localized severe outbreaks finally appeared in the Portage la Prairie and Winnipeg areas. Canso in the former area was free of late blight, while fields of other varieties alongside were severely infected. In most seed potato fields the tops were destroyed by roto-beater and the tubers dug 10-14 days later. Little tuber rot developed (J. E. Machacek, D. J. Petty).

Late blight was first observed in s. w. Ont. (Halton Co.) on 6 July, in central Ont. (Prince Edward Co.) on 9 July and in e. Ont. (Carleton Co.) on 10 July, indicating its almost simultaneous appearance across Ont. The disease continued to spread through much of July, August and in the northern part of district 3 in September. The seed crop was adequately protected over much of the area and the blight warning service was helpful in reaching growers in time, but in much of the crop blight appeared early and became established in sprayed fields. In e. Ont., where late blight became epidemic by mid-August it was estimated that about 10% of the acreage was sl. affected, 25% mod. affected, and 65% sev. affected. The reduction in yield, from the premature death of the vines, varied from 0 to 25% and averaged 5%. An additional 5% was lost from decay of the tubers. No blight was noticed in Canso, or Keswick (C. B. Kelly et al.)

Late blight appeared about 10 July in s. w. Que., especially in Chateauguay, Laval, Terrebonne, and Berthier Counties. In the next 2-3 weeks it was reported from very few additional districts, but by 18 Aug. it had reached almost all potato growing areas in the province, weather conditions being very favourable for its development. In late August it appeared that the epidemic might be as severe as in 1930, when it was estimated that 9 million bushels of potatoes were destroyed by late blight, but the losses were fortunately not that great in 1951. The disease was particularly severe in w. Que. and in the Gaspé Peninsula; the fields were killed prematurely and 5-10% of the tubers were decayed in unsprayed fields.

Late blight was reported in 394 (38.1%) of the fields inspected and it caused the rejection of 10 fields in 1951 compared with 4 in 1950 and 134 in 1930. The roto-beater and herbicides, especially a mixture of sodium arsenite and crank-case oil were used on hundreds of acres to destroy the vines. Growers who killed the vines before mid-September harvested crops virtually free of tuber rot. Those who delayed lost some of their crop. Canso, Keswick, and Kennebec was everywhere highly resistant to late blight, except in a few fields where a trace of the disease was seen on the foliage. At digging time in all fields of Canso, a few tubers were found affected by late blight. In one crop of Keswick in Bonaventure Co.,

0.5% of the tubers were diseased; no other cases were noted. No tuber rot was observed in Kennebec. Bin inspection of 496 lots revealed less than 1% tuber infection. In table stocks, tuber infection was about 6% about Montreal and Quebec and in the Eastern Townships. In other districts losses from tuber rot were negligible (B. Baribeau, H. Genereux).

At the Substation, Ste. Clothilde de Chateauguay, in the variety trials, the plants were dusted twice with DDT and sprayed 9 times with a fixed copper. Canso yielded 553 bu. and Green Mountain 486 bu. per acre in the trials, in which a difference in yield of 39 bu. per acre was significant. In the potato seedling trials, which were dusted only with DDT, no late blight was observed on the foliage of Canso, whereas no harvestable crop was produced by Green Mountain on account of the disease. From 100 bags of Canso run over the grader, 6 tubers infected by late blight were found. The presence of the fungus was confirmed by isolations made at Ottawa. It was estimated that 10% of the crop, which consisted entirely of susceptible varieties, was a total loss in the Ste. Clothilde area and the total loss from late blight easily averaged 20-30% of the crop (N. M. Parks, F. S. Browne).

No fungicide spray program was effective this year in controlling late blight in N. B. Weather conditions were ideal for the development of the disease and the epidemic got under way about the middle of July and by the first week of September all potato fields were defoliated except those planted to Keswick and Canso, which, with two exceptions showed no infection even when unsprayed. Loss from the disease was due largely to a reduction in yield. This reduction was especially heavy in some fields of early varieties which had been poorly sprayed. Loss from rot was also heavy in early varieties because they were often dug before the tops were destroyed. A few bins of Bliss Triumph in the Florenceville area suffered severe breakdown from blight. The late crop, dug 3-5 weeks after the tops were dead, showed little tuber rot (C. H. Godwin, J. L. Howatt).

Late blight was first reported 10 July in Kings Co. and on the South Shore of N. S., where some fields were almost defoliated by that date. The disease spread rapidly and by mid-August most fields were completely defoliated except well-sprayed fields. Many growers began to spray after the fields were already attacked; most continued to spray and harvested a crop relatively free of tuber rot. In areas where no spraying was done the loss from tuber rot was very high especially in the coastal areas of Digby, Yarmouth and Lunenburg Counties. Late blight was seen on the foliage in one field of Keswick and two of Canso and after the crop was dug tuber rot was found in several lots, one of which showed at least 10% loss. Several other blight resistant seedlings were tested this year in N. S. Some of these seedlings became infected and later showed tuber rot in some of the plantings. Although about the normal amount of rain fell some nights were cool and the days humid, dark, and foggy (R. C. Layton, K. A. Harrison). The fungus was isolated from tubers of Canso grown at Starr's Point (K. M. Graham).

The first observed infection of late blight in P. E. I. in 1951 was on potato plants growing in a cull pile at O'Leary in Prince Co. on 16 July; 4 days later a sl. infection was seen in 2 fields of Sebago in the same area. By the end of July

late blight was present in many localities and by mid-August it had become epidemic. Initial infections usually appeared as small scattered spots on the upper leaves of the plants. Such was the pattern in many fields that were at considerable distance from other fields or were isolated by natural barriers. These observations suggest that viable sporangia were being transported some distance from where they were formed. Fan-shaped infected areas with the apex of each fan opposite an opening in a spruce hedge were observed in several fields.

The critical period for an epidemic in P. E. I. usually occurs in September. This year it occurred between 11 August and 1 September. During this period the mean weakly temperatures were 65. 8° F., 65. 7° F. and 65. 9° F. and the means for the relative humidity were 84. 3, 81. 5 and 80. 5, the highest recorded for the season. In the 13-week period, 1 July-29 Sept., 15. 61 inches of rain fell on 41 days and in the 3-week period, 11 Aug. -1 Sept., 5. 19 inches fell on 12 days. Farmers who failed to reduce the interval between spray applications, as advised, were unable to halt defoliation. It was estimated that the yield was reduced as a direct result of defoliation by nearly 1,000,000 bushels in P. E. I.

In spite of the extreme severity of the late blight epidemic, losses from tuber rot were less than usual. However, experience has shown that severe tuber rot usually follows moderate, but prolonged attacks on the foliage and that losses are negligible in seasons when severe epidemics destroy the vines early and quickly. Considerable rot developed in some lots of table potatoes for the early market that were lifted when the vines were still partially green or otherwise came in contact with viable sporangia. Almost all the rot in the main crop was caused by spores washed down into the hills by rain, but in fields where heavy hilling was practised few tubers were affected. A survey of Queens Co. and the eastern part of Prince Co. in the last week of August revealed that of the farmers visited 13. 3% had used no fungicide, 66. 6% had used Bordeaux mixture, 10. 0% Dithane or other carbamates and 10. 0% a neutral copper such as Basi-Cop, C. O. C. S. or Perenox. The fungicides were applied by sprayers on 76. 6% of the farms, and 10. 0% by dusters. Besides the 13. 3% of the farmers who applied no fungicide, 63. 3% made only 1-5 applications and 23. 4% made 6-8. Experiments at Charlottetown demonstrated that at least 6 applications of a suitable fungicide were required this year to control late blight.

