

III. DISEASES OF VEGETABLES AND FIELD CROPS

ASPARAGUS

RUST (*Puccinia asparagi*) was general throughout the Armstrong district of B. C. It affected practically all the plants in most commercial fields (G. E. Woolliams).

DIE BACK (cause undetermined) was seen on occasional plants in Queen's Co., P. E. I. Affected plants were sev. damaged (R. R. Hurst).

BEAN

Diseases of White Beans in Ontario in 1957

R. N. Wensley

Root rot of white beans was not prevalent in western Ontario in 1957. Moreover, where found, the disease was mild and was not a serious deterrent to plant development. An immature crop of the Slender Green variety of snap beans at Harrow developed sev. root rot caused by *Fusarium* and *Pythium* species in October under the prevailing wet conditions.

Bacterial blight was prevalent on the foliage but did not attack pods to any extent. Crop development was not affected.

Anthracnose was prevalent in Huron and Elgin counties and in part of Middlesex Co. Yield and seed quality of susceptible varieties were reduced. The variety Sanilac was the least affected by anthracnose.

The seed quality of late maturing and unharvested crops of white beans was reduced by a prolonged period of wet weather. The earlier varieties, such as Sanilac, escaped weather injury and proved profitable in many areas.

Other Observations

GRAY MOLD (*Botrytis cinerea*) was present on pole beans throughout the Lower Fraser Valley of B. C. following cool, wet weather at the end of June. There was some pod loss (H. N. W. Toms). There was a mod. infection on leaves and pods of Brittle Wax at Ste. Foy, Que. (D. Leblond). Gray mold was tr. on Lapin and Soldier at Millville, N. B. (S. R. Colpitts). A light infection occurred in a field at Berwick, N. S. The disease was less in 1957 than usual (K. A. Harrison).

ANTHRACNOSE (Colletotrichum lindemuthianum) was sev. in plots at St. Jean, Que. (R. Crete). It was sev. at St. Petronille and sl. at St. Michel, Que. on snap beans (L. J. Coulombe). In test plots at Fredericton and Millville, N. B. anthracnose was 100% on Charlottetown #80; 50% on Soldier; and tr. on Lapin (S. R. C.). Mod. -sev. infections on snap beans at Miscouche, P. E. I. caused mod. damage. Leaf, petiole, stem and pod lesions were evident (J. E. Campbell). Anthracnose was sev. in a few gardens in Kings Co., N. S. There were no reports of losses in commercial fields (K. A. H.).

HALO BLIGHT (Pseudomonas phaseolicola) was scattered through a field of beans grown for seed at Grand Forks, B. C. About 5% of the plants were affected (G. E. Woolliams). Little halo blight was seen in commercial plantings in N. S. but it was sev. in plots at Kentville where local seed was sown. Kearnly was 100% infected (K. A. H.).

SCLEROTINIA ROT (S. sclerotiorum) affected 20% of the pods of a snap variety at Canning, N. S. (J. F. Hockey).

RUST (Uromyces appendiculatus). Following a heavy infection in 1956 and with favorable damp, cool weather at the end of June, rust was again heavy on foliage in the Lower Fraser Valley, B. C. Damage was not assessed (H. N. W. T.). It was widely distributed throughout this area (W. R. Foster). Rust was tr. on Charlottetown #80 in test plots at Fredericton, N. B. (S. R. C.).

COMMON BLIGHT (Xanthomonas phaseoli). A sev. attack of blight was present on 16 Aug. in one group of navy bean plots at Portage la Prairie, Man. following a heavy rainfall accompanied by high winds. No infection was found in another group of plots several hundred yards from the first and said to have been sown with seed from the same source but at a later date. The circumstances suggest that the initial infection in the diseased plots was not seed-borne, but possibly had been introduced on a carrier agent earlier in the season and had spread rapidly during the period of hydrosis caused by the rain storm (W. A. F. Hagborg). A 10% infection at St. Laurent, Que. caused sl. damage (L. J. C.). The varieties Charlottetown #80 and Soldier in test plots at Fredericton, N. B. were 100% infected (S. R. C.).

MOSAIC (virus). Many late maturing fields of snap beans grown in the Harrow district for canning factories showed almost 100% infection with mosaic (C. D. McKeen). Mosaic was present in snap beans in many gardens in Kings Co., N. S. A plot of pole beans growing near gladiolus was 20% infected (K. A. H.).

BEET

LEAF SPOT (Cercospora beticola). Beets grown on the same 5-acre field at Ridgetown, Ont., for the third consecutive year were sev. defoliated by leaf spot. All plants were infected. A reduction in yield of at least 50% was estimated (R. W. Walsh). At Sherrington, Que. about 20% of a 15-acre field was affected, causing the death of older leaves. Mod. infections occurred in several home gardens at Hemmingford (R. Crete).

SCAB (Streptomyces scabies) was mod. -sev. in 6 small gardens in the Manuel's-Killigrews area of Nfld. Sl. infections were noted in 4 small plots at Clarke's Beach and in 2 at Harbour Main (G. C. Morgan).

BLACK ROOT (pathogen undetermined). A 4-acre field at Tilbury and another at Erieau, Ont. were rejected for processing because of the high incidence of black root. Over 50% of the roots at Erieau were infected. Flood conditions earlier in the season are believed responsible for the outbreaks (R. W. W.).

NEMATODES (Paratylenchus sp.) Two areas of poor growth, each about 50 ft. in diam. were observed in a 5-acre field at Ridgetown, Ont. An examination of the soil in the affected areas showed high populations of Paratylenchus sp. (R. W. W.).

BORON DEFICIENCY. A crop grown in the Montreal district was rejected at the canning factory due to internal black spotting caused by this disease. The incidence of internal symptoms was high (R. O. Lachance). A late planting of Detroit Dark Red at New Canaan N.S. destined for canning was badly deformed and blackened in the outer ring of flesh. The field was too severely affected to be harvested (K. A. Harrison).

BROAD BEAN

CROWN AND STEM ROT (Fusarium sp.). Several plants were affected in a garden in Queen's Co., P. E. I. (R. R. Hurst).

BLACKENING (physiologic). Stems, leaves and pods were affected at Ste. Foy, Que. Symptoms first appeared at the end of June and became progressively worse as the season progressed. No control was obtained with fungicide applications. Alternaria, Botrytis, Fusarium, Phytophthora and Verticillium spp. developed on pods in moist chambers (D. Leblond).

CABBAGE

LEAF SPOT (Alternaria sp.) was tr. on an unnamed variety in Queen's Co., P. E. I. (R. R. Hurst).

GRAY MOLD ROT (Botrytis cinerea) affected 1-2% of the heads of Golden Acre in a field at Upper Gullies, Nfld. It caused a moist, blackish rot of the outer leaves on the tops and sides of heads (O. A. Olsen), stored cabbage in cellars at Harbour Grace and Carbonear and in a warehouse at St. John's were sev. affected (G. C. Morgan).

YELLOWWS (Fusarium oxysporum f. conglutinans). Sl. infections were seen in mid-July at Ste. Foy, Que. Cauliflower and Brussels sprouts were also affected (D. Leblond).

DOWNY MILDEW (Peronospora brassicae) was tr. on Golden Acre at Saanichton, B. C. (W. R. Orchard).

CLUB ROOT (Plasmodiophora brassicae). A few reports of club root were received from growers in the Lower Fraser Valley and in the Vancouver area, B. C. No heavy attacks were reported (H. N. W. Toms). Several fields in Kings Co., N. S. had sl. infections (K. A. Harrison). It was present in all areas of Nfld. (O. A. Olsen), it was sl. -mod. in 2 fields at O'Regans, 3 at Searston and 4 in the Robinson's-Cartyville area, all on the west coast. A sev. infection was seen in 2 fields at Codroy. It was sev. in 8 fields at Conception Bay and in 6 at Bonavista Bay, and sl. -mod. in many fields at Trinity Bay (G. C. Morgan).

BLACK ROT (Xanthomonas campestris) was present in many fields in the Burlington-Toronto area. Sev. loss was occasioned in one 3-acre field where rotation had not been practiced (E. F. Muir).

DAMPING OFF (pathogens undetermined) was quite general in the Burlington-Toronto area and sev. in 3 or 4 cases where the seedbeds had not been sterilized (E. F. M.).

BLACK LEAF SPECK (non-parasitic) was seen on cabbage received from a local market in Quebec City, Que. (D. L.).

CARROT

LEAF SPOT (Cercospora carotae). A 1-acre field of Gold Spike carrots at Grafton, N. S., was so sev. affected that the roots were only half-size when they had to be lifted. A number of growers report that growth of carrots has been poor because of this leaf spot. The disease is increasing in severity in N. S. (K. A. Harrison).

SCLEROTINIA ROT (S. sclerotiorum). Specimens were received from Les Ecureuils, Portneuf Co., Que. (D. Leblond).

BACTERIAL BLIGHT (Xanthomonas carotae) occurred on 1 % of the plants in a field being grown for seed at Grand Forks, B. C. Infection occurred on leaves and umbels. Umbel infection was mostly sl. (G. E. Woolliams).

ROOT KNOT NEMATODE (Meloidogyne hapla). Sl. infections occurred on 20 % of the roots in an 8-acre field on muck soil at West Dover in s. w. Ont. There were only a few knots per root and little distortion was seen (R. W. Walsh).

YELLOW S (Callistephus virus 1). Yellow S was widespread and sev. in Sask. In a market garden in Saskatoon, inspected late in the season, about 90 % of the carrots were affected, most of them severely (R. J. Ledingham). At Jeanette Creek in Kent Co., Ont. 10-15 % of an 8-acre field was infected. Secondary organisms had caused a core rot of affected plants (R. W. W.). Aster yellow S was the most serious disease in carrots in the Thedford and Grand Bend Marshes in 1957. Much of the infection apparently took place fairly late in the season. Infection was as high as 40 % in some fields but losses from the disease were only around 10 %. Even at that figure the loss would be over 300 tons. Carrots in this area are grown mainly for processing (J. R. Chard). The disease was less troublesome than usual in Kings Co., N.S. in 1957, averaging 3-5 %. Infection occurred late in the season and consequently the carrots were not affected as severely as is usual (K. A. H.).

FROST INJURY. Heavy frosts the week of 22 Sept. caused considerable losses to the canning carrot crop in the Thedford and Grand Bend Marshes in Ont. Carrots with crowns exposed developed a breakdown of vascular tissues often followed by soft rot. Losses from freezing were variable depending on the location and the percentage of exposed crowns. Individual losses ran as high as 25 % with an overall loss of about 15 % (J. R. C.).

CAULIFLOWER

SOFT ROT (Erwinia carotovora) was present at Berwick, N.S. in a field which showed boron deficiency (K. A. Harrison).

CLUB ROOT (Plasmodiophora brassicae). Club root was less prevalent than usual in the Burlington-Toronto area in 1957. One sev. outbreak occurred in field-sown cauliflower grown on a farm which had been club-root free for 5 yrs. (E. F. Muir).

BORON DEFICIENCY. An estimated 15 % of the heads in one field at Berwick, N.S. showed symptoms of boron deficiency (K. A. H.).

WHIPTAIL (*Molybdenum* deficiency). A sl. amount of whiptail occurred on a molybdenum deficient soil at York, P. E. I. Foliage sprays of sodium molybdate were applied too late to give maximum benefit (J. E. Campbell). A few plants in a small garden at Baxter's Harbor, N. S. were sev. affected by whiptail (K. A. Harrison).

CELERY

EARLY BLIGHT (*Cercospora apii*) was present in many fields in the Burlington-Toronto area but serious losses were prevented by spraying (E. F. Muir).

NEMATODES (*Paratylenchus* sp.). The pin nematode again caused sev. stunting to celery in the Thedford Marsh, Ont. Yield reductions of over 50% occurred in heavily infested fields. Plants attacked by nematodes appeared more susceptible to infection by early and late blights and also to showing symptoms of several minor element deficiencies. Fumigation has not proven a practical control on muck soil (J. R. Chard). One grower at Burlington, Ont. lost approximately 25% of his crop. Counts made by J. L. Townshend showed a population of *Paratylenchus* sp. of 4000 to 14,000 per lb. of soil (E. F. M.). This nematode is an ectoparasite. The roots of affected plants had numerous rusty-brown lesions (J. L. T.).

STEM MOLD (*Pellicularia filamentosa*). The *Pellicularia* stage of the fungus was growing up the stalks of celery at the Exp. Farm, St. John's West, Nfld. About 15% of the plants were affected but they appeared to suffer no particular damage (O. A. Olsen).

