

### III. DISEASES OF VEGETABLES AND FIELD CROPS

A special report entitled "Vegetable Disease Survey of the Holland-Bradford Marsh, 1954" prepared by Dr. O. T. Page, Department of Botany, Ontario Agricultural College, Guelph, forms an admirable preface to the section. Considerable concern is felt over the possibility that the club root organism may have been widely distributed as a result of flooding in October 1954.

According to a survey of the Holland-Bradford Marsh conducted by Mr. K. W. Hunter in 1954, 94% of the area (6,745 acres) was planted to 5 vegetable crops. These crops were: lettuce (1870 acres), carrots (1317 acres), onions (1427 acres), potatoes 1289 (acres) and celery (442 acres). The muck soil on which the crops are grown overlies peat of either sedge-grass or woody origin.

On 15 Oct. 1954 the entire area of the Bradford Marsh was inundated to a depth of 1-8 feet in the wake of hurricane Hazel. The marsh was again completely drained within a month after flooding. It is anticipated that the dissemination or destruction of inocula of several pathogens will be reflected in crop losses in 1955. An estimate