The loss from tuber rot on most farms was a reflection of the spray program. Farmers who did not use fungicides harvested small crops with little rot, the plants being killed by the disease early and very quickly. Other farmers who sprayed consistently and thoroughly obtained high yields and the loss from rot was very low, adequate spraying having held the disease in check and deposited a toxic layer of copper on the soil. Further protection was obtained by destroying the plants with a herbicide. In general, those farmers who sprayed in a haphazard fashion prolonged the period that the fungus was active on the vines and in consequence losses from tuber rot were heavy. The main crop was harvested under ideal weather conditions. Tubers infected during the growing season were largely culled out by the pickers and no fresh inoculation of the healthy tubers occurred while they were being lifted. The seed inspectors reported that they cannot recall a year in which so little late blight rot was found in storage (L. C. Callbeck).

Table 8. Effect of the Control of Late Blight on the Yield of Potatoes.

Year	Bordeaux-treated			Untreated			Increase in Yield	
	Total Yield	Tuber Rot %	Mktble. Yield	Total Yield	Tuber Rot %	Mktble. Yield	Total %	Mktble. %
1945	286.3	0.2	275.2	249.1	6.4	224.5	14.9	22.6
1946	296.5	0.6	285.0	268.7	16.0	218.9	10.3	30.2
1947	301.3	1.0	271.5	278.2	15.1	208.6	8.3	30.2
1948	275.4	0.4	255.0	199.5	6.6	160.6	38.0	58.8
1949	441.4	0.3	398.0	394.6	20.4	277.5	11.9	43.4
1950	418.3	1.3	362.9	348.1	18.1	233.1	20.2	55.6
1951	333.5	1.1	274.1	257.8	9.6	196.4	29.4	39.6
Average		0.7			13.1		19.0	40.1

Note: The plots in 1949-51 were located in a somewhat more fertile piece of land than formerly; growing conditions were also very good in the last three years. In the years 1945-48, tubers grading No. 2 and No. 3 were included in the Marketable Yield; in the last three years Marketable Yield was based entirely on tubers grading No. 1. Yields in bu. per acre.

It is believed that losses from late blight in Nfld. in 1951 were the highest in the last 10 years, especially in the early potato crop, chiefly Irish Cobbler and Warba. Not one field visited was free from damage, infection was 10-75%, and averaged 25% (G. C. Morgan). No late blight was seen at St. Anthony, where the prevailing temperature is too low for the development of the pathogen (D. B. O. Savile).

It is not customary to report in the P. D. S. results of experiments, but some data kindly supplied by Mr. Callbeck on increased yields obtained when Bordeaux 10-5-100 was used to control late blight in the plots at Charlottetown, P. E. I. is so valuable for the light it throws on losses caused by this disease that it is briefly summarized in Table 8.

Under the conditions at Charlottetown, where late blight becomes epidemic almost every year, it will be seen that the average loss from tuber rot is reduced from 13.1% in the unsprayed crop to 0.7% in the protected crop. This saving alone is considerable. When the yields are compared it will be seen that both the total yield and the marketable yield of the unsprayed crop are inferior to those of the crop sprayed with Bordeaux. In round numbers the total yield is increased 20% and the marketable yield by 40%. Since the benefit from spraying has been consistently high it would seem a 40% increase in yield may be taken as an average figure.

Table 9. Reaction of Potato and Tomato Varieties to Strains of Phytophthora infestans

Strain	Green Mountain	Canso	Keswick	Stokesdale
Canso, Starr's Point, N.S.	S	S	S	T
Sebago, Bowesville, Ont.	S	I	I	T
Tomato, Picton, Ont.	S	I	R	S

Note: S = Susceptible. T = Tolerant; spreading lesions without sporulation. R = Resistant; pin-point lesions. I = Immune; leaves unmarked.

From the evidence available, the increase in yield of Bordeaux-treated plots is due entirely to the protection provided against late blight. However some fungicides do stimulate the plant. When 10 applications of Dithane D-14 plus zinc sulphate were applied at Charlottetown in 1951 instead of 6 applications of Bordeaux, the yield was significantly increased. Total yields were: Untreated 257.8, Bordeaux 333.5 and Dithane 394.3 bu. per acre. Marketable yields were: Untreated 196.4, Bordeaux 274.1 and Dithane 343.7 bu. per acre. Marketable yield was increased by: Bordeaux 39.6% and Dithane 75.0% (I. L. Conners).

Experiments recently completed in the greenhouse at Ottawa have provided conclusive evidence that physiologic races of the late blight fungus occur in Canada. The results are shown in Table 9 (K. M. Graham).

LEAK (Pythium ultimum). A sl. infection was seen in early harvested tubers and also in storage in potatoes from Courtenay, Duncan, and N. Saanich, B.C, (W. Jones). Leak was found in one field of Katahdin on low land in Que.; 5-10% tubers were infected (B. Baribeau).

STEM ROT (Sclerotinia sclerotiorum). A sl. infection was seen on the Bradford marsh, Ont., under moist conditions. The foliage was extremely dense and the stalks in contact with the soil were affected by a soft rot with profuse mycelial growth and abundant sclerotia of the organism (J. K. Richardson).

SILVER SCURF (Spondylocladium atrovirens). Quite a few affected tubers were found in October when the crop harvested from the potato scab research plots from Ancaster, Ont., were examined. The presence of the organism could not be correlated with any particular plot treatment (J. K. Richardson). Very little scurf was seen during bin inspection in district 3. It was found, however, on tubers in the various exhibits at the Royal Agricultural Winter Fair. It seemed most prevalent on Irish Cobbler, Warba, Chippewa and Katahdin. The disease appeared to be most prevalent where the tubers had been rubbed or thoroughly

brushed. The same impression has been gained from examining potatoes in jute bags that have been handled frequently (H. W. Whiteside). A sl. infection was seen in a few lots of Green Mountain in Que. at bin inspection (B. Baribeau). About 25% of the tubers of Irish Cobbler were infected in one lot on 24 Feb. 1951 in Queens Co., P. E. I. (R. R. Hurst).

POWDERY SCAB (Spongospora subterranea) was heavy on a tuber received in August from a garden plot at Prince George, B. C. (N. S. Wright, H. N. Racicot). A number of potatoes were found infected at Clute, Ont., and specimens were submitted to Ottawa (H. N. Racicot). The disease was reported in most potato lots grown in the Lower St. Lawrence district, Que.; infection was 1-25%. High soil moisture prevailed during the growing season (B. Baribeau). Powdery scab was reported in 3 lots grown in the Scotts Bay and North Mountain area of Kings Co., N. S.; av. infection was 6%. A 50% infection was seen in one lot of table stock in Digby Co. (R. C. Layton).