BACTERIAL BLIGHT (*Pseudomonas apii*) appeared late in the season in the Bradford-Thedford Marshes in Ont. (L. V. Busch).

LATE BLIGHT (*Septoria apii*) was noted on celery at Fort Vermillion, Alta. (E. W. B. Ward). Late blight was sev. in many fields in the Burlington-Toronto area. Several fields were totally lost. Copper dusts were less effective in control than copper sprays (E. F. M.).

YELLOW S (*Callistephus virus*) affected 10% of the plants of Utah #15 in the laboratory plots at St. Catharines, Ont. (G. C. Chamberlain). Yellow S caused 5-10% loss of crop in some fields in the Burlington-Toronto area. Much of the infection appeared to have taken place either in the seed bed or soon after transplanting (E. F. M.). The disease in the Bradford-Thedford Marshes ran as high as 15% in some fields as compared with 1-2% in most years. The overall loss from aster yellows in celery was probably less than 10% (J. R. C.).

MAGNESIUM DEFICIENCY. Foliar applications of magnesium salts usually correct the deficiency. However, there appear to be varietal differences in this respect. Many growers in the Burlington-Toronto area are changing from Utah Salt Lake to Utah Dark Green which does not show the chlorotic effect (E. F. M.).

CHINESE CABBAGE

WHITE SPOT (Cercospora albo-maculans). A tr. infection was seen at Ste. Foy, Que. (D. Leblond).

CUCUMBER

LEAF SPOT (Alternaria sp.) was tr. at Saanichton, B. C. (W. R. Orchard). It was reported from Lulu Island, B. C. in association with root rot and wilting after cool, wet weather (H. N. W. Toms). Leaf spot was sev. on the Chicago Pickling variety in Queen's Co., P. E. I. where it caused considerable damage (R. R. Hurst). Alternaria leaf spot was recorded from many parts of the Annapolis Valley in N. S. (K. A. Harrison).

GRAY MOLD (Botrytis cinerea) was prevalent in many greenhouse crops in Essex Co., Ont. during the latter part of April and during May (C. D. McKeen). It was tr. in a greenhouse at Kingston, N. S. in March. A few plants had died (K. A. H.).

SCAB (Cladosporium cucumerinum) occurred in mod. amounts in a field at Carman, Man. (W. C. McDonald). In plots at the Que. Dept. of Agr. Plant Protection Sta. at Ste. Foy, Que. 15% of the cucumbers were scabbed at harvest (D. Leblond). At Ste. Anne de la Pocatiere, Que. 80-100% of the fruit of all varieties under test were sev. affected at an early stage of development. At St. Nicholas, Que. in Aug. 50% of the fruits were scabbed early in August. Small cucumbers were more affected than those of market size. The National Pickling variety was also sev. affected at Charlesbourg, Que. (L. J. Coulombe). Scab was especially sev. on cucumbers in N. B. in 1957. Control measures were rarely applied and the resistant varieties available were not used because of market preference for the older varieties (S. R. Colpitts). The disease was tr. in a home garden in Queens Co., (R. R. H.) and sev. in gardens at Kensington, P. E. I. (J. E. Campbell).

BACTERIAL WILT (Erwinia tracheiphila) caused the death of 3-4% of young plants set in many fields in Essex Co., Ont. in late May and early June (C. D. McK.). It caused losses of over 50% in 2/3 affected fields in the Burlington-Toronto area. No attempt was made to control the cucumber beetle (E. F. Muir). A tr. infection occurred at Woodside, N. S. (K. A. H.).

POWDERY MILDEW (Erysiphe cichoracearum). Infection was general but light on foliage in the greenhouse at the Vancouver, B. C. lab. (H. N. W. F.) Mildew appeared in a few greenhouses in the Leamington, Ont. district in late April and subsequently spread to all greenhouses. All cucumber crops in the field were affected. Karathane gave adequate control (C. D. McK.). Mod. -sev. infections occurred on Maine #2 in test plots at the Exp. Farm, Charlottetown, P. E. I. (J. E. C.). The disease was sl. in plots at the Exp. Farm, Kentville, N. S. (K. A. H.).

WILT (Fusarium solani) caused sl. damage in a field at Taber, Alta. (F. R. Harper).

FOOT ROT (Fusarium sp.) killed over 75% of the plants in a greenhouse in Mersa Twp., Ont. Cucumbers had been grown in the same soil every year for eight years without any sterilization (R. W. Walsh).

BLACK ROT (Mycosphaerella melonis). The Ascochyta stage of the fungus caused lesions on fruits at Ste. Foy, Que. (D. L.).

ANGULAR LEAF SPOT (Pseudomonas lachrymans) was present in the Osoyoos district of B. C. but was controlled by protective sprays (W. R. Foster). It was isolated from petioles of diseased plants in the Winnipeg, Man. district (W. L. Gordon, W. A. F. Hagborg). A 10% infection was seen in a field at Gagetown, N. B. (S. R. C.).

DAMPING-OFF (Pythium sp.) was found in one field in the Cranford district of s. Alta. (F. R. H.). Young plants set under paper in the Harrow, Ont. area suffered losses of up to 25%. The disease is always more destructive on soils of light texture (C. D. McK.).

FOLIAGE DECAY (Trichothecium roseum). Leaf infections occurred in a few greenhouses at Leamington, Ont. The fungus develops saprophytically on honey bee faeces on the upper surfaces of leaves and then becomes parasitic on adjacent healthy tissue often destroying 1/3 of the leaf. Regular application on Maneb gives fairly good control (C. D. McK.).

WILT (Verticillium albo-atrum) was sev. in a field of Wisc. S. R. 2 at Woodside, N. S. The field had grown a crop of Kennebec potatoes the previous year (K. A. H.).

MOSAIC (virus) was sev. at Rimouski, Que. (D. L.). The National Pickling variety was affected at Charlesbourg, Que. (L. J. C.). Tr. infections were observed on Long Green in Queen's Co., P. E. I. (R. R. H.). Sev. symptoms were observed in experimental plots at Kentville, N. S. No infection was seen in commercial fields (K. A. H.).

NECROTIC LEAF SPOT (virus). Since 1952 a virus which was earlier thought to be one of the ringspot group has appeared periodically during the fall, winter and early spring dropping seasons in 2 series of greenhouses in the Harrow-Leamington area of Ont. The virus, though showing certain characteristics of those of the tobacco necrosis group, is distinct and is being designated "Cucumber necrosis virus." It rendered unproductive one crop at Leamington in 1957 (C. D. McK.).

RING SPOT (virus). A strain of the tomato ringspot virus appeared in one greenhouse at Kingsville, Ont. in April. It destroyed 30% of the plants. (This is an unreported strain and a paper describing the virus and the symptoms it produces is being prepared) (C. D. McK.).

YELLOWINGS (*Callistephus virus 1*). Damage to cucumbers, attributed to the aster yellows virus, was widespread and sev. in Sask. in 1957. Yellowing and dwarfing of the plants was soon followed by wilting and death (R. J. Ledingham).

CHEMICAL INJURY. Copper sulphate, erroneously applied for copper-lime dust completely destroyed a planting of 1 1/2 acres at Narrows, N. B. (S. R. C.).

EGGPLANT

WILT (*Verticillium albo-atrum*). All fields in Essex Co. showed wilt varying from tr. -10% infection. Adequate irrigation on a fertile soil ensures a crop despite the presence of the fungus in the vessels of infected plants (C. D. McKeen). Wilt was again serious in many fields in the Burlington-Toronto area. Fumigation with Dowfume MC-2 appeared to give some control of the disease (E. F. Muir).

LETTUCE

GRAY MOLD (*Botrytis cinerea*) caused extensive damage to flower heads and seeds at Saanichton, B. C. (W. R. Orchard). It was sl. on University plots at Vancouver, B. C. (H. N. W. Toms). Infection varied from 10-20% in 3 half-acre fields at Leamington, Ont. in April and May. Infected plants failed to form heads (C. D. McKeen). Gray mold was seen on head lettuce in a retail store in Charlottetown, P. E. I. (R. R. Hurst).

ROOT ROT (*Botrytis cinerea*) caused serious losses in the Bradford and Thedford muck areas in Ont. Damage in many fields was in excess of 50%. This is one of the most serious diseases of head lettuce in the area (L. V. Busch). *Botrytis*, in association with *Sclerotinia sclerotiorum* and *Rhizoctonia solani* caused extremely sev. outbreaks of root rot in the Grand Bend Marsh of Ont. in the early part of the 1957 season. It was most sev.

on land cropped to lettuce the previous year and on newly broken land. In many such fields infection was 100% and losses ranged from 75 - 100% depending on weather conditions at heading time (J. R. Chard).

DROP (Sclerotinia sclerotiorum) was tr. in seed plots at Saanichton, B. C. (W. R. O.). It was sl. in seed fields at Grand Forks, (G. E. Woolliams), and in University plots at Vancouver, B. C. (H. N. W. T.). Drop was responsible for sev. injury to lettuce in a few gardens in Saskatoon, Sask. (R. J. Ledingham). The disease was less destructive than usual in N. S. in 1957 (K. A. Harrison).

YELLOWS (Callistephus virus 1). Yellowing was less serious on lettuce in Sask. than in other crops (R. J. L.). This disease was widespread in s. w. Ont. Several crops grown in Aug. and Sept. in the La Salle area were a complete loss (C. D. McK.). In late July aster yellowing infection built up to the highest level yet seen in the Grand Bend Marsh, Ont. All fields were infected, and coupled with the losses from root rot most growers considered themselves lucky to harvest 50-75 crates per acre as compared to a normal yield of 300 crates. It was impossible to control the vector when nearby fields and ditch banks were not sprayed or dusted (J. R. C.). Losses from aster yellowing in the Bradford-Thedford areas of Ont. were much heavier than usual in 1957. The vector, the six-spotted leaf hopper was unusually prevalent. At the peak of the trouble in early July lettuce was wholesaling at \$11.00 per crate against the normal \$3.00. Many growers suffered 100% loss. Normal crops were harvested by two growers who applied DDT every 5-7 days to their entire acreage, including drainage-ditch banks (L. V. B.). Yellowing was mod. -sev. in most fields around Ste. Clothilde, Que. Losses ranged from 30-50% (R. Crete).

FLOWER DEFORMITY (? genetic). Deformation of flowers, virescence and phyllody, and fasciation of stems occurred in both 1956 and 1957 in the University plots at Vancouver, B. C. In a few cases only part of the inflorescence was affected (H. N. W. T.).

TIPBURN (physiological) was sl. in a market garden at Cornwall, P. E. I. Affected plants showed necrosis at the leaf margins and near the veins of the inner leaves (J. E. Campbell).

MELON

LEAF SPOT (Alternaria cucumerina). A heavy infection appeared in many fields in s. Essex Co., Ont. at mid-harvest (C. D. McKeen).

ANTHRACNOSE (Colletotrichum lagenarium) was sl. -mod. in a 3-acre field at Harrow, Ont. (C. D. McK.).

POWDERY MILDEW (Erysiphe cichoracearum). Mildew occurred in many fields in Essex Co., Ont. necessitating the application of Karathane. Good results were obtained where spraying was begun early (C. D. McK.).

FUSARIUM WILT (F. bulbigenum var. niveum). The growing of wilt-resistant varieties in s.w. Ont. is accompanied by a decrease in damage from this disease (C. D. McK.).

DAMPING-OFF AND ROOT ROT (Pythium irregulare). Melons started in non-heated sash frames developed considerable root rot. In some beds the disease was so sev. that the plants could not be set in the field. Low temperatures are conducive to root rot (C. D. McK.).

ONION

NECK ROT (Botrytis allii). Infection ranged from 5-50% in different locations in the Okanagan Valley, B. C. (G. E. Woolliams). A tr. infection was seen in a garden at Kentville, N. S. (K. A. Harrison).

PINK ROOT (Fusarium sp.). About 5,000,000 fall-planted seedling plants were imported into B. C. from Walla Walla, Wash. in 1957. Most plants grown from these sets were severely affected with pink root, whereas plants produced from locally grown sets were largely free of the disease. The affected plants were so devitalized that the bulbs were abnormally small and were produced at a loss. The continued importation of diseased plants into B. C. may eventually so infest Okanagan soils that production as a whole may be adversely affected (G. E. W.).

DOWNY MILDEW (Peronospora destructor). A tr. infection was seen in White Portugal at Saanichton, B. C. (W. R. Orchard). Mildew was present in only a few fields in the Grand Bend and Thedford Marshes in Ont. in 1957 and caused little damage (J. R. Chard). Two small fields in the Burlington-Toronto area suffered 50% loss. The overwintering crop was infected (E. F. Muir). Four sprays of Zineb gave good control in an infected field at Berwick, N. S. A field at Kentville sprayed only twice was killed down by mildew before maturity (K. A. H.).

NEMATODES (Pratylenchus penetrans and Paratylenchus sp.). Heavy populations of root lesion nematodes were found in association with a pink-root disease in onions grown in the Okanagan Valley, B. C. from imported seedlings in 1956. In 1957 nematode determinations showed tr. populations of P. penetrans in 2/13 samples collected in Wash., U. S. A.; 12 samples grown in virgin soil from imported seedlings were free of parasitic nematodes; 7/12 samples of mature onions from imported seedlings and 3/4 from domestic seedlings carried populations of P. penetrans and/or Paratylenchus.

One sample carried root-knot nematodes (Meliodogyne sp.). Pink-root symptoms were found in nematode-free samples, hence the Okanagan form of pink-root is not dependent on the presence of nematodes. The study suggested that the nematodes were present in growers fields before the onions were planted (J. Bosher).

Outbreak of the Bulb and Stem Nematode in Ontario

W. B. Mountain

In July, 1957, a sample of muck soil from the Leamington Marsh submitted to the Harrow Laboratory was found to contain large numbers of the bulb and stem nematode Ditylenchus dipsaci (Kuhn, 1857) Filipjev, 1936. This represents the first confirmed outbreak of this nematode on onion in Canada.

Onions grown in infested areas were found to be severely affected. Usually, within a month following emergence, the leaves became chlorotic, subsequently dying back from the tips, and frequently, by July, the plant had been killed. Damage to the onion bulbs included splitting and separation of the scales, splitting and doubling of the bulb and rotting which extended upwards from the base. It was learned that, in infested areas, practically no saleable onions are produced. As an example, one grower in the Leamington Marsh, whose farm is infested with the bulb and stem nematode harvested 200 pounds of onions from a five-acre field in 1957. Normal onion production for this field is approximately 75 tons.

In view of the potential threat of the nematode to onion production in Ontario, a preliminary survey of the other onion marshes in western Ontario (Erieau, Bradford, Thedford, and Janette's Creek) was carried out in September, 1957. Soil and onion samples from 20 fields in these marshes showed no trace of the nematode. A more detailed survey of these areas will be carried out in 1958.

An extensive survey of the Leamington Marsh was completed in the fall of 1957. During this survey, approximately 100 samples of soil or onion material were examined for the nematode. Included was a survey of all Dutch sets produced in the Leamington area for seeding in 1958. The collection of these sets was carried out by Inspectors of the Plant Protection Division and the Ontario Fruit Branch. The Dutch sets which were found to be infested by the bulb and stem nematode are being destroyed by the Provincial Department of Agriculture under the regulations of the Plant Diseases Act. The nematode has been found on 19 farms. Several other farms are believed to be infested but the nematode has not yet been recovered from these areas.

There is little doubt that the infestation is of recent origin. None of the growers had noticed the trouble before 1955 and few of them before 1956. Almost without exception, growers whose land is infested with the nematode had purchased Dutch sets for planting and it has been found that, in recent years, such sets were imported from Illinois. Since recent outbreaks in New York State have been traced to infested sets produced in Illinois it is assumed that our growers also received some of this infested material. However, it has not been possible to examine imported Dutch sets and therefore final proof of the source of the outbreak is lacking.

SMUT (Urocystis cepulae). A light infection was observed in commercial fields in sections of the Kelowna and Vernon areas, B. C. (G. E. Woolliams). There was less loss from smut in the Dutch set crop in the Thedford Marsh, Ont., than in any recent years (J. R. C.). Onion smut, though widespread in the Bradford-Thedford areas, caused little damage since most growers treated their seed with 1 or 3/4 lb. of 50 or 75% thiram per lb. of seed. Some untreated plantings had as much as 90% smut (L. V. Busch).

YELLOW (Callistephus virus 1). A light infection occurred at Morden, Man. in Foundation seed plots (W. C. McDonald). Tr. infections occurred in Ont. Infected plants were yellow, stunted, twisted, and failed to form a bulb (J. R. C.).

PARSNIP

LEAF SPOT (Ramularia pastinacea) was mod. on all plants in a seed plot at Morden, Man. (W. C. McDonald).

YELLOW (Callistephus virus 1). At Morden, Man. 3/4 of the plants in a seed plot were mod. infected (W. C. McD.).

PEA

The Incidence of Leaf and Pod Spot of Peas Caused by Ascochyta pisi in the Ottawa Valley

V. R. Wallen

Four fields of Sterling field peas and three fields of the variety Arthur grown in the Renfrew and Shawville districts were inspected twice during the summer of 1957 for the incidence of leaf and pod spot caused by Ascochyta pisi. The Sterling peas were inspected because screening tests, conducted in co-operation with the Cereal Crops Division, showed that variety to be more resistant to A. pisi than the varieties Chancellor and Arthur commonly

grown in this area. The field inspections showed no A. pisi infection in the Sterling variety while all three fields of Arthur were infected slightly.

Seed from two of the fields of Arthur and from the four fields of Sterling was examined in the laboratory for the presence of pathogenic fungi. The two fields of Arthur contained four and five per cent Ascochyta infection respectively. Seed lots from two of the Sterling fields were free of A. pisi, one lot contained 1 per cent, while the other sample contained 4 per cent A. pisi. An examination of the sample containing 4 per cent infection showed it to be a mixture of Sterling and small seeds from a foreign source.

Other Observations

LEAF AND POD SPOT (Ascochyta pisi). A sl. infection was seen on Lincoln at Saanichton, B. C. (W. R. Orchard). Sl. infections also occurred on Pioneer and Perfection at Creston and on Thomas Laxton at Grand Forks, B. C. All were grown for seed. Infection was confined largely to the lower leaves (G. E. Woolliams). Infection was sl. occurring as patches in a field at Portage la Prairie, Man. (W. A. F. Hagborg). Seed-borne infection was tr. -sl. with no secondary spread in a 65-acre field of Arthur at Cobden and in another field at Douglas, Ont. (V. R. Wallen). Sl. infections occurred in Thomas Laxton in Queens Co., P. E. I. (R. R. Hurst).

FOOT ROT (Ascochyta pinodella) was sl. on Lincoln at Saanichton (W. R. O.), and seen in 2 fields at Creston, B. C. (W. C. Broadfoot). It was sl. in a 1-acre field of garden peas at Aylmer, Que. (V. R. W.).

GRAY MOLD (Botrytis cinerea) was tr. at Ste. Foy, Que. Infection appeared to be initiated from fallen floral parts on the leaves (D. Leblond).

POWDERY MILDEW (Erysiphe polygoni). Sl. infections were seen in a 15-acre field of Pioneer at Creston, B. C. (G. E. W.). Mildew was sev. on all varieties with the exception of Thomas Laxton and Onward at Charlottetown, P. E. I. (R. R. H.). Heavy infections developed late in the season on Fenland Wonder at Kentville, N. S. Yields did not seem to be affected (K. A. Harrison).

NEAR WILT (Fusarium oxysporum f. pisi (Linford) Snyder and Hansen race 2.). The presence of this organism in Ont. has now been confirmed, and isolations from plants collected throughout the canning crop areas indicate that race 2 is rather widely distributed. Infection was sl. in most of the fields sampled although a mod. -sev. infection occurred in a 10-acre field near Troy, Wentworth Co. This disease is a potential threat to the pea industry since the majority of the canning pea varieties are of Perfection parentage and offer no resistance to this pathogenic strain of Fusarium (B. H. MacNeill).

MYCOSPHAERELLA BLIGHT (M. pinodes). Sl. -mod. infections occurred in a field at Portage la Prairie, Man. (W. A. F. H.). One of 2 fields of Sterling examined at Shawville, Que. showed a sl. infection of blight (V. R. W.).

DOWNY MILDEW (Peronospora pisi) was tr. on Lincoln at Saanichton, B. C. (W. R. O.). It was seen in all fields on the Creston Flats, B. C. Infection was present on most plants but was confined to the lower, shaded leaves. It did not appear to be causing appreciable damage (G. E. W.).

BACTERIAL BLIGHT (Pseudomonas pisi). A mod. infection was recorded in experimental plots at Portage la Prairie, Man. (W. A. F. H.).

LEAF BLOTCH (Septoria pisi). The lower leaves of Arthur were mod. infected in a field at Douglas, Ont. (V. R. W.).

RUST (Uromyces fabae). Sl. -sev. infections were present in seed plots at Fredericton, N. B. (S. R. Colpitts). Rust was tr. on American Wonder, Thomas Laxton and Little Marvel at Charlottetown, P. E. I. (R. R. H.). Late infections caused little damage at Kentville, N. S. (K. A. H.). Tr. infections recorded in a garden at St. John's, Nfld. (O. A. Olsen).

ROOT ROT (various pathogens). Fusarium sp. caused a tr. of root rot in Lincoln at Saanichton, B. C. (W. R. O.). Many canning crop fields were affected in Ont., as in previous years. Yields were undoubtedly reduced in the more sev. cases (J. Cutcliffe). Mod. infection of root rot, with Aphanomyces and Fusarium spp. and R. solani involved were noted in fields at St. Jean, St. Edouard and Napierville, Que. (R. Crete). Infections ranging from tr. -20% occurred in garden plots at Fredericton and Gagetown, N. B. (S. R. C.).

MOSAIC (virus). A 10% infection on Lincoln at Saanichton, B. C. caused sl. damage (W. R. O.). Late planted peas in a garden at Kentville, N. S. were 100% infected. Aphid infested commercial fields in Kings Co. showed appreciable infection in the last few leaves on the vines late in the season (K. A. H.).

STREAK (virus). Mod. -sev. infection occurred in a field near Troy, Ont. (B. H. MacN.).

STUNT (virus). Typical symptoms of Wisconsin pea stunt were observed in a hybrid pea nursery at Portage la Prairie, Man. Affected plants were stunted, the upper portion showed a tight rosette of leaves, stipules and blossoms, no pods had formed and vein clearing had occurred in the leaves. The diseased plants were readily observed because of the dwarfed, upright growth beside prostrate plants bearing pods (W. C. McD.).

PEPPER

ROOT ROT (Rhizoctonia solani and Fusarium sp.). These two organisms were isolated from affected plants in a commercial planting at Medicine Hat, Alta. (F.R. Harper).

WILT (Verticillium albo-atrum). Two 4-acre fields near Harrow were sev. affected by wilt. Symptoms were most pronounced after the plants became infected with an aphid-borne virus (C.D. McKeen).

BACTERIAL SPOT (Xanthomonas vesicatoria) was not as prevalent in s.w. Ont. as in 1956, but it was sev. in a small number of crops. When the disease appeared in plants before they were set in the field the crop was a total loss. The new variety Liberty Bell is the most susceptible of the sweet varieties being grown in the area (C.D. McK.).

DAMPING OFF (pathogens undetermined) was noticeable in cold frames and seed beds in the Burlington-Toronto area, especially where the soil had not been sterilized (E. F. Muir).

MOSAIC (virus). All pepper crops in the Harrow, Ont., area were seriously affected by aphid-borne viruses. Tobacco etch, Potato Y, and cucumber mosaic viruses were identified. The viruses occurred singly and in combination (C.D. McK.).

BLOSSOM END ROT (physiological). Foliage was poor and irrigation did not appear to check the disease which affected 30% of the plants in a field at Berwick, N.S. (K.A. Harrison).

POTATO

The data in Tables 8 to 10 on Seed Potato Certification were submitted by the Plant Protection Division, Production Service.

Potato acreage entered for inspection and the acreage passed were both slightly greater than in 1956. Bacterial ring rot was the most important cause of rejection, being responsible for 30% of the total rejections. It appeared in seed fields in all provinces but Sask. and B. C. Black leg was again prevalent in P. E. I. and Que. Fewer fields were rejected in 1957 because of mosaic. Sebago again accounted for over one third of the total certified acreage. Increased plantings of Sebago, Kennebec and Irish Cobbler accounted for much of the increased acreage.

GRAY MOLD (Botrytis cinerea) caused a stalk rot in tr. amounts at Dunstaffanage, P. E. I. (D.B. Robinson, J.E. Campbell). It also caused a leaf spot in tr. -sl. infections at St. John's West, Nfld. (O.A. Olsen).