COMMON SCAB (Streptomyces scabies) was less severe and widespread this year in B. C. than usual. The steady decrease in incidence since 1948 has continued. No crops were rejected for scab, but there will be some in scattered areas (H. S. MacLeod). Certified seed stocks were very free of scab this year even on smooth-skinned varieties. Less scab was found on bin inspection in 1951 than in the last 10 years. (J. W. Marritt). A severe infection was found at Edmonton in a garden plot that had been limed in the spring (T. R. Davidson). A specimen heavily infected was received from Langenburg, Sask. (T. C. Vanterpool). Common scab gave no particular trouble in Man. this year (D. J. Petty). Although only small amounts of sev. scab were observed at bin inspection in the London district, Ont., in 1951, sl. scab was found in most crops and even mod. infections appeared to be more prevalent than in 1950 (F. J. Hudson). One grower on whose farm scab is a problem has produced market-clean potatoes for the past 2 years by growing the variety Ontario (J. K. Richardson). Several crops in Dufferin and Wellington Counties were so heavily scabbed that they could not be graded. Severe scab was slightly less prevalent in Durham Co. than last year. Table stock growers who tested varieties such as Ontario and Yampa, reported clean crops of tubers of good shape and cooking quality (W. L. S. Kemp). Scab was less prevalent in district 3 in 1951 than in 1950, probably because of the cool moist conditions (H. W. Whiteside). Scab was comparatively light in central and e. Ont. (E. H. Peters). A sev. infection was noted in only 4 lots in Que. (B. Baribeau). Sl. -mod. infections were seen in a few scattered lots in N. B. (C. H. Godwin). Scab was severe in a few lots in N. S. where the potatoes had been planted on old orchard land. The lesions were a sort of russetting rather than the well defined pits, usually seen (R. C. Layton). Scab was mod. -sev. in some lots examined in Cape Breton and Inverness Counties (P. M. Grainger). Scab infection was very light in P. E. I., causing about 2% loss (H. L. McLaren). Common scab was prevalent in Conception Bay and the Burin Peninsula, Nfld. Ordinarily, Nfld. soils are considered acid, but since many tons of lime have been available to farmers at reduced rates during the last 10 years soils on quite a few farms are now alkaline. On one large farm near St. John's, the entire crop of Keswick, Canso and President were heavily infected (G. C. Morgan).

WART (Synchytrium endobioticum). Losses from wart were not great in Nfld. in 1951, but the percentage of infection was high. Wart was definitely found to occur in Trinity Bay, when a 10-50% infection was observed in 12 fields. The disease is also suspected to occur on a farm in St. John's West, a district previously believed free of wart. The disease was again prevalent in Conception Bay, but infection was much lighter than in 1950. Sebago (mauve blossom) is the only variety being grown in Nfld. at the present time that appears to be highly resistant to wart. Keswick that was classed as immune in 1950, and Canso and Katahdin as highly resistant proved to be only moderately resistant this year (G. C. Morgan).

WILT (Verticillium albo-atrum) affected 15% of the plants in a garden plot at Ladner, B. C.; the fungus was isolated (N. S. Wright). The disease affected about 25% of the plants in plantings of Warba and Netted Gem, from which the pathogen was isolated, at Osoyoos and Summerland. A few affected Warba plants were seen at a field frequently cropped to tomatoes at Kamloops (G. E. Woolliams). Wilt was found in one field in central Ont. (E. H. Peters). A few wilted plants were found in Teton, Sebago, Chippewa, Canso, Irish Cobbler and Green Mountain in Que.; Sebago was the most severely affected (B. Baribeau). Wilt was reported in 38 out of 387 fields inspected in N. S. (R. C. Layton). The average infection was 1% or less in the principal varieties grown in P. E. I. (R. R. Hurst).

FOLIAR NECROSIS (Solanum virus 1, D strain). Two plants were found in a commercial field in York Co., N. B. (D. J. MacLeod).

LEAF ROLL (virus) was found in 68 (10.4%) of the fields inspected in B. C. and caused the rejection of 6, a big reduction over 1950. This drop is attributed to the rejection of crop from several fields in 1950, in which leaf roll had been steadily increasing (H. S. MacLeod). Leaf roll was found in 60 (20%) of the fields inspected in Alta. and 3 were rejected. The disease was more prevalent than usual in the irrigated districts of s. Alta., but no leaf roll was found in the Peers and the n. e. districts of the province (J. W. Marritt). Many garden plots at Edmonton were severely infected (T. R. Davidson). Certified seed of Netted Gem and Bliss Triumph were planted in a garden in Saskatoon in 1950. The crop became infected from a nearby garden but yielded well. The varieties were planted again in 1951, but every plant was severely dwarfed and the crop was virtually a failure (T. C. Vanterpool). Leaf roll only affected 16% of the fields in Man. in 1951, but it caused the rejection of 4 (D. J. Petty). Leaf roll appeared to be less prevalent in London district, Ont., than usual, but 2 fields, both Warba, were rejected (F. J. Hudson). With less Sebago and Chippewa being grown in district 2, no fields were rejected (W. L. S. Kemp). In all, 8 fields were rejected for leaf roll in district 3. It appears to be most prevalent in Warba. A demonstration plot of Chippewa in the Cochrane area showed no leaf roll in any of the 12 sources of seed planted (H. W. Whiteside). Leaf roll was found in about a third of the fields inspected in central and e. Ont., and caused the rejection of 2 (E. H. Peters, O. W. Lachaine). Leaf roll was noted in 394 (38%) of the fields inspected in Que.; only 6 fields were rejected (B. Baribeau). Leaf roll was less prevalent than last year in N. B. and caused the rejection of only 27 fields (C. H. Godwin). Leaf roll

was reported in 97/387 fields inspected in N.S., with 2 rejections (R. C. Layton). Leaf roll, less prevalent than in 1950, caused only 36 fields to be rejected in P.E.I. (H. L. McLaren). Infection was sl. in 5 fields of Sebago and mod. in 10 fields of Arran Comrade and Kerr's Pink in Nfld. (G. C. Morgan).

LEAF STREAK (Solanum virus 1, N strain). A trace was found in one plant of Katahdin, 2 of Canso and one seedling in a test plot at Fredericton, N. B. (D. J. MacLeod).

SIMPLE MOSAIC (Solanum virus 1, L and S strains) was common in fields in Albert, Carleton, Charlotte, Queens, Sunbury, and Victoria Counties, N. B.; infection was tr. -27%. It was observed in Katahdin, Chippewa, Canso, Keswick, Pontiac, Sebago, Kennebec and 17 seedlings (D. J. MacLeod).

MILD MOSAIC (Solanum viruses 1 and 2). A trace to 3% infection was recorded in table stock fields of Green Mountain in Carleton, Charlotte, Victoria, Westmorland, and Albert Counties, N. B. (D. J. MacLeod).

FAINT MOSAIC (Solanum virus 3). A faint mosaic was found in Arran Victory, President, Keswick, Golden Wonder and 4 seedlings including U. S. D. A. Seedling 41956 in a test plot at Fredericton, N. B.; infection was tr. -8% (D. J. MacLeod).

RUGOSE MOSAIC (Solanum viruses 1 and 2) was found in 7 table stock fields in Albert, Carleton, Sunbury, and Victoria Counties, N. B.; infection was tr. -3% (D. J. MacLeod).

CRINKLE MOSAIC (Solanum viruses 1, 2, and 3) was common in table stock fields in Carleton, Charlotte, Sunbury, and Victoria Counties, N. B.; infection was tr. -5% (D. J. MacLeod).

MILD MOSAIC (Solanum virus 11). A trace to 7% was found in table stock fields of Irish Cobbler in Carleton, York, and Charlotte Counties, N. B. See also next item (D. J. MacLeod).

LEAF-ROLLING MOSAIC (Solanum virus 11) was found in 7 table stock fields of Green Mountain in York and Carleton Counties, N. B. The virus was identified as Solanum virus 11. It resembles Solanum viruses 2 and 3 in its reaction on Nicotiana tabacum, but it differs from them in its ability to infect Datura tatula and D. stramonium. The latter hosts are immune to the type strains of Solanum viruses 2 and 3. Solanum virus 11 is readily transmitted by Myzus persicae, but it is difficult to transmit by sap inoculation. A severe crinkle mosaic is produced when this virus occurs with Solanum virus 2 or 3 in Green Mountain (D. J. MacLeod).

MOSAIC (virus) was found in only 38 (5.8%) of the fields inspected in B. C., about a third as many as last year. It is possible that the symptoms were masked during the prolonged dry season (D. J. MacLeod). Low percentages of a mild mosaic was seen in 15 (7.1%) of the fields inspected in Alta. (J. W. Marritt).

In spite of efforts to eliminate mosaic in Bliss Triumph by tuber-unit planting, the disease has increased in the Pike Lake area, Sask., and 2 fields were rejected. It has also increased in Pontiac at Estevan (A. Charlebois). Mosaic was found in only 9% of the fields inspected in Man. (D. J. Petty). Light infections were noted in Irish Cobbler and Katahdin in the London district, Ont. (F. J. Hudson). Mosaic was fairly heavy in only one field, which was rejected for black leg, in district 2. The large acreage of Katahdin may account for its low incidence (W. L. S. Kemp). Mosaic caused 8 fields to be rejected in district 3. There is some evidence that the mild mottling encountered particularly in Katahdin but also in Green Mountain in this district is due to mineral deficiency. For instance one field in several planted with seed from the same source showed a high percentage of mottling while the other fields showed almost none. Dr. K. Fernow, Cornell University, reported that several lots of Katahdin seed from the Lafontaine district in Simcoe Co. had a lower incidence of mosaic than lots from many other sources of this variety. One lot of Green Mountain that appeared marginal in previous years in n. Ont. was almost free of mottle in 1951 and produced a crop of over 700 bu. per acre (H. W. Whiteside). Five fields were rejected for mosaic in e. Ont. and small amounts were seen in nearly half the fields inspected (O. W. Lachaine, E. H. Peters). Mosaic was present in 511 (49.3%) of the fields inspected in Que.; compared with 149 (10.8%) last year (B. Baribeau). Mosaic caused the rejection of 27 fields, chiefly of Green Mountain, in N. B., about a third of all rejections (C. H. Godwin). Mosaic was reported in 132 out of the 387 fields inspected in N. S. and caused the rejection of 11 (R. C. Layton). The disease caused the rejection of 200 fields in P. E. I. in 1951, compared with 456 in 1950; it was less prevalent, except in Green Mountain, than last year (H. L. McLaren). The average amount of mosaic in table stock fields based on counts of 10 fields of each variety were: Green Mountain 1%, Irish Cobbler, Sebago and Katahdin trace (R. R. Hurst). Mild mosaic was seen in every field visited in Nfld. and infection was often high. Traces of rugose mosaic were seen in a few fields of Green Mountain and Arran Pilot, whereas about three quarters of the fields of Arran Victory and President showed high infections (G. C. Morgan).

PURPLE or BUNCH TOP (virus). Nine units affected by haywire occurred in a plot of 2452 units grown to check the transmission of witches' broom in the Cariboo district, B. C. Whether this disease is distinct from the haywire stage of purple top is unknown. No purple top was seen in the Cariboo in 1950 (N. S. Wright). Purple top was found chiefly in Alta. in the Peers and the Peace River districts. Haywire was found in 18 (8.5%) of the fields inspected and purple top in 39 (18.4%) (J. W. Marritt). Five fields in Man. showed 1-3% of the plants affected by bunch top, with tr.-0.5% in some other fields (D. J. Petty). A single plant was found affected by purple top in a field of Katahdin in the London district, Ont. (F. J. Hudson). Purple top was doubtfully present affecting scattered plants in Durham Co. (W. L. S. Kemp). This disease was negligible in district 3 (H. W. Whiteside). Traces of bunch top were observed in 9 fields in central Ont. and 7 in the Ottawa district (E. H. Peters). Canso plants showing typical symptoms were brought in by E. H. Peters from a field at Port Perry (H. N. Racicot). A sl. infection was observed in fields of Canso in Que. On the other hand a large number of affected plants were noted in table stock fields of President (B. Baribeau). Purple top was again fairly common in fields of Katahdin in N. B., but less prevalent than in previous years (C. H. Godwin).

Bunch Top was widespread in potato fields in Carleton, Queens, Sunbury and York Counties. Current season infection was a tr. to 12% in 12 fields examined. The bunch top symptoms were found in Bliss Triumph, Canso, Chippewa, Green Mountain, Irish Cobbler, Katahdin, Keswick, Pontiac and Sebago.

Late Leafroll (cf. P.D.S. 27:69. 1948), the early stage of bunch top, was common in Carleton, Sunbury, Charlotte, and Victoria Counties. It was found in the varieties mentioned above except Canso and Keswick. Haywire, or the secondary stage of bunch top, was noted in Canso, Green Mountain, Irish Cobbler, Katahdin, Keswick, and Sebago. Misses attributed to bunch top infection of the seed pieces were noted in 2 fields: 7% in Sebago and 1% in Katahdin (D. J. MacLeod). Purple top affected 10-15% of the plants in a field of Sebago and traces were noted in a few other fields in N. S. (R. C. Layton). The disease was of little importance in P. E. I. (H. L. McLaren). Average infection in table stock fields was estimated to be: Sebago 1%, Irish Cobbler, Green Mountain, and Katahdin trace (R. R. Hurst). Traces were seen in fields of Menominee, Arran Pilot, and Arran Victory in Nlfd. (G. C. Morgan).

SPINDLE TUBER (virus). Traces were observed in Man. and Ont. (D. J. Petty et al.). Small amounts were observed in several varieties, mostly table stock, in Que. (B. Baribeau). A trace was reported in a few fields of Irish Cobbler in N. B. (C. H. Godwin). A trace to 3% of spindle tuber was found in 8 fields examined in Carleton Co., infecting Kennebec, Green Mountain, Irish Cobbler, and Katahdin (D. J. MacLeod). Spindle tuber caused 31 fields to be rejected in P. E. I. in 1951, compared with 5% in 1950; it was found mostly in Sebago (H. R. McLaren). Traces were found in 5 fields of Irish Cobbler and high percentages in 20 fields of Arran Victory in Nfld. (G. C. Morgan).

WITCHES' BROOM (virus) was found in 79 (12%) of the fields inspected in B. C. and 13 fields were rejected. Although fewer fields were infected, a larger number of fields were rejected. The disease is most prevalent in the Cariboo district (H. S. MacLeod). To determine the amount of transmission of witches' broom in the Cariboo in 1950, 2452 tubers were selected from the same number of symptomless plants of White Rose grown at Soda Creek and planted at Richmond, where transmission of the disease has never been observed. Out of the 2452 units grown 11 units were found infected with witches' broom (N. S. Wright). Witches' broom was found affecting 36 fields located in the Peers (n. e. Alta.) and the Prince River districts. Both witches' broom and haywire occur in the same fields and it is not always easy in the early stages to distinguish between plants affected by these two diseases (J. W. Marritt). A few infected fields were seen in the most northerly part of district 3, Ont. (H. W. Whiteside).

YELLOW DWARF (virus). Single affected plants were collected in Keswick at Port Parry, and in Canso at Pontypool, Ont., and in Green Mountain near l'Annonciation, Labelle Co., Que. (E. H. Peters, O. W. Lachaine).

CRACKING (non-parasitic) affected most of the tubers in a planting of Essex in Queens Co., P. E. I. (cf. W. L. G. G. Cracking of Potato tubers. Abstr. R. A. M. 20:377. 1941) (R. R. Hurst).