Table 8. Seed Potato Certification
Fields and Acres Inspected and Passed, 1957

Province	Number of fields		Fields	Number of Acres		Acres
	Inspected	Passed	Passed %	Inspected	Passed	Passed %
P. E. I.	6,146	5,457	88.7	30,991	27,503	88.7
N. S.	216	206	95.4	411	382	92.9
N. B.	2,505	2,283	91.1	15,698	13,099	83.5
Que.	1,017	636	62.5	4,059	2,121	52.3
Ont.	576	470	81.6	1,606	1,230	76.5
Man.	110	96	87.2	826	760	92.0
Sask.	69	59	85.5	127	116	91.3
Alta.	222	188	84.6	1,556	1,271	81.6
B. C.	556	484	87.0	2,393	2,106	88.0
Total,						
1957	11,417	9,879	86.5	57,667	48,588	84.2
1956	11,440	9,575	83.7	53,926	44,398	82.3*
1955	12,003	10,239	85.3	51,627	42,173	81.7
1954	13,783	11,959	86.8	59,360	50,687	85.4
1953	14,411	11,875	82.4	60,173	47,706	79.3

*The figures shown herein are final figures submitted by the Plant Protection Division for fields and acres entered and passed in 1956 and differ from those published in P. D. S. 36: 68, 1957.

EARLY BLIGHT (*Alternaria solani*) was reported as follows:
145-sl. 23-mod. 4-sev./556 fields inspected in B. C. It caused serious economic losses only in the Grand Forks area. In many areas of the Interior it caused yield reductions through hastened maturity (N. Mayers). Sl. -mod. infections observed in some table stock fields in s. Alta. (R. P. Stogryn); present in sl. amounts in most fields inspected in n. Alta. (E. C. Reid); not observed in Sask. (A. Charlebois). Sl. -mod. on most early varieties in Man. (D. J. Petty); tr. at Carman, Man. (W. L. Gordon). Sl. in 2 fields in n. w. Ont., tr. in districts 1 and 2, (J. T. McKercher, W. L. S. Kemp), but sev. on Irish Cobbler and Keswick in district 3 (H. W. Whiteside), infection 36-sl. 8-mod./56 fields in e. Ont. (E. H. Peters). Observed 220-sl. 87-mod. 8-sev./1017 fields in Que., mostly confined to Chicoutimi and Lake St. John district (B. Baribeau). Sl. in N. B. generally (C. H. Godwin), but sev. on Warba at Gagetown (S. R. Colpitts); sl. -mod. in P. E. I. (H. L. McLaren, D. B. Robinson, J. E. Campbell); sev. in 2 fields of Irish Cobbler in Colchester Co., N. S. and mod. in 1 field of Warba in Kings Co. (R. C. Layton); tr. -sev. at the Exp. Farm, St. John's, Nfld. (O. A. Olsen).

Table 9. Seed Potato Certification
Acreage Passed by Variety and Province - 1957

Variety	P. E. I.	N. S.	N. B.	Que.	Ont.	Man. -Alta.	B. C.	Total
Sebago	19,950	34	219	134	280	10	3	20,630
Katahdin	1,382	16	6,326	131	407	5	12	8,309
Kennebec	1,484	111	3,273	251	25	125	95	5,364
Irish Cobbler	3,348	37	507	120	122	129		4,263
Netted Gem	14	30	1,019		2	1,260	1,580	3,905
Green Mountain	718	36	256	1,381	52	6	30	2,479
Red Pontiac	184	8	678			166		1,036
Keswick	164	12	183	86	87		3	535
Russet Rural	21		365		20			406
Pontiac		4	183		1	40	50	278
Warba	7	9	7	5	12	95	107	242
Chippewa	4	1	29		144	1		178
Canso	170	5	14		2			191
White Rose							134	134
Cherokee	28	19	29	7	1	23		107
Columbia Russet					2	81	6	89
Huron	1	1	2		72			76
Others	28	30	9	6	1	206	86	366
Total	27,503	382	13,099	2,121	1,230	2,147	2,106	48,588

Table 10. Seed Potato Certification
Fields Rejected on Field Inspection - 1957

Province	Leaf Roll	Mosaic	Ring Rot in Field	Rot on Farm	Black Leg	Wilts	Adjacent Diseased Fields	Foreign Variety	Misc.	Total
P. E. I.	18	65	23	63	213	22	18	198	150	770
N. S.	1	3	5	6	1	5		4	1	26
N. B.	1	20	87	53	13		8	33	10	225
Que.	10	44	197	70	71		10	23	10	435
Ont.	15		21	21	15	6	3	13	11	105
Man.	4		2	5					3	14
Sask.					1	3		1	5	10
Alta.			3	9	14			1	6	33
B. C.	27	1			5	2			37	72
Total	76	133	338	227	333	38	39	273	233	1,690*

*The discrepancy between the total given herein and the total rejections calculated from the data in Table 8 is explained as follows:

The figures in Table 10 include lots which were rejected at shipping and bin inspection whereas the figures in Table 8 refer to field inspections only (D. W. C.).

Rejection as a percentage of fields:

Inspected	0.7	1.2	3.0	2.0	3.0	0.3	0.4	2.4	2.1	14.8
Rejected	4.4	7.8	20.0	13.4	19.7	2.2	2.3	16.5	13.7	100.0

BLACK DOT (*Colletotrichum atramentarium*). The organism was isolated from diseased tissue from Morden, Man. (W. L. Gordon). It was tr. on Irish Cobbler in Queens Co., P. E. I. (R. R. Hurst). Isolated consistently from dying stalks of Keswick at Kentville, N. S. (K. A. Harrison).

BACTERIAL RING ROT (*Corynebacterium sepedonicum*). B. C. continues to be virtually free of ring rot. It was found in tr. amounts on 3 farms in the Fraser Valley as compared with 20 in 1956 (W. R. Foster), no B. C. seed stocks were found infected (N. Mayers). Ring rot was found in 3/105 fields inspected in s. Alta. and was responsible for the rejection of 9 other fields on the same farms. All 3 farms concerned were infected in 1956 (R. P. Stogryn); it was not found this year in n. Alta. (E. C. Reid).

Infected tubers were received from 6 growers in Sask. (R. J. Ledingham), and ring rot was found in Columbia Russet in that province (A. Charlebois). It was found in 2/110 fields inspected in Man. Five other fields were rejected because of ring rot on the farm (D. J. Petty). One field of Katahdin was infected at Strathroy, Ont. (J. T. McKercher). The crops of 6 fields in District 2 were rejected in the bin because of ring rot (W. L. S. Kemp). In District 3 ring rot was the most troublesome disease encountered in 1957; 20/369 fields were infected and a further 20 fields rejected because of ring rot on the same farm. The high incidence of the disease is blamed on the use of custom planters in the districts most affected (W. H. Whiteside). The 15th annual ring rot survey in Ont. in 1957 revealed the presence of the disease on 191 farms as compared with 92 farms in 1956. Conditions for the detection of ring rot were optimum, and the absence of frost until late fall permitted the completion of the survey (D. S. MacLachlan).

Ring rot caused the rejection of 197/1017 fields inspected in Que. Another 20 lots were rejected at harvest and bin inspection. Rejections were up over 150% from the 1956 total of 73 fields. Much of the increase is attributed to the general use of custom planting and digging equipment and of poorly disinfected second hand bags. The Provincial Dept. of Agriculture is intensifying its ring rot control program (B. Baribeau). It was common in the Lake St. John and Saguenay districts of Que. (D. Leblond). The disease increased slightly in N. B. due partly to infection in imported seed of Red Pontiac. 87/2505 fields were rejected as diseased and a further 53 fields were turned down due to the proximity of infected table stock fields (C. H. Godwin). In P. E. I. 23/6146 fields were infected; 63 more fields were

rejected as contact cases (H.L. McLaren). No infections were detected in the field in N.S., but post harvest inspections revealed ring rot in Cherokee from 5 fields. It was also detected in potatoes from 5 table stock fields, 3 of Cherokee and one each of Katahdin and Kennebec. All infected Cherokee crops could be traced to 1 lot of seed imported from Maine in 1953 (R.C. Layton). No ring rot was seen on the west coast of Nfld. (G.C. Morgan).

BLACK LEG (Erwinia atroseptica) was 102-tr. 2-mod. 4-sev./556 fields inspected in B.C. It has increased slightly over the 1956 totals. The use of whole seed appears to be of some help in controlling this disease (N. Mayers). It occurred in 84/105 fields in s. Alta. (R.P. Stogryn), and in 62 (53%) of the fields inspected in n. Alta., causing the rejection of 14. Black leg continues to be a serious threat to seed stocks in Alta. (E.C. Reid). It was tr. in 13% of Sask. fields inspected and caused the rejection of 1 field (A. Charlebois). Tr.-sl. infections were observed in 16% of Manitoba fields, but was of no consequence in n.w. Ont. (D.J. Petty). Sebago, Katahdin and Irish Cobbler were infected at Scotland, Waterford and Strathroy, Ont. (J.T. McKercher). It caused the lowering of grade of 4 fields to Certified in District 2 (W.L.S. Kemp). In District 3, 61 fields were infected and 13 (3.6% of fields inspected) were rejected (H.W. Whiteside). 21/56 fields in e. Ont. were infected and 2 totalling 3 acres were rejected (E.H. Peters). In Que. 564/1017 fields showed infection; 71 fields were rejected. The disease was much less prevalent in N.B. than in 1956. Only 13/2505 fields were rejected (C.H. Godwin). It was sev. in many Sebago fields in P.E.I. (J.E. Campbell), and caused the rejection of 213/6146 fields inspected in the province (H.L. McLaren). Black leg was reported in 53/216 fields inspected in N.S. (R.C. Layton). Tr. infections were seen on Irish Cobbler at St. John's West, Nfld. (O.A. Olsen). Infection was sl.-mod. in 75% of the fields visited on the west coast of Nfld., particularly in the Cormac area. Sl. infections occurred in many east coast fields and mod.-sev. infections were seen in 3 fields at Clarke's Beach, in 8 in the Bonavista Bay and 4 in the Trinity Bay areas (G.C. Morgan).

SOFT ROT (Erwinia carotovora). A car of Katahdin potatoes from N.B. was found to be sev. affected by soft rot on arrival at Leamington, Ont. in Jan. (C.D. McKeen). Little soft rot was observed in Ont. district 3 in 1957 (H.W. Whiteside).

DRY ROT (Fusarium spp.) was more prevalent than usual in the 1956 crop in Que. and the loss sustained in some bins was 2-6% (B. Baribeau). There was little dry rot in the stored 1956 crop in N.B. (C.H. Godwin). It was sl. in P.E.I. (H.L. McLaren).

WILTS (Fusarium oxysporum, Verticillium albo-atrum) were 7-tr. 2-sev./556 fields in B.C. Pontiac seems quite susceptible (N. Mayers). Wilts were present in 87/105 fields in s. Alta., but it was probable that other conditions were partially responsible (R.P. Stogryn). They were sl. in n. Alta. (E.C. Reid). Wilts were widespread in sl. amounts in s.w. Ont. (J.T. McKercher). Three Kennebec, 2 Cherokee and 1 Chippewa fields were rejected because of wilts in Ont. district 2 (W.L.S. Kemp). Wilts were present in most fields in district 3 (H.W. Whiteside), and were sl. in 11 fields in e. Ont. (E.H. Peters). Sixty-one/1017 fields inspected in Que. showed sl. infections, principally on Kennebec (B. Baribeau). No fields were rejected in N.B. though 64/2505 fields showed sl. infections (C.H. Godwin). A sl. decrease in wilts was recorded in P.E.I. where 22/6146 fields were rejected (H.L. McLaren). In N.S. wilts occurred in 41/216 fields inspected. Five fields were rejected (R.C. Layton).

SILVER SCURF (Helminthosporium atrovirens = Spondylocladium atrovirens) appears to be increasing in Ont. district 3 (H.W. Whiteside). Seed potatoes examined in the spring of 1957 revealed that in most cases Foundation, as well as Certified seed stock was infected with silver scurf regardless of source. In addition, table stock from N.B. in retail stores in Ont. was infected. Potatoes growing on the Bradford Marsh were infected in early Aug. and the disease was prevalent at harvest (L.V. Busch). Silver scurf was seen on a few lots of Green Mountain at bin inspection in Que. (B. Baribeau). Sl. infections were noted in N.S. (R.C. Layton).

RHIZOCTONIA (Pellicularia filamentosa (R. solani)) was unusually sev. in B.C. in 1957 and caused appreciable losses in most areas. Infections were 320-sl. 170-mod. 22-sev./556 fields inspected (N. Mayers). In s. Alta. it was recorded as 28-sl. 63-mod. 9-sev./105 fields. Tuber infection was less than normal (R.P. Stogryn); elsewhere in Alta. it caused considerable trouble on some wet soils, attacking early shoots with resulting misses and weak plants. The variety Early Ohio seemed particularly subject to attack (E.C. Reid). The disease was unusually sev. in Sask. (A. Charlebois), many fields and gardens in the Saskatoon area had 5-20% of the plants affected. The same condition was observed at Indian Head, Swift Current and Scott (R.J. Ledingham, T.C. Vanterpool). It was sl. in most fields in Man. and n.w. Ont. (D.J. Petty), and of no consequence in s.w. Ont. (F.J. Hudson). Rhizoctonia was particularly sev. in the Grand Bend Marsh area. Sebago, the principal variety grown, seems to be very susceptible. Up to 10% of the plants in some fields were sev. attacked and formed aerial tubers. Sclerotial infections were high and only a small portion of the Grand Bend Marsh area crop was suitable for washing (J.R. Chard). The organism is present in most soils in the Guelph area where Common Scab is also a problem (W.L.S. Kemp). It was sev. in many fields in Dufferin Co., and the incidence on tubers was

high in the northern parts of Ont. district 3, especially Cochrane and Temiskaming (H.W. Whiteside). Rhizoctonia was 18-sl, 2-mod./20 fields inspected in e. Ont. (E.H. Peters). Infection was noted in 112/1017 fields inspected in Que., mostly in the northwestern districts. Tuber infection was 253-sl, 35-mod, 12-sev./300 lots at bin inspection (B. Baribeau). Sl. infections were seen at two points in Chateauguay Co. (R. Crete), and mod. infections in a field in Kamouraska Co., Que. (H. Genereux). Infections were sl. in a few fields in N.B. (C.H. Godwin). It was sl. on Sebago at Cornwall, P.E.I. (J.E. Campbell). Rhizoctonia was not important in the field or in bins in N.S. in 1957 (R.C. Layton). Sev. infections on Arran Victory and Irish Cobbler were recorded at Upper Gullies, Nfld. (O.A. Olsen). It was general on plants in the O'Regan's, Cartyville, Robinson's and McKay's areas on the west coast of Nfld. Infection was mod.-sev. in 5 fields at Cormac. Though generally lighter on the east coast than in 1956, sl.-mod. infections were seen in 12 fields at Conception Bay, in 8 at Bonavista Bay, and in 4 at Trinity Bay (G.C. Morgan).

LATE BLIGHT (Phytophthora infestans) was present in all districts of B.C. Tuber infection was fairly high in some fields but the greatest loss came from reduced yields due to early defoliation. Dry weather from mid-Aug. on prevented heavier losses. Infections were 118-sl, 56-mod, 16-sev./556 fields inspected (N. Mayers). The disease appeared late in 1 field in n. Alta. (E.C. Reid). It was not seen in Sask. in 1957 (A. Charlebois). Sl.-mod. infections were seen in Man. in the Winnipeg, Portage la Prairie and Carman districts, with parts of some fields at Carman sev. attacked. Tuber losses in some cases at Carman and Portage la Prairie were 10-15%. Cherokee in the latter area remained free of blight although adjacent fields were affected (D.J. Petty).

Some late blight was seen in s.w. Ont. during the third field inspection, but comparatively few tubers showed any sign of the disease in the bin (J.T. McKercher). The disease was late in appearing in Ont. District 2 and affected only late planted crops, particularly Katahdin (W.L.S. Kemp). In District 3 it was sev. in a field of Russet Rural in Dufferin Co., but did not seriously affect Huron planted in an adjacent field. Most fields in Simcoe and Dufferin Counties showed sl. infections. Dry weather and the use of vine killers kept the disease at a minimum. Tuber infection was generally light throughout the district (H.W. Whiteside). Late blight appeared early in the Thedford Marsh, being evident on 17 June. Infection appeared to come from volunteer potato plants which were numerous in fields cropped to potatoes the previous year. Dry weather in July and Aug. checked disease development. By mid-Sept. there was considerable leaf infection, but the advent of heavy frosts killed the tops well in advance of harvest and little tuber infection occurred (J.R. Chard). Blight was not serious in the Burlington-Toronto area (E.F. Muir). Tubers

from an unsprayed field at Orleans, Ont. were affected (H.N. Racicot). Irish Cobbler was infected in 2 fields near St. Bernardin, Prescott Co., Ont. (E.H. Peters).

Late blight was first recorded in Que. on 10 July on Irish Cobbler near Notre Dame de la Paix, Papineau Co., over 2 weeks earlier than in 1956. Spread was not as rapid as usual, but by 19 Aug. sl.-mod. infections were recorded in most counties of the province, Matane, Matapedia and Papineau being exceptions. Nearly all unsprayed crops were affected to the extent of 10-25%. In seed fields infections were 412-sl, 148-mod, 29-sev./1017 fields inspected. Bin inspections revealed 255-sl, 21-mod, 9-sev./285 (56.5%) of bins examined (B. Baribeau). A sl. infection was seen in a 100-acre field at Napierville, Que. Tuber infection was light. Unsprayed fields in Chateaugay and Napierville counties showed mod.-sev. infections in many cases (R. Crete). One blight resistant seedling was 100% infected at Ste. Clothilde, Que., apparently due to planting infected tubers (D.S. MacLachlan). Unsprayed Green Mountains yielded 35% infected tubers at Ste. Foy, Que. (D. Leblond). Sev. infections on Irish Cobbler at St. Roch, and mod infections on Irish Cobbler and Katahdin at Charlesbourg were observed (L.J. Coulombe).

Late blight was first reported in N.B. in the Hartland area on Rural Russet on 15 July. The disease gained rapid headway in these fields and the foliage was mostly killed by early Aug. These sev. affected fields had not been adequately sprayed. Elsewhere in the province late blight developed very slowly. Continued dry weather in Aug. arrested disease development and at no time did it reach epidemic proportions. Ideal weather prevailed during the harvest season and tuber rot was scarcely observed in the crop, nor has it been a problem during the fall shipping season (C.H. Godwin).

The 4th annual survey to determine the races of late blight occurring in Canada was conducted by the Fredericton Laboratory. By 18 Nov., 1957, 98 collections from 8 provinces were examined and 150 isolates identified as to race. The collections were in the form of potato leaves, tubers and seed balls and tomato fruits. The results of the survey are given in Table II.

Table 11 Distribution by Provinces of Physiologic Races of
Phytophthora infestans in Canada in 1957.

Physiologic Race	P.E.I.	N.S.	N.B.	Nfld.	Que.	Ont.	Man.	B.C.	Total
0	2							3	5
1	1	1			1		1	6	10
2		1							1
3	3	4	4		5	2	1	15	34
4	16	5	10	3	7	3	1	34	79
1.3		1	1						2
1.4		3	4		3				10
2.3								1	1
2.4		1			1				2
3.4		1			1			3	5
1.2.4		1							1
	22	18	19	3	18	5	3	62	150

The results are based mainly on a single determination on the differential hosts. As in previous years, race 4 seems to predominate, but this may be due to the masking of race 0. Race 3 is the second most prevalent race having displaced race 1, 4 from this position (J. L. Howatt).

Late blight was a serious problem in 1957 in P.E.I. despite a lower than average precipitation for the July-Sept. period. The first lesions were found on plants in a cull pile on 17 July and the first field symptoms were observed 22 July. Infection was general soon after 1 Aug. The initial outbreak and spread of the epiphytotic were forecast from a study of the rain-temperature-humidity pattern. A succession of showery days beginning 13 July and a 4-week period of high humidity favored a rapid development of the disease. Unsprayed fields were seriously threatened. A second outbreak occurred early in Sept. but properly sprayed fields were not seriously affected. Losses through late blight tuber , except in unsprayed or rarely sprayed fields, were light in 1957 (L.C. Callbeck).

Late blight was first reported in N.S. from the Hall's Harbor area of Kings Co. on 7 Aug. about 2 weeks later than in 1956. In most areas of the province infections were sl.-mod. The only sev. outbreak occurred in Digby and Yarmouth Counties about mid-Aug. No sev. losses from late

blight tuber rot were reported in 1957 (R.C. Layton). Blight was sev. on seedlings and named varieties under test at the Exp. Farm, St. John's West, Nfld. Up to 50% tuber losses were recorded (O.A. Olsen). Losses on the east coast were generally light and no infections were seen on the west coast. The only sev. infections seen were in 4 fields of Green Mountain at Bonavista Bay. Thirty % of the tubers were affected (G.C. Morgan).

LEAK (Pythium ultimum) occurred in 4/25 storage bins inspected in the Pemberton area of B.C. and nearly all crops in s.e. B.C. showed traces of the disease (N. Mayers). Tr. infections were observed in a few lots of Kennebec at shipping inspection in Que. in the spring of 1957 (B. Baribeau), and a sl. infection occurred in a 5-acre field at Ste. Anne de la Pocatiere (H. Genereux). Specimens were received from three areas of Kings Co., N.S. (K.A. Harrison).

POWDERY SCAB (Spongospora subterranea) was tr. in 1 table stock field in the lower Mainland of B.C. (N. Mayers). It was present as infections of up to 3% in crops in the Cochrane district, Ont. (H.W. Whiteside). Powdery scab was less prevalent in Que. than in 1956 and occurred as sl.-mod. infections in a few bins in the lower St. Lawrence area (B. Baribeau), and as a sl. infection in a 5-acre field at Ste. Anne de la Pocatiere, Que. (H. Genereux). No infections occurred in seed crops in N.B. or in P.E.I. (C.H. Godwin, H.L. McLaren). Four lots with average infection of 6% were reported from the Hall's Harbor, N.S. district (R.C. Layton). Infections ranging from 5-100% were observed on Fredericton seedlings at St. John's West, Nfld. (O.A. Olsen). Sl. infections were seen in the wart plots in the Conception Bay area. Powdery scab was sl.-mod. in 3 fields at Clarke's Beach and 6 fields in the south shore district (G.C. Morgan).

COMMON SCAB (Streptomyces scabies) was prevalent in the Interior of B.C. where it caused considerable damage to the white-skinned varieties (N. Mayers). It did not present any appreciable problem in s. Alta. (R.P. Stogryn). Elsewhere in Alta. 1 or 2 seed stocks of Netted Gem had sufficient scab to require close grading (E.C. Reid). Dry, hot weather in July tended to increase the incidence and severity of scab in Sask. (R.J. Ledingham). The disease was sl. in about half of the fields inspected in s.w. Ont. (J.T. McKercher). It is well established in most soils in district 2. The average loss from sl. scab averaged 20-25% and from sev. scab 10-15% (W.L.S. Kemp). Scab was somewhat more prevalent than usual in district 3. It was observed on the scab-resistant variety Huron in the Lafontaine area (H.W. Whiteside). In e. Ont. it was quite prevalent in many bins of seed potatoes. Huron and Rural Russet were only slightly or not at all affected (E.H. Peters). Infections were

239-sl. 30-mod. 35-sev./1017 fields inspected in Que. Scab was mostly confined to the lower St. Lawrence districts where infections as high as 25-80% were recorded in a few fields (B. Baribeau). Mod. infections occurred at Ste. Foy (D. Leblond), and in the Gaspé Peninsula and at Ste. Anne de la Pocatière, Que. (H. Genereux). The disease was less prevalent in N.B. than in recent years (C.H. Godwin). It was mod. in seed crops in P.E.I. (H. McLaren). Sl.-mod. infections were seen at bin and shipping inspections in N.S. Two lots of table stock were sev. scabbed (R.C. Layton). Sev. infections occurred in test plots at St. John's West, Nfld. (O.A. Olsen). It was widespread and mod.-sev. in intensity in the Conception Bay area. Very heavy infections were noted at Manuel's, Bay Roberts, Clarke's Beach and Searston (G.C. Morgan).

WART (Synchytrium endobioticum). Conditions in Nfld. in 1957 were favorable for wart development. Heavy infections developed on the susceptible varieties Arran Victory and Irish Cobbler in the Conception Bay and Trinity Bay areas. Crop losses were generally light to mod. but losses as high as 75% occurred in some garden plots devoted to continuous or near continuous potato culture (O.A. Olsen). Arran Victory, Bliss Triumph, Green Mountain, Irish Cobbler, Kerr's Pink and Warba were sev. affected in most wart infected areas. Keswick and Canso were sl.-mod. affected and sl. infections were seen in 2 fields of Kennebec. Sebago again showed high resistance to wart. Wart infection on the west coast of Nfld. is mostly confined to the St. George's area and to several settlements on the extreme west coast. It was sev. in 2 plots of Early Rose and 2 of Early Fortune in the St. David's area. No infection was noted at Searston or Codroy (G.C. Morgan).