FROST INJURY. Net necrosis, due to frost killing the plants, caused some damage in n. central B. C. (H. S. MacLeod). Early frosts caused some damage to tubers near the surface in district 2, Ont. (W. L. S. Kemp). An unusual internal browning occurred in some lots of Chippewa and Canso grown in the Cochrane district. The injury was believed to be caused by a severe frost before harvest (H. W. Whiteside). Small amounts were seen in the Ottawa district (E. H. Peters). Frost injury caused slight damage to a few lots in Que. (B. Baribeau). Several fields of Arran Victory and Arran Banner were slightly injured by frost in St. John's, Nfld. (G. C. Morgan). Two cases of rather severe injury wereseen in 2 lots of Sebago in P. E. I. Also some low temperature injury occurred during the winter 1950-51 (R. R. Hurst).

GIANT HILL was reported in 100 (15. 2%) of the fields inspected in B. C. in 1951; the figures for 1950 were 236 (23. 7%) (H. S. MacLeod). Giant hill was more prevalent than usual in Chicoutimi and Lake St. John districts, Que. (B. Baribeau). A condition resembling giant hill was common in commercial fields of Green Mountain, Irish Cobbler and Bliss Triumph in Carleton and York Counties, N. B. (D. J. MacLeod.)

GROWTH CRACKS. Oversize, hollow tubers or ones with large growth cracks were common in Sask. ; the fall was abnormally wet (H. W. Mead).

INTERNAL BROWN SPOT was unusually prevalent this year in the Lower Mainland, B. C. It was attributed to inadequate soil moisture during tuber development. The trouble was noticed principally in Katahdin and Netted Gem on clay land (I. C. MacSwan). The disorder also occurred on Vancouver Island, where it caused considerable loss in some gardens. Great Scott, Early St. George, Columbia Russet, and Netted Gem were affected (W. Jones).

NO-SPROUT TUBERS. Several poor stands occurred particularly in fields of Canso in the Courtenay district, B. C. It occurred to a lesser degree in White Rose, Green Mountain, Columbia Russet, and Keswick. The trouble was attributed to high temperature during storage and dry soil conditions at and after planting. In a few lots, the seed had sprouted heavily in storage and the sprouts had to be broken off before planting. Instead of forming normal sprouts, the seed pieces developed tubers, resulting in a miss (W. Jones). Misses in the field as high as 30% of the stand were common this year in N. B. , due to the failure of the eyes of sets to develop normal shoots; instead, tubers developed. This condition was most prevalent in Katahdin and Sebago. Work done at Boyce Thompson indicates that the condition is due to too high soil temperatures prior to digging or high storage temperatures (J. L. Howatt).

NET NECROSIS. Not over 0. 25% of the tubers were found affected in either table or seed stock in Que. (B. Baribeau). A few mild cases were observed in Green Mountain in Madawaska Co. , N. B. (C. H. Godwin). Only one case of net necrosis or stem end browning has been reported in N. S. About 2% of tubers were slightly affected in a crop of Green Mountain, the vines of which had been killed by a herbicide (R. C. Layton).

POTASH DEFICIENCY. Some of the fields in the Covehead area, Prince Co., P. E. I., are deficient in available potash yet show adequate amounts of reserve potash. About 10% of the plants were affected in the field examined (R. R. Hurst).

STEM-END DISCOLORATION. Tubers of the Canso variety often show a disorder that is mistaken for stem-end browning or black leg. Affected tubers first show a slight swelling and browning in the peripheral cells about the stolon at its junction with the tuber. After digging the stolon end does not heal properly and a more or less open, depressed, brownish area develops. Groups of brownish cells may occur anywhere between the pith and the skin. When an extensive group of cells become brownish and necrotic, a cavity may develop within them, particularly in the central region, to form a more or less extended cavity. If the cavity extends to the surface, soft rot commonly sets in although Fusarium dry rot sometimes develops. Other fungi may occasionally become established but are walled off by formation of cork. The condition is not always confined to the larger tubers. In one lot 10% of the tubers were affected. No organisms have been isolated from deep-seated, isolated, affected centres (J. L. Howatt).

PUMPKIN

POWDERY MILDEW (?*Erysiphe cichoracearum*) was observed on the leaves of one plant of Connecticut Field in the University plots, Vancouver B. C. (H. N. W. Toms).

RADISH

CLUB ROOT (*Plasmodiophora brassicae*). A very heavy infection was found on muck land at St. Leonard - Port Maurice, Que. (E. Lavallee).

SCAB (*Streptomyces scabies*) was found affecting radishes at Ancaster, Ont., being quite severe in areas where infection was heavy on potatoes (J. K. Richardson).

BROWN HEART (boron deficiency). A trace was seen in a garden in Queens Co., P. E. I. (R. R. Hurst).

FUME INJURY (?SO_2) caused the plants to be stunted and leaves chlorotic or browned in a planting on muck soil near a nickle smelter at Port Colborne, Ont., in July (J. K. Richardson).

RHUBARB

LEAF SPOT (*Phyllosticta straminella*). One leaf heavily infected in a planting in Carleton Co., Ont. (D. S. MacLachlan).

MOSAIC (?virus). A plant was affected in a private garden at Jervis Inlet, B. C. (R. Stace-Smith).

RED LEAF (cause unknown). Canada Red and Macdonald continue to show the greatest resistance to red leaf among the varieties grown at Lacombe, Alta.; however, a few plants of these varieties were infected this year. The disease was also observed in a planting of Ruby at Edmonton (T. R. Davidson). The disease was seen at Saskatoon, Sask., and affected specimens were received from Milden and Cutknife. The latter infection was on a "green" variety from a garden in the virgin prairie; the root cuttings were supposed to have come from a garden where the disease was unknown. Dr. Dowson, Cambridge University, was of the opinion that red leaf of rhubarb exhibits the same internal crown symptoms as the bacterial disease of rhubarb in England. The 'red leaf' symptom is not found in English varieties (T. C. Vanterpool).

SPINACH

DOWNY MILDEW (Peronospora spinaciae) caused mod. losses on muck land at St. Michel, Laval Co., Que. (E. Lavallee).

CHLOROSIS and LEAF DROP (manganese deficiency) caused mod. damage to spinach in the Horticulture plots, Ottawa, Ont. (K. M. Graham).

SWEET CORN

SMUT (Ustilago maydis). Infection was reported: sl. at Medicine Hat, and Edmonton, Alta. (A. W. Henry); fairly heavy in a garden plot in York Co., Ont. (H. N. Racicot).

SQUASH

BACTERIAL WILT (Erwinia tracheiphila). One plant of Hubbard squash was found affected in a garden at Kentville, N. S. (K. A. Harrison).

WILT (Verticillium albo-atrum) affected 10% of the plants of Buttercup in a planting at Vernon, B. C.; the pathogen was isolated (G. E. Woolliams).

TOBACCO

The diseases of tobacco were summarized in a special report by Dr. L. W. Koch.

Seedbed Diseases

BLUE MOULD (Peronospora tabacina) did not occur either in the New or Old Tobacco Belts of Ont. until the last week of May, when scattered infections appeared in numerous districts. By this time transplanting was well under way and damage was slight because after the plants became infected the dry weather proved unfavourable for development of the disease.

YELLOW PATCH (excessive nutrients) caused considerable damage throughout the New Tobacco Belt. It seems that many growers are still prone to overfertilize their tobacco seedbeds even though they are aware of the danger from so doing. Damage from this trouble was negligible in the Old Tobacco Belt.