CALICO (virus) was tr. on Kennebec at the Exp. Farm, St. John's West, Nfld. (O.A. Olsen).

LEAF DROP STREAK (virus). The variety Huron showed 2% infection at Smithfield, Ont. It appeared to be caused by a strain of potato virus X. (D.S. MacLachlan).

LEAF ROLL (virus) was reported from all provinces with the exception of Sask. and caused the rejection of seed fields in all provinces except Sask., Alta. and Nfld. A few of the reports are given below (D.W.C.).

In the north Okanagan district of B.C. leaf roll continues to be the greatest problem in seed potato production with 49% of the fields inspected visibly affected. Little net necrosis has occurred in seed fields but table stock growers are suffering severely. The high degree of infection in some crops could result in 100% tuber necrosis. Infections in seed stocks for the province as a whole were 134-tr. 11-sl. 8-mod. 9-sev./556 fields

inspected (N. Mayers). In Ont. District 3 the disease was present in 117/369 fields inspected and caused rejection of 13. Cherokee, Keswick, Warba and Chippewa were the varieties most affected (H.W. Whiteside). Ten fields were rejected in Que., as compared with 5 in 1956 (B. Baribeau). Leaf roll continues to be of minor importance in N.B. (C.H. Godwin), and has decreased in 1957 in P.E.I. (H.L. McLaren). In N.S. though found in 115/216 fields inspected, only 1 field was rejected (R.C. Layton). Tr. infections were seen in several varieties at St. John's West, Nfld. (O.A. Olsen). It was sl.-mod. in most fields visited in Nfld. (G.C. Morgan).

MOSAIC (virus), though generally distributed throughout the potato growing districts of Canada was less prevalent in seed fields than in 1956. In 1957, 133/11,417 or 1.16% of the fields entered were rejected for mosaic as compared with 294/11,470 or 2.8% in 1956. A few reports only will be mentioned (D.W.C.).

Mosaic was found in 7 fields in e. Ont. A plant infected by Spanish rosette was collected in a field of Sebago near Kemptville. The Huron variety showed a sev. mosaic (leaf drop and streak) (E.H. Peters). It was recorded in 332/1017 fields in Que. and caused the rejection of 44 fields. In 1956, 116 fields were rejected (B. Baribeau). The incidence of mosaic in N.B. was much the same as in 1956 (C.H. Godwin). Only half as many fields as in 1956 were rejected in P.E.I. (H.L. McLaren). In N.S. 104/216 fields inspected showed mosaic and 3 fields were rejected. An extremely sev. infection occurred in one field of Keswick (R.C. Layton). Mosaic infection was widespread in the Cormac area of Nfld, with the varieties Arran Victory, Keswick and Bliss Triumph being the most sev. affected (G.C. Morgan).

PURPLE TOP (virus) was seen in 26/105 fields in s. Alta., principally on red-skinned varieties (R.P. Stogryn), and in 59% of the fields inspected in n. Alta. (E.C. Reid). It was widely prevalent in Sask. in 1957. Owing to the severity of Rhizoctonia, critical examination was necessary to separate the two diseases (R.J. Ledingham, A. Charlebois). This disease was common in commercial fields and sev. on many varieties in plots at Brandon and Morden, Man. (W.C. McDonald). Most Man. and n.w. Ont. fields showed 1-5% purple top. Infection in 4 fields was 6-8%. This is the highest incidence of the disease in many years (D.J. Petty). One field in the Algoma district of Ont. was 50% affected and rejected for certification. Katahdin, Sebago and Russet Rural were the most sev. affected varieties in District 3 (H.W. Whiteside). Most fields in the Grand Bend and Thedford Marshes showed tr. infections with little loss (J.R. Chard). Twenty-five % infection occurred in a 5-acre field planted between affected carrot and celery crops in the Bradford Marsh (D.S. MacLachlan). Three fields of Huron were infected in e. Ont. (E.H. Peters). It was tr. in a few fields

in N.B. (C.H. Godwin) and on Sebago at Cornwall, P.E.I. (J.E. Campbell), and in a few fields in N.S. (R.C. Layton).

SPINDLE TUBER (virus). Tr. infections were found in 2 Man. fields of Columbia Russet and Kennebec (D.J. Petty). It was reported from Ont. District 3 in Katahdin, Sebago and Huron. All lots of Huron grown in the District were affected (H.W. Whiteside). Tr. amounts were observed on Sebago and Huron at bin inspection in e. Ont. (E.H. Peters). It occurred in a few fields of Kennebec and in 4/451 bins inspected in Que. (B. Baribeau). Spindle tuber was slightly more prevalent in N.B. in 1957, particularly in Kennebec and Netted Gem (C.H. Godwin), while in P.E.I. the disease showed a slight decrease from the 1956 incidence (H.L. McLaren). Sl. infections occurred in Irish Cobbler, Sebago and Kennebec in N.S. (R.C. Layton). Sev. infections in Arran Victory and sl. infections in Green Mountain and Katahdin occurred in the Cormac area, Nfld. (G.C. Morgan).

WITCHES' BROOM (virus) was 17-tr. 1-sl./18 fields inspected in B.C. (N. Mayers). It was tr. in 1 field of Netted Gem in s. Alta. (R.P. Stogryn) and tr. in n. Alta (E.C. Reid).

YELLOW DWARF (virus). A few affected plants were found in 1 field of Katahdin near Komoka, (J.T. McKercher), and in a small plot of Keswick in n. Simcoe Co., Ont. (H.W. Whiteside).

Some Recent Findings in Potato Virus Research

R.H. Bagnall

Resistance to virus Y in the potato:

Results obtained in field and greenhouse experiments during the past six years show that a number of American potato varieties are field resistant to a strain of virus Y commonly found in Eastern Canada. This resistance was correlated with necrotic response to infection. Included amongst the resistant varieties are the widely grown Katahdin, Kennebec, and Warba. Varieties reacting with rugose mosaic, such as Canso, Green Mountain, Irish Cobbler, and Keswick were relatively susceptible to field infections with virus Y. On the basis of necrotic response to virus Y, it is probable that the following varieties are also field-resistant to the common strains of virus: Canus, Cherokee, Chippewa, Earlaine, La Salle, Marygold, Norkota, Saco, Seneca, and White Cloud. (See: Bagnall, R.H. and R.H.E. Bradley. Resistance to virus Y in the potato. *Phytopathology* 48: 121-125, 1958).

Uncommon viruses in potatoes imported for breeding:

Studies of the reactions of different potato varieties to the common viruses have indirectly uncovered a number of unsuspected viruses in the material being tested. Several stocks of the variety Albion received from different sources in Canada and the United States were found to carry symptomlessly a virus resembling potato virus F (Clinch, Loughnane and Murphy). Similarly, several stocks of the variety Thorbecke carried a virus resembling potato virus C (Bawden), a non-aphid-transmitted strain of virus Y. It would appear that the original stocks of these varieties imported for breeding purposes, were infected with the respective viruses. These varieties have been maintained at various Experimental Stations for more than twenty years. Neither virus F nor virus C has ever been reported from Canadian or United States seed growing areas and it is improbable that they are now of serious consequence. Nevertheless if the viruses could go undetected for so long by specialists, it is doubtful if field inspectors or even plant pathologists could identify them by visual means. Several other viruses, as yet unidentified, have been found in imported potato stocks.

Early and late-maturing Irish Cobbler potatoes correlated with strains of virus X:

The Irish Cobbler potato variety has long been known to be entirely infected with virus X. During greenhouse eye-indexing tests of different stocks of this variety, selections were made of plants showing distinct foliar mottling and others appearing entirely healthy. Sap inoculations to Datura tatula and Nicotiana tabacum (var. White Burley) indicated that the mottled Irish Cobbler harbored a relatively "severe" strain of virus X, while the "healthy" Irish Cobbler harbored a relatively "mild" strain of the virus. All stocks of Irish Cobbler so far tested, have been found infected with virus S, but in the present instance, no viruses other than S and X could be demonstrated. Tubers from the Irish Cobbler selections were regrown in the field for multiplication, the progeny of each original selection being kept separate. During 1956 and 1957, replicated trials were run to determine the growth habit and yielding ability of the various selections. The results showed that the plants appearing mottled in the greenhouse gave rise to large, upright, dark-green, comparatively late-maturing field plants which blossomed profusely and set two or three seed-balls per plant. The "healthy" greenhouse plants on the other hand, gave rise to comparatively small, spreading, light-green, and early-maturing field plants which developed few blossoms and set no seed. There appeared to be no difference in yielding ability between the early and late maturing types when they were top-killed 90 days after planting. Yields in 1957 averaged 398 and 405 bu. per acre, respectively, at this stage. The early maturing plants top-killed more readily however, and were more easily harvested. When the two types of Irish Cobbler were left 110 days before top-killing,

yields of the late maturing type were significantly higher, averaging 503 bu. per acre against 436 for the early maturing type. As a result of these selections, we have two distinct types of Irish Cobbler potato. It is probable that the extremes can be widened still further by selection amongst the individual tuber-lines. There is reason also, to believe that similar results could be obtained with other potato varieties. With one variety, earliness may be of prime importance, while yield at a later date would be the main consideration with another. It is therefore suggested that some fresh thought should be given to what is actually being accomplished by the extensive eye-indexing programs. These, after all, are conducted under artificial greenhouse conditions.

HAYWIRE (? virus). Thirteen affected plants were seen in 6 fields in B.C. Eleven of these were in 1 field of 60 acres in the Pemberton district (N. Mayers). It was tr. in 2/105 fields in s. Alta. (R.P. Stogryn), and tr. in 7% of the fields inspected in n. Alta. (E.C. Reid).

FROST INJURY was tr. in the n. Okanagan and s.e. B.C. (N. Mayers). In n. Alta. low temperatures during the harvesting season rendered tubers unduly brittle and subject to bruising or cracking (E.C. Reid). It caused quite extensive losses in some parts of Sask. (A. Charlebois). Sl. damage occurred in the Guelph district (W.L.S. Kemp) and in e. Ont. (E.H. Peters). Frost injury in Que. was confined to the n.w. portions of the province where frost occurred in late Sept. (B. Baribeau). Some injury occurred on the west coast of Nfld. (G.C. Morgan).

BLUE SPOTTING (physiological) was economically important in Netted Gem tubers grown in the lower Fraser Valley, B.C. in 1956 and in the dry, southern interior of B.C. in 1957. It has been identified as a disease previously described in Holland, Great Britain and the U.S.A. as "blue spotting", "black spotting" and "internal black spot". The direct cause is an enzymatic reaction probably involving polyphenoloxidase which is incited in susceptible tubers following handling bruises. Predisposing factors are those which contribute to flaccidity in tubers such as potash deficiency, soil moisture shortage, or low humidity in storage. Insufficient soil moisture during the month preceding maturity is believed to be the principal predisposing factor in B.C. (N.S. Wright). see P.D.R. 41: 608-611, 1957. (D.W.C.).

BROWN EYE (cause unknown). This disease was noted for the first time in P.E.I. in 1957. It occurred in tr. amounts in Sebago. A similar disease called "pink-eye" has been reported in Maine and Connecticut where it has sometimes caused sev. damage. Wherever found, brown-eye has occurred in Verticillium infected fields but it is apparently only indirectly associated with wilt. Verticillium has not been

recovered from brown-eye lesions but Pseudomonas bacteria are often present in great abundance (D.B. Robinson).

HOLLOW HEART (physiological) was encountered in a number of fields in B.C., but was rarely serious (N. Mayers).

GIANT HILL was present in trace amounts in 20 fields in s. Alta. (R.P. Stogryn). Symptoms of the disease were observed in a few fields in the Dufferin district on Ont. (H.W. Whiteside). It was seen in 9/216 fields in N.S., particularly in Netted Gem, Green Mountain and Irish Cobbler (R.C. Layton).

STEM END DISCOLORATION (non-parasitic) was reported in 5% of the bin lots inspected in Que. One lot of Green Mountain with 60% of the tubers affected was rejected (B. Baribeau).

MAGNESIUM DEFICIENCY was sev. causing interveinal necrosis and brown lesions on the foliage of Irish Cobbler and Katahdin and to a lesser extent on Green Mountain at Ste. Foy, Que. (D. Leblond).

In August, 1957, Mr. H. Genereux made a survey of potato fields and home gardens in communities on the north shore of the St. Lawrence from Riviere au Tonnerre in Quebec to Forteau Bay in Labrador. He reports the following diseases in the Quebec communities.

Early Blight (Alternaria solani) was sev. in 1/12 fields at Riviere au Tonnerre, in 1/17 at Magpie and in 2/11 at Longue Pointe de Mingan; sl.-sev. in 8/45 at Havre St. Pierre; sl. in 7/43 at Ile à Michon and in 2/14 at Natashquan; tr. in 5/56 at Aguanish.

Bacterial Ring Rot (Corynebacterium sepedonicum) was found in tr. amts. in 2/43 fields at Ile à Michon.

Black Leg (Erwinia atroseptica) appeared in tr. amts. at Riviere au Tonnerre, Magpie, Riviere St. Jean and Tête à la Baleine. It was also tr. in 6/45 fields at Havre St. Pierre, 3/26 at Aguanish, 4/40 at Ile à Michon, and 6/17 at Lourdes de Blac Sablon.

Rhizoctonia (Pellicularia filamentosa (R. solani) was sl. in 1/45 fields at Havre St. Pierre and tr. in 1/14 at Natashquan.

Late Blight (Phytophthora infestans) was sl.-mod. in 3/45 fields at Havre St. Pierre and sl. in 1/11 at Longue Pointe de Mingan.

Powdery Scab (Spongospora subterranea) was present in 1/17 fields at Lourdes de Blanc Sablon.

Common Scab (Streptomyces scabies) was present in most fields at Riviere au Tonnerre, Longue Point de Mingan, and at St. Augustin; 9/22 fields at Ile à Michon had sl. -sev. scab; 7/37 fields at Havre St. Pierre, 8/26 at Aguanish, and 10/14 at Natashquan showed tr. amts. of common scab.

Leaf Roll (virus) was tr. in 1/43 fields at Ile à Michon.

Mosaic (virus) was the predominant disease at Riviere au Tonnerre; it was sev. on Green Mountain at Magpie; a few sev. affected plants were found in 16/26 fields at Aguanish, 12/43 at Ile à Michon, 1/14 at Natashquan and 1/17 at Lourdes de Blanc Sablon; a tr. of mosaic was observed at Tête à la Baleine and St. Augustin.

In the 3 Labrador communities surveyed these diseases were recorded.

Black Leg (Erwinia atroseptica) was sl. in 5/10 fields at Forteau Bay and tr. in 5/14 at Pointe Anse Eclair.

Mosaic (virus) was seen in 1 field at Pointe Anse Eclair and in 1/10 at Forteau Bay.

PUMPKIN

POWDERY MILDEW (Erysiphe cichoracearum) was general on all varieties of pumpkin foliage late in the season in the Okanagan Valley, B.C. (G.E. Woolliams). It was prevalent in several fields in Essex Co., Ont. on pumpkins grown for canning. Foliage was prematurely destroyed in Sept. (C.D. McKeen).

RADISH

WHITE RUST (Albugo candida) infected greenhouse-grown radishes at Beauport, Que. (D. Leblond).

RHUBARB

RING SPOT (virus) sev. affected a single plant in a planting at Charlottetown, P.E.I. (R.R. Hurst).

SPINACH

WILT (Fusarium oxysporum). A 20% infection of wilt was seen at Les Saules, Que. (D. Leblond). At Ste. Anne de la Pocatiere, Que., 25% of the plants in one field were infected (L.J. Coulombe).

SQUASH

POWDERY MILDEW (Erysiphe cichoracearum) was prevalent during late Aug. and during Sept. on all squash crops in Essex Co., Ont. Premature defoliation resulted (C.D. McKeen).

LEAF SPOT (Septoria cucurbitacearum). A sev. outbreak developed in Aug. in a garden plot at Kentville, N.S. The vines lost their foliage early and an estimated 20% decrease in yield was sustained (K.A. Harrison).

SWEET CORN

STEWART'S WILT (Bacterium stewartii). At Anderson, Essex Co., Ont. 5% of the plants in a 1/2 acre section of a 15-acre field were infected with bacterial wilt. This portion of the field had not received an application of D.D.T. (R.W. Walsh).

SMUT (Ustilago maydis). Specimens were received from Corning, Sask. (T.C. Vanterpool), and from two widely separated districts in Sask. The disease is comparatively rare in the province (R.J. Ledingham). Specimens were received at the Kentville laboratory from scattered points in N.S. It is not important in commercial fields (J.F. Hockey).

LEAF SCORCH (physiological). Plants at La Prairie, Que. showed leaf scorch due to a water deficiency (R. Crete).

TOMATODiseases of Canning Tomatoes in Southwestern Ontario in 1957

W.G. Benedict

Anthracnose (Colletotrichum sp.) continues to be the most important disease of the canning tomato crop. Field experiments on anthracnose control were conducted in 1957 using two different spray schedules on many of the locally grown varieties and some anthracnose-resistant varieties. The data obtained indicated that bimonthly applications of Manzate at the rate of 3 lbs. per acre beginning early in July and continuing until the second

week in Sept. gave satisfactory control of the disease in early maturing varieties. Differences in yields from sprayed and unsprayed plots of varieties ripening in mid-season or later were small at the peak of the harvest season about 30 Aug. However, during the following weeks almost twice as many disease-free fruits were picked from sprayed than from unsprayed plots. Where the second spray was delayed until ripe fruit appeared, slightly lower yields resulted. There are at present a few high-yielding tomato varieties that are resistant to anthracnose under local conditions on soil types and in areas where anthracnose is most prevalent.

Late Blight (Phytophthora infestans) appeared in 1957 for the first time in nearly a decade. The disease was confined to certain districts across the northern part of Essex Co. and caused considerable losses in isolated fields in late Aug. and early Sept.

Root lesioning and Damping off (Rhizoctonia solani) occurred again in 1957 where tomato plants were transplanted into non-steamed compost soil and placed in an A-type greenhouse to grow until planting time. Varietal differences in susceptibility to this fungus were evident. In the Harrow variety 66/250 plants were killed in comparison with 10/250 plants of the variety Valient. Few Harrow plants in the test lacked extensive root lesions during the early stage of attack by the fungus. The plants which survived were retarded but later developed normally.

Other Observations

EARLY BLIGHT (Alternaria solani) was sl. in the early basket crop in s. Essex Co., Ont. A higher incidence of disease was observed in several unsprayed canning crops throughout the county (C.D. McKeen). It was present in most fields in the Burlington-Toronto area. A potentially serious outbreak was checked by a combination of sprays and better weather conditions (E.F. Muir.) Traces of early blight were present in many fields in Hastings and Prince Edward Counties, Ont. but in contrast to 1956 did not cause serious defoliation (J. Cutcliffe). Early blight was widespread in fields in Queens and Sunbury Counties, N.B., but did little damage (S.R. Colpitts). Sl. infections were seen on Bonny Best (R.R. Hurst), and on Monarch, with some fruit lesioning at Charlottetown, P.E.I. (J.E. Campbell). Sev. outbreaks developed on all varieties in Kings Co., N.S. during the summer and defoliation was heavy. An estimated 15% of the crop was unmarketable because of fruit spotting (K.A. Harrison). Fifty % of the fruit of Valnorth was affected with rot at the Exp. Farm, St. John's West, Nfld. (O.A. Olsen).

GRAY MOLD (Botrytis cinerea) was general throughout the fall greenhouse tomato crop in Essex Co., Ont. In many instances sev. foliage infections prevented the proper sizing of fruit. By early Dec. the most

seriously affected crops were nearly defoliated (R. W. Walsh). Gray mold rot, which caused serious losses to a grower at Berwick, N.S., in 1956, was kept well under control on the same farm in 1957 by the use of Thylate in the spray program. Losses were estimated at 5%. At Kentville, N.S. in replicated plots of the variety Stokesdale, 27% infection was recorded. Results obtained in spraying experiments at Kentville in 1956 and 1957 indicate strongly that Botrytis on field tomatoes is favored by the application of carbamate sprays (K.A.H.).

LEAF MOLD (Cladosporium fulvum) occurred in the greenhouse at Fort Vermillion and in Edmonton, Alta. (W.P. Campbell). The disease appeared in four large greenhouses at Harrow, Ont. in the spring crop and yield was reduced by one-third. Since leaf mold is seldom troublesome at this time completely susceptible varieties are often grown in the spring crop greenhouses. High atmospheric humidities in the spring of 1957 favored leaf mold development (C.D. McK.). A. sl. attack developed in March in a greenhouse at Kingston, N.S. (K.A.H.).

WILT (Colletotrichum atramentarium). The development of a wilt condition in a 10-acre field near Burgessville, Oxford Co., Ont. resulted in the entire field being affected by harvest time. Sev. affected plants showed marked vascular discoloration. Isolations and infection tests indicate that C. atramentarium is involved in this disturbance, which, in the field resembles Fusarium wilt (B.H. MacNeill). (see MacNeill, B.H., P.D.R., 41:12, 1032, 1957). (D.W.C.).

ANTHRACNOSE (Colletotrichum spp.). In general, anthracnose was much less serious in 1957 in canning crops in Essex Co., Ont. than it has been for several years. The cool, wet summer may not have favored the disease (C.D. McK.). Tr. infections were noted in Hastings and Prince Edward Counties (J. Cutcliffe). Commercial fields in N.S. showed very little anthracnose, but some gardens and plots on the Exp. Farm, Kentville where tomatoes are raised year after year were mod. affected (K.A.H.).

Tomato Anthracnose in Ontario

W.I. Illman and R.A. Ludwig

A survey was made of the tomato anthracnose organism as it affects the canning crop in Ontario. For this purpose infected fruits were collected from cannery trim lines by cooperating field-men and sent to the London Laboratory for examination. The affected fruits thus obtained were representative of the entire tomato growing area. A total of 105 isolations were made in 1956 and 169 in 1957. These, with one exception, were

sclerotium forming types, showing only minor cultural variations and agreed in all characteristics with von Arx's description (1) of Colletotrichum atramentarium (Berk. ♀ Broom) Taubenh. A typical culture was subsequently sent to Dr. J.A. von Arx who confirmed this identification (2). The single exception mentioned was a culture of Colletotrichum dematium isolated from one of several lesions on a fruit sent in from Ridgetown in 1957.

Isolates received during 1957 from affected field-grown fruits in Wisconsin, Ohio, Pennsylvania, New Jersey, Delaware and Nova Scotia, all proved to be C. atramentarium. A conidial strain of Glomerella cingulata (Stonem.) Spauld. ♀ v. Schrenk (Colletotrichum gloeosporioides Penz.) was isolated in Maryland and one producing spores of similar size and shape was recovered from a fruit collected September 5, 1957 on a field excursion to Essex County, Ontario.

Cultures isolated from potato tubers were obtained from Nova Scotia, the Netherlands and Quebec. All were morphologically indistinguishable from the tomato fruit isolates. The Nova Scotia and Netherlands potato isolates produced typical anthracnose lesions on tomato fruits following artificial inoculation with aqueous spore suspensions.

(1) Arx, J.A. von, Die Arten der Gattung Colletotrichum Cda. Phytopath. Zeits. 29 413-468, 1957.

(2) Arx, J.A. von, Personal communication.

Pantidou and Schroeder (Phytopath. 45: 338-345, 1955), found that some fruit rotting isolates of Colletotrichum spp. were able to infect tomato roots and stems, and one isolate from tomato roots was highly pathogenic to tomato fruits. The inference is strong that they may have had a strain of C. atramentarium which has been shown by various authors to be the cause of a root rot, and more recently, (MacNeill, B.H., P.D.R. 41: 12, 1032, 1957), a wilt of tomatoes.

The presence of C. gloeosporioides Penz. (C. phomoides Chester) as well in the anthracnose complex in Ont., as shown by Illman and Ludwig, confirms the earlier findings of Richardson (P.D.S. 36: 92, 1957). Both authors have isolated from rotted fruit the conidial stage of Glomerella cingulata.

The implications of the findings of Illman and Ludwig and those of MacNeill reported above are far reaching. They will necessitate a re-examination of our concepts of the etiology of some of our most important disease problems in field-grown tomatoes (D.W. Creelman).

BACTERIAL CANKER (Corynebacterium michiganense) was seen on greenhouse plants in the Lower Fraser Valley (H.N.W. Toms), and affected 10-20% of the crop in fields at Cranston and Kamloops, B.C. Early affected plants succumbed (G.E. Woolliams).

PHOMA ROT (Phoma destructiva) caused up to 10% loss of fruit in plots at Ste. Foy, Que. (D. Leblond). Tr. infections occurred on Stokesdale at Kentville, N.S. (K.A.H.).