DAMPING-OFF (Pythium sp. and Rhizoctonia solani) was widespread and caused moderate damage during the early part of the season in the New Tobacco Belt of Ont. Continued cloudy weather provided favourable conditions for the disease, but it caused damage only where water was applied in excess or in a faulty manner. In all beds where severe damage was reported or observed the growers did not follow a spray program for control of blue mould.

Mushrooms continued to cause mild damage throughout the burley and dark tobacco areas of Kent County.

2,4-D (Dichlorophenoxyacetic Acid) INJURY. A number of cases of injury was brought to our attention apparently as the result of using improperly-cleaned knapsack sprayers.

Field Diseases

BLUE MOULD (Peronospora tabacina). Widespread infection of tobacco in the field occurred in extensive areas of the New Tobacco Belt of Ont. A study of these occurrences strongly indicated their origin to be spore showers from the U.S. tobacco growing areas - probably from Kentucky, Virginia and Ohio. Infection in most cases was limited to leaves on the lower half of the plant although in some fields all leaves showed spots resulting from blue-mould infection. (For a detailed study of its epidemiology see R. H. Stover and L. W. Koch, Sci. Agr. 31:225-252. 1951).

In general, damage to tobacco in the field by the blue mould fungus in Ont. was perhaps more serious during 1951 than in any previous year.

BROWN ROOT ROT (nematodes) caused mild damage to burley tobacco in Essex and Kent Counties and less than the usual amount of damage on flue tobacco throughout Ont.

BROWN ROOT ROT (Thielaviopsis basicola) caused mod. damage to pipe and cigar varieties in Que. On the other hand, less damage than usual occurred throughout the flue-cured areas of Ont. Growing more of the resistant variety Delcrest was, in part, responsible for the reduced amount of injury in the flue-cured crop in Ont.

MOSAIC (virus) was widespread throughout the burley and dark tobacco areas of Essex and Kent Counties. Etch strains of the virus again proved to be responsible for most of the disease present. (See also R. H. Stover, Tobacco etch virus in Ontario. Can. Jour. Bot. 20:235-245. 1951).

RINGSPOT (virus) was observed to be scattered throughout the burley tobacco area of Kent Co.; damage was slight.

SORE SHIN (?Rhizoctonia solani) occurred in several fields of flue-cured and burley tobacco in Essex County. This condition was observed at a much later date than usual and resulted in the weakening of stalks of plants that were nearly mature. There was some evidence that organisms other than R. solani contributed to the damage.

Other Observations

MOSAIC (virus) was particularly troublesome in Que. in 1951, because conditions were wet during the period of cultivation (F. Godbout).

TOMATO

EARLY BLIGHT (Alternaria solani) was not observed in the Lower Fraser Valley, B. C., during this dry summer (H. N. W. Toms). Most tomato patches suffered some defoliation in the Saskatoon area, Sask.; yields were probably little affected (H. W. M.). Only traces of the disease were found in the early crop at Leamington, Ont. (C. D. McKeen). Early blight caused extensive defoliation in many plantings of early staked tomatoes in Lincoln Co. In one field where the foliage had been severely blighted earlier, the disease caused severe damage to the fruit (J. K. Richardson). A survey of 50 fields in Prince Edward, Northumberland and Hasting Counties the first week of September revealed that early blight was mod. - sev. in some fields causing defoliation and black rot of the fruit. Along with late blight (q. v.) this disease was causing considerable loss in marketable fruits in the area. The concensus of opinion was that protective measures are not feasible because of the excessive cost of fungicides and their application. However, in the absence of any demonstration of sprayed vs. unsprayed crops it is difficult to accept this point of view as final (K. M. Graham). Early blight was general, as usual, in the Montreal district, Que.; it caused light losses (E. Lavallee). Early blight caused more defoliation than usual in Hants Co., N. S., because of wet weather in August and September. A 5% loss was estimated in fruit ripening in storage (K. A. Harrison). The disease was quite prevalent in gardens in Queens Co., P. E. I. (R. R. Hurst). Mod. infections were noted in 4 plantings in the St. John's area, Nfld. (G. C. Morgan).

GREY MOULD (Botrytis cinerea) appeared in 2 fall greenhouse crops at Leamington, Ont.; 50% of the plants showed stem lesions and a few plants were killed (C. D. McKeen). Grey mould killed about 2% of the plants in a spring greenhouse crop at Kingston, N. S., and about 1% in a greenhouse in October at Falmouth. About 3% of the fruits rotted on the vines in the spray plots at Kentville. Most of the affected fruits were in contact with the ground. The disease was very common in field crops this year (K. A. Harrison). Stem cankers were fairly common in a greenhouse crop at Falmouth where the twine had abraded the stems (J. F. Hockey).

LEAF MOULD (Cladosporium fulvum) caused a small amount of damage in commercial greenhouses in the Okanagan valley, B. C. (G. E. Woolliams). A severe general infection occurred on Vetomold in a greenhouse at Medicine Hat, Alta. (M. W. Cormack). In the Leamington area, Ont., leaf mould was not observed where either of the resistant varieties Improved Bay State or Vulcan was grown. However, the disease caused extensive defoliation with resultant losses where susceptible varieties were used (C. D. McKeen). Leaf mould was present on the fall crop in 8 greenhouses near Sherbrooke, Que. Four crops were severely defoliated and growers considered that the losses would be high (E. Lavallee).

ROOT ROT (Colletotrichum atramentarium). Samples of affected roots were received from a greenhouse near Leamington, Ont.; the extent of the damage was not learned. The ascervuli of the fungus were observed on the rotted roots and corresponded to the descriptions given by McKay, who states that it is "one of the commonest and most ruinous maladies attacking tomato plants in Ireland" (Robert McKay. Tomato Diseases Dublin 1949, pp. 19-20) (C. D. McKeen).

ANTHRACNOSE (Colletotrichum phomoides) was much less prevalent than in some years in the canning crop in s. w. Ont.; it developed toward the end of the season on the early crop. (C. D. McKeen). The disease was present on over-ripe fruit only in 6 fields examined in the canning area centering on Prince Edward Co. (K. M. Graham). Anthracnose is established in one garden at Kentville, N. S., preventing the late ripening of fruit from this garden. Traces were present in the Station garden. The disease is a serious threat to the practice of ripening picked fruit after the season closes (K. A. Harrison).

BACTERIAL CANKER (Corynebacterium michiganense) affected about 5% of the plants in a planting of Moscow at Lillooet, B. C. (G. E. Woolliams). A sl. infection was seen om 3 fields at Medicine Hat, Alta. (M. W. Cormack). The disease caused considerable damage in a 5-acre field of canning tomatoes at Belle River, Ont. (C. D. McKeen). About 10% of the plants were severely affected in a field at Levis, Que.; no previous case had been observed in the district (O. Caron). Bacterial canker caused about 20% damage in two fields at Falmouth, N. S. The transplants were raised in a greenhouse where the disease was present in 1950 (K. A. Harrison).

WILT (Fusarium lycopersici) was less prevalent in commercial fields at Medicine Hat, Alta., than in 1950; about 1% of the plants were severely damaged in the 3 fields examined (M. W. Cormack).

PHOMA ROT (Phoma destructiva) caused increasing losses during the storage period at the Station, Kentville, N. S. About 10% damage was seen in one lot and the average loss was 2% (K. A. Harrison).

LATE BLIGHT (Phytophthora infestans) was not seen in the Lower Fraser Valley, B. C., in 1951 (H. N. W. Toms). Late blight was found on tomato fruits in Man. almost as early as on potatoes and by late September was very prevalent. Green fruits harvested when warnings of frost were broadcast, were in many instances a total loss before the fruits ripened in storage (J. E. Machacek). Traces of late blight were observed in a few fields of the canning crop in Essex Co., Ont., late in the season. The disease also developed in a few greenhouse crops, in the Harrow-Leamington area, in which the crop was not protected. Most growers have followed the recommendations to spray or dust plants with a fixed copper at fortnightly intervals, following the widespread and serious losses suffered by many growers in the fall crop of 1950 (C. D. McKeen). Field spraying of tomatoes was recommended as a general practice in the Niagra Peninsula for the first time this year and the results have been excellent. Although infection started early, wherever regular fungicide applications were made losses were significantly reduced and most of the crop could be harvested. Many of the unsprayed plantings were a total loss (J. K. Richardson). Late blight infection was mod. in 7 and sev. in 12 of the 50 fields surveyed in the canning area centering

on Prince Edward Co. Only one grower applied fungicides to control the disease. As remarked under early blight (q. v.) the loss was considerable in marketable fruits (K. M Graham). Late blight was general in e. Ont. and some 10% of the plantings were severely affected. Foliage and stem infections were general with some disease on the fruit (H. N. Racicot). The outbreak of late blight this year was the most severe experienced for many years in the Montreal district, Que.; losses were high everywhere (E. Lavallee). Late blight was first observed on tomato fruits on 2 August in Laval Co. By the end of the month the disease was severe in many parts of Que. and losses were as high as 75% of the crop in some fields. The late crop was a total loss in most localities (H. Genereux). Late blight was first observed on tomato on 10 Aug. in Queens Co., N. B. (S. F. Clarkson). Late blight was very prevalent in N. B. and caused a loss of half the crop in unsprayed and poorly sprayed fields. Even in sprayed fields there was considerable fruit rot (J. L. Howatt). Late blight was first observed on tomatoes on 10 Aug. in N. S. In the canning area, in 6 fields examined, infection was light with no loss of fruit. Most tomato fields were well sprayed, but for the third year growers who did not spray lost their late crop of tomatoes. Home gardens suffered severely (K. A. Harrison). Late blight was destructive to tomatoes in many locations across P. E. I. (R. R. Hurst). See p. 64 for physiologic specialization of the pathogen.

BACTERIAL SPECK (Pseudomonas tomato). A sl. infection was seen in a planting at Edmonton, Alta. (L. E. Tyner). Most of the fruits in a small field of early tomatoes at Leamington, Ont., were well spotted; the loss was heavy because the fruits were unmarketable (C. D. McKeen).

DAMPING-OFF (?Pythium sp.). Damage was mod. in 3 greenhouses and tr. in 2 in Nfld. (G. C. Morgan).

STEM ROT (Sclerotinia sclerotiorum) affected a single plant in a plot at Kentville, N. S. (K. A. Harrison).

LEAF SPOT (Septoria lycopersici). Leaf and stem spot was mod.-sev. in 10 fields out of the 50 surveyed in the area centering on Prince Edward Co., Ont.; the disease was most severe where tomatoes had been grown on the same land for 2 or more years. A sl. infection was also present in the Laboratory plots at Ottawa (K. M. Graham). As in previous years leaf spot caused much defoliation of the early crops in Essex Co. (C. D. McKeen). Mod. infected leaves were received from Farnham, Que. (H. N. Racicot). Traces of leaf spot were found in most fields of tomatoes in Kings Co., N. S., before the close of the season. Very little of this disease has been seen in previous years (K. A. Harrison). Leaf spot caused sl. defoliation in 3 small acreages of early tomatoes in the St. John's area, Nfld. (G. C. Morgan).

WILT (Verticillium albo-atrum) was widespread in B. C. and caused considerable damage (W. R. Foster). The survey of crops for Verticillium wilt in the B. C. Interior begun in 1950 was continued. The disease is widely distributed in the Okanagan, Thompson, and Upper Fraser Valleys. It was most prevalent on tomato and pepper (q. v.), 10-100% of the plants being affected. Other hosts were potato,

eggplant, cucumber, cantaloupe (cf. melon), watermelon, squash, apricot and some weeds. At Kamloops and Lillooet, the disease was severe affecting about 100% of the plants in fields planted continuously to tomatoes. Infection was sl. in fields planted to tomatoes for only 2-3years and no infection was noted in fields newly planted to tomatoes (G. E. Woolliams). V. albo-atrum was isolated from the stems of tomato plants showing wilt symtoms that were sent in from a greenhouse in Lincoln Co., Ont. (J. D. Gilpatrick). Wilt caused a severe loss in seedlings 5-6 weeks old in a greenhouse at Trenton, N. S. It affected 20% of the plants of Bay State in a new greenhouse producing its second crop of tomatoes at Falmouth; the soil had not been sterilized (J. F. Hockey, K. A. Harrison).

DOUBLE VIRUS STREAK (virus). A diseased plant received from Norwood, Man., on 13 Aug. showed symtoms typical of this disease -- dark streaks on stems, fruits rough with "grease spots" and necrotic areas in the leaves. When the garden was examined 1 Sept. many diseased plants were seen and a few were so heavily attacked that they bore no marketable fruits. A plant of Bonny Best inoculated mechanically with the juice of the infected plant developed the disease. When juice from the inoculated plant was passed through a Seitz filter and used to inoculate 5 plants of Bounty, all 5 developed the disease. Five control plants inoculated with sterile water remained healthy. One month later all 5 inoculated plants were dead and the 5 controls still healthy (W. A. F. Hagborg).

MOSAIC (virus) was severe in a greenhouse on Lulu Island, B. C. 29 April (I. C. MacSwan). Mosaic infected a few plants in some fields to almost 100% in others on 30-31 July in the Kamloops area. Up to 10% of the plants were affected in some of the plots at Summerland (G. E. Woolliams). Shoe string-mosaic (Cucumis virus) was found affecting 50% of the plants in a planting of staked tomatoes in Lincoln Co., Ont., on 1 June; the leaves were severely stunted (G. C. Chamberlain). Mosaic was found in many fields in the Montreal district, Que. Some 50% of the plants were infected at Ste. Dorothee and Ste. Rose. A trace to 40% of the plants showed mosaic in 8 greenhouses near Sherbrooke (E. Lavallee). In a greenhouse in York Co., N. B. 3% of the plants showed a faint mosaic caused by Solanum virus 1, strain L. In a commercial greenhouse in Sunbury Co., 3% of the plants were affected by mosaic (Nicotiana virus 1); damage was sl. The fern-leaf effect was seen in 2 plants in a planting in York Co. (D. J. MacLeod). All the plants in a greenhouse crop of Bay State at Kingston, N. S., were affected. The grower estimated that a serious reduction in yield occurred in the first 2-3 trusses (K. A. Harrison). Mosaic was also seen in Inverness and Victoria Counties (P. M. Grainger). About 50% of the plants were affected in a greenhouse at Torbay, Nfld. (G. C. Morgan).

PURPLE TOP (virus). A trace to 1% was noted in 7 plantings in Sunbury and York Counties, N. B. (D. J. MacLeod).

YELLOWS (Beta virus 1) caused very little damage in the southern part of the Okanagan Valley, usually only an occasional plant being affected (G. E. Woolliams).

BLOSSOM-END ROT (non-parasitic) was common in gardens especially on Stokesdale about Sidney and Victoria, B. C., under the dry conditions prevailing in 1951 (W. Jones). The disease was general in the Lower Fraser Valley and as

high as 90% of the fruit were affected at times in the University plots, Vancouver (H. N. W. Toms). Blossom-end rot occurred throughout the Interior. It affected some or all the fruits on the first truss, but those formed later were rarely affected (G. E. Woolliams). Blossom-end rot was common in a planting in Carleton Co., Ont.; the soil tended to dry off rapidly after rains and it had been heavily fertilized (K. M. Graham). Very little loss of fruit occurred in N. S. (K. A. Harrison) or P. E. I. (R. R. Hurst). Some loss occurred in several greenhouses in Nfld.; losses in field tomatoes were less than in 1950 (G. C. Morgan).

BLOTCHY RIPENING (non-parasitic) was general and caused considerable loss of fruit in one greenhouse at Sooke, B. C, (W. R. Foster). This disease has been observed on tomato fruits for the last 4-5 years in N. B. At first I mistook it for late blight on the fruit. The name "Blotchy Ripening" proposed by Atkinson of New Zealand (cf. P. D. S. 30:92) is a very accurate description of the symtons after the tomato has ripened. However, what appears to be the same disease is called "Grey Wall" by the pathologists in Florida. This term refers to the symtoms in the immature fruit and is quite appropriate since most of tomatoes grown there are still green when they are picked to ship to northern markets. I have seen the disease in Florida and the symtoms on the green fruit are very severe. If a fruit is cut crosswise circular to elongate brown spots are present in the central tissue of the wall. If a thin slice is removed from the side of a fruit brown streaks sometimes almost continuous are exposed. The cause of the trouble is still unknown, but some ovservations made by me last winter in Florida agree with Atkinson's contention that the disease may be kept in check by reduced watering. This disease, according to Dr. Conover, has only been observed in Florida for the last few years, which is my experience in N. B. (S. F. Clarkson). Blotchy ripening was found everywhere in Kings Co., N. S., throughout the season this last summer, and 20% of the fruit were commonly affected. The trouble does not seem to be associated with potash deficiency (K. A. Harrison).

2,4-D INJURY. Considerable distortion of the foliage and lack of seed development in the fruits were observed in Essex Co., Ont., in many tomato fields where nearby roadsides or stands of weeds had been sprayed with the ester form of 2,4-D (C. D. McKeen). Specimens of severely malformed leaves and elongated seedless fruits injured as a result of spraying roadsides and weeds were brought to the laboratory from Lincoln Co. (J. K. Richardson). Crop in a home garden at Scarboro was almost a total loss as a result of spraying a roadside and a railway right-of-way near the garden (H. N. Racicot). Fully half the crop was killed and the rest severely injured in a greenhouse in Trenton, N. S. The owner of the sprayer loaned it to another, who used it to apply 2,4-D and returned it without notifying the grower of the fact (K. A. Harrison).

FRUIT ROT (cause unknown). A few fruits affected by a watery soft rot, dull green in colour, and covered with a growth of Penecillium were found in a field in Carleton Co., Ont.; the fruits were quite small when they became infected (K. M. Graham).

TURNIP

GREY MOULD (Botrytis cinerea). In April about 30% of the stecklings of one lot of Ditmars swede turnips at Barton, N.S., showed lesions on the sprouts and necks; of these half had to be discarded. When the infected roots were planted the disease progressed further and the yield of seed was reduced 75% (K. A. Harrison).

SOFT ROT (Erwinia carotovora). A few plants of Ditmars Bronze Top swede turnip were found infected in a field at Barton, N.S. (K. A. Harrison).

POWDERY MILDEW (Erysiphe polygoni). A light infection was seen on a crop of Ditmars Bronze Top at Barton, N.S., in late October (K. A. Harrison).

DOWNY MILDEW (Peronospora brassicae). A heavy infection was seen on Ditmars Bronze Top at Barton, N.S., in June; leaves were somewhat curled and drying out (K. A. Harrison).

BLACK LEG (Phoma lingam). A tr. to 10% of the plants were affected in plantings of Laurentian swede turnips in Queens Co., P.E.I. (R.R. Hurst).

CLUB ROOT (Plasmodiophora brassicae). A field of about 1/3 acre of Ditmars Bronze Top at Barton, N.S., was severely damaged by club root. It was particularly severe in the lower part that is sometimes flooded (K. A. Harrison). Infection was tr. in a field in Cape Breton Co., and 10% in Inverness Co. (P. M. Grainger). In areas in Nfld. where Wilhelmsburger is being grown loss has been greatly reduced. However, small garden plots in Trinity, Bonavista, and Notre Dame Bays are heavily infected. Subsistence farmers have such small plots that they do not practise crop rotation (G. C. Morgan).

STORAGE ROT (Rhizoctonia solani). A waxed swede turnip root showing several small darkened areas up to 1 cm. in diameter and evidently enlarging was received from D. R. Sands, Department of Botany, O.A.C., Guelph, Ont. Two unwaxed roots were perfectly healthy. Rhizoctonia solani was almost the only fungus isolated from the dark spots (H. N. Racicot). Almost 20% of the stecklings from a lot of Ditmars Bronze Top rotted in storage at Barton, N.S.; the fungus was freely isolated (K. A. Harrison).

SCLEROTINIA ROT (S. sclerotiorum). A single plant found affected at Barton, N.S. Several flowering stalks rotted during the summer in a seed plot at Kentville (K. A. Harrison).

BLACK ROT (Xanthomonas campestris) caused considerable damage in one shipment of swede turnip from Pemberton Meadows to Victoria, B.C. (W.R. Foster). Six roots severely rotted were brought in to the laboratory at Charlottetown, P.E.I. (R.R. Hurst).

MOSAIC (virus). About 15% of the stecklings in a planting of Ditmars Bronze Top at Barton, N.S., showed mosaic mottling and the affected plants were somewhat stunted. (K. A. Harrison).

STERILITY (virus). About 2% of the plants in a seed plot in York Co., N.B., showed sterility (D. J. MacLeod). About 1% of the plants showed the typical sterile inflorescence in a field of Ditmars Bronze Top at Barton, N.S. (K. A. Harrison).

WITCHES' BROOM (virus). Two affected plants were found in a seed plot in York Co., N.B. (D. J. MacLeod).

BROWN HEART (boron deficiency). Traces were observed in all three counties of P. E. I. In one field at Kensington, 3% of the roots were mod. infected (R. R. Hurst). Sl. damage was observed in Trinity Bay and Conception Bay, Nfld. (G. C. Morgan).

2,4-D INJURY. When 2,4-D (ester) was sprayed on a field of grain to control mustard in Queens Co., P. E. I., it caused injury to hoed crops in parallel rows in an adjoining field. Injury was severe on the turnips (1 1/2 acres), greatly stunting the growth. Affected roots remained small, curved, and narrow waisted. Hardly a root reached normal size in the half of the planting nearest the grain field and it was estimated the loss was 80% of the crop; the other half was probably less severely affected, but it was not carefully examined. The carrots (1/2 acre) were also affected but would probably produce a harvestable crop. The crown was rough and woody, but the rest of the root appeared normal. The potatoes (1 acre) had shown some twisting and curling of the vines, but appeared to have outgrown the condition. The mangels (1/2 acre) were unaffected. A second case was seen later. Similar injury by 2,4-D was observed by L. C. Callbeck last year at Woodstock, N.B., and Dr. R. O. Bibbey, O. A. C., Guelph, reported that he had seen the trouble on swede turnips in Ont. (E. G. Anderson, L. C. Callbeck).

WATERMELON

ANTHRACNOSE (Colletotrichum lagenarium). About 50% of the fruits were affected in a 1/2-acre field at Pont Viau, Que.; some stem lesions were severe (E. Lavallee).