LATE BLIGHT (Phytophthora infestans). Initial infection was sev. in test plots at the University, Vancouver, B.C. by the end of July following cool, moist weather. By mid-Sept. 25% loss of fruit was recorded. Varying amts. of foliage blight developed on the Ottawa blight-resistant strains 056-723-1, 056-701-1, 056-701-5, and 056-701-12, but in no case was the fruit attacked (H.N.W. Toms). In n. Essex Co., Ont. late blight appeared in a field near Tilbury on 22 July, and in three other widely separated fields in the n. and w. portions of the county before mid-Aug. All these outbreaks were in fields set with Georgia-grown plants. During Sept. blight became widespread in n. Essex and caused 50-60% loss in some fields. Well sprayed fields suffered insignificant losses. Late blight entered several greenhouses at Leamington causing a total crop loss in some and considerable defoliation and some fruit infection in others. Damage was also sev. in many canning crops in Kent Co. A greenhouse crop at Ridgetown was destroyed (C.D. McK.). Blight was not serious in the Burlington-Toronto area. At the most, 2 or 3 fields suffered 10% damage (E.F.M.). In Hastings and Prince Edward Counties blight was first observed in fields set with southern-grown plants. Since blight has not been prevalent in the district during the past 5 or 6 years it is strongly suspected that the disease accompanied the imported plants. Generally dry weather and the use of fungicides held the overall loss at less than 10% (J.C.). Specimens were received from Dresden, Ont. (H.N. Racicot). In check plots at Ste. Foy, Que. 75% of the tomatoes were blighted (D.L.). Mod. losses were incurred at Charlesbourg (L.J. Coulombe), and 25% loss of the late crop occurred at Ste. Anne de la Pocatiere, Que. (H. Genereux). Late blight caused little loss in Queens, York, and Sunbury Counties, N.B. (S.R.C.). Mod. infections were fairly general on unsprayed crops in P.E.I. (J.E.C.). Late blight did not appear in fields in Kings Co., N.S. until mid-Sept. Two growers who had not sprayed their fields lost their late crops. The standard spray programs gave good control (K.A.H.). Foliage infection at St. John's West, Nfld. was 10-20%. No fruit infection occurred (O.A. Olsen).

BACTERIAL SPECK (Pseudomonas tomato). Fruits from one field in Leamington, Ont. bore speck lesions (C.D. McK.). Specimens were received from the Montreal and Quebec regions. P. tomato was confirmed

by M.D. Sutton (H.N.R.). Speck was quite general in several fields in Ste. Hyacinthe and Ste. Martine, Que. (R. Crete). It was observed at Ste. Foy, Que. on Asgrow. This is the first observation in the district for 10 yrs. (D.L.).

STORAGE ROT (Rhizopus nigricans). Tomatoes at the retail level from Jonquiere, Que. had R. nigricans growing in growth cracks (D.L.).

SEPTORIA LEAF SPOT (S. lycopersici) sev. defoliated most of the early tomato crop in s. Essex Co., Ont. soon after the beginning of harvest. Many growers had gambled on weather conditions and had omitted protective sprays. Adequately sprayed fields produced clean crops and good yields (R.W.W.). A few fields in Hastings and Prince Edward Counties showed sl. infection. The variety Ferguson appeared quite susceptible. The disease was less prevalent than in 1956 (J.C.). Leaf spot was sev. at St. Pierre les Becquets, Que. (D.L.).

SCLEROTINIA ROT (S. sclerotiorum). Tr. infection developed at the Exp. Farm, Kentville, N.S. A few fruits were destroyed and adjacent stems killed by the disease (K.A.H.).

VERTICILLIUM WILT (V. albo-atrum) was widely distributed and caused marked reductions in yields in many fields in B.C. (W.R. Foster). Approximately 40% infection occurred in commercial fields in B.C.'s Okanagan and Thompson Valleys (G.E. Woolliams, E.M. King). Up to 20% damage was suffered by a few growers in the Burlington-Toronto area (E.F.M.).

BACTERIAL SPOT (Xanthomonas vesicatoria). Specimens were received at the Ottawa laboratory from Chatham, Ont. The causal organism was verified by M.D. Sutton (H.N.R.). Mod. damage was caused by a 30% infection on Bounty at Deschambault, Que. (L.J.C.).

DAMPING-OFF (pathogens undetermined) was widespread in greenhouses in N.B. and caused a loss of 10% of the plants at Mampstead (S.R.C.).

BLOTCHY RIPENING (? virus), with varying amounts of browning of the vascular tissues was common in the spring crop of greenhouse tomatoes at Kingston and Falmouth, N.S. The plants had sev. mosaic symptoms. The disease was also found in most commercial fields in Kings Co. during the summer but was not serious enough to cause the culling out of affected fruits (K.A.H.).

BLACK CORE (? virus). A few affected fruits were obtained from one field in Essex Co., Ont. Tobacco mosaic virus was isolated from the fruits (C.D. McK.).

BROWN WALL (Tobacco mosaic virus) was less prevalent than usual in the early basket and canning crops in Essex Co., Ont. It was reported to be serious in Norfolk and Simcoe Counties in s. Ont. It affected the fruit on 1 or 2 trusses of the variety Vinequeen in several fall crops (C.D. McK.). Losses ran as high as 12% in many fall greenhouse crops in s.w. Ont. (R.W.W.).

MOSAIC (virus). The fall greenhouse crops in the Leamington, Ont. area showed a higher incidence of infection than usual (C.D. McK.). Most commercial plantings in Hastings and Prince Edward Counties, Ont. contained some mosaic, though infection was only tr.-sl. (J.C.). Mosaic affected 4% of 7000 Red Cloud plants at Gagetown, N.B. (S.R.C.). Mosaic was sev. in greenhouse crops in Kings and Hants Counties, N.S., but did not appear until quite late in the summer in commercial fields (K.A.H.).

PURPLE TOP (Callistephus virus 1) was widely prevalent on tomatoes in Sask. in 1957. Usually 5-10% of the plants were diseased and these showed very sev. symptoms (R.J. Ledingham). Purple top was common in all parts of Man. (W.C. McDonald). Affected plants were found scattered through many canning crop fields in Essex and Kent Counties, Ont. (C.D. McK.).

STREAK (virus). Single virus streak appeared first affecting about 80 plants in a large greenhouse at Leamington, Ont. in mid-Sept. It later spread throughout the entire greenhouse causing sev. foliage and stem injury. Some fruits developed black lesions rendering them unmarketable (C.D. McK.). Streak was seen in 2 greenhouses in the Burlington-Toronto area with 1 grower suffering 10% loss from the disease (E.F.M.). A sev. outbreak occurred in a commercial field near Burgessville, Oxford Co., Ont. Infection experiments with juice from diseased plants indicate that the tomato spotted wilt virus as well as tobacco mosaic virus and potato virus X may be involved as a complex causing the type of necrosis commonly known as streak (B.H. MacN.). Double virus streak appeared late in the season in a field in Kings Co., N.S. An adjacent potato field was the probable source of one of the viruses (K.A.H.).

BLOSSOM-END ROT (physiological) was not seen in the University or laboratory plots at Vancouver, B.C. (H.N.W.T.). It was more sev. in Sask. than for several years. Some cases of heavy losses, up to 25%,

were reported. Extremely dry, hot weather prevailed for a period in late July followed by rain and cool weather in Aug. (R.J. Ledingham). Enquiries regarding the disease were received at Saskatoon following hot weather late in July (T.C. Vanterpool). Blossom-end rot was less serious than usual in Kent and Essex Counties, Ont., probably because of the wet, cool summer (C.D. McK.). It was present in a field near Leamington, Ont. (W.G. Kemp). The condition was not serious in the Burlington-Toronto area in 1957 (E.F.M.), but was quite prevalent in Hastings and Prince Edward Counties, particularly on fruit of the first trusses. In the most sev. cases 75% of the fruits of the first picking were affected. Rains in early Sept. checked its development on later pickings. The varieties Manitoba, Sioux, Glamour and Moreton Hybrid showed considerable tolerance to the disease while John Baer appeared very susceptible (J.C.). Specimens on Ball's Extra Early were received from a greenhouse crop at Ville la Salle, Que. The grower stated that this variety was more susceptible than others in the crop (H.N.R.). It was tr. in a garden in Queens Co., P.E.I. (R.R.H.). Blossom-end rot was serious in the Annapolis Valley, N.S. early in the season, but later rains checked its development (K.A.H.).

CHEMICAL INJURY. Injury from 2,4-D ester sprays was extensive on many tomato crops in s.w. Ont. Evidence was obtained to show that the application of low volatile esters within 1/2 mile of a tomato crop may damage it considerably (C.D. McK.). At Leamington, Ont. one greenhouse crop was injured following the application of the hormone N-M-tolylphthalamidic acid (Duraset 20W) at the rate of 200 ppm. The chemical is used to increase bloom. Injury was typical of 2,4-D injury. Affected plants required about 4 weeks to recover (R.W.W.).

GROWTH CRACKS. Intermittant rains during the harvest of the canning crop in s.w. Ont. caused many otherwise sound fruit to split. Invasion of secondary rot organisms such as Alternaria, Rhizopus and Penicillium caused a further loss. Some growers lost up to 50% of their marketable fruit from these causes (R.W.W.). Showery weather resulted in many growth cracks on fruit in Sunbury and Queens Counties, N.B. Loss was as high as 15% in some fields (S.R.C.).

DROWNING. As the result of torrential rains in early July several acres of tomato plants were destroyed in low-lying areas in s. Essex Co., Ont. (C.D. McK.). A leaf rolling condition, due to excessive soil moisture was sl.-mod. in several fields in Missisquoi Co., Que. (R. Crete).

TURNIP

SOFT ROT (Erwinia carotovora) caused sl. damage in a 1-acre field in Queens Co., P.E.I. (R.R. Hurst). Sev. infections developed in 2 carloads stored at St. John's; in 300 bogs at Lethbridge and in 750 bags at Clarendville, Nfld. (G.C. Morgan).

BLACK LEG (Phoma lingam). A specimen was received from Cumberland Co., N.S. The grower reported that the disease was causing serious damage (K.A. Harrison).

CLUB ROOT (Plasmodiophora brassicae) was sev. at Les Saules, Neuville and St. Romuald, Que. (D. Leblond), and was observed at Natashquan, on the n. shore of the Gulf of St. Lawrence (H. Genereux). A few isolated cases of sev. club root infection in swedes were noted in P.E.I. in 1957 in contrast to the widespread and destructive outbreaks in 1956. Relatively low moisture levels following seeding in 1957 were not favorable for infection (G.W. Ayers). Club root was reported from all areas of Newfoundland where turnips are grown. Damage varied from sl.-sev. (O.A. Olsen), mod.-sev. infections were evident in the low lands of Clarke's Beach, the south shore and in the Bonavista Bay area. Infections in several small plots at Trinity Bay were 75-100%. It was mod.-sev. in 8 commercial fields on the west coast and sl.-mod. in 12 others (G.C. Morgan).

SCAB. (Streptomyces scabies). Considerable scab developed on a limed plot at Charlottetown, P.E.I. (J.E. Campbell).

BLACK ROT (Xanthomonas campestris) appeared to be widely scattered throughout P.E.I. in 1957 in the Laurentian variety. At Guernsey Cove infection was 2% and at Brackley it was 1% (G.W.A.). Tr. infections were seen in Laurentian at Torbay, Nfld. (O.A.O.).

STORAGE ROTS (various organisms). Specimens received from Beauport West and St. Laurent, Que. yielded Ascochyta sp. Botrytis cinerea. Oospora lactis, Rhizopus nigricans and Erwinia carotovora (D.L.).

BROWN HEART (boron deficiency) occurred at Beauport West, St. Laurent and Giffard, Que. (D.L.). It was tr. on a limed plot at Charlottetown, P.E.I. (J.E.C.). Specimens were received from several localities in Colchester Co., N.S. (K.A.H.).

CHEMICAL INJURY. Drift of 2,4-D from brush spraying ruined a 12-acre field of turnips at Bird's Hill, Man. (W.L. Gordon).

WATERMELON

ALTERNARIA ROT (A. cucumerina) caused the loss of 30% of the melons in a small plot at Nepean, Ont. (V.R. Wallen).

ANTHRACNOSE (Colletotrichum lagenarium). A mod. infection was noted in a garden near Harrow, Ont. (C.D. McKeen).

FUSARIUM WILT (F. bulbigenum var. niveum) caused wilting and death of 75% of the plants in a half-acre planting near Harrow, Ont. (C.D. McK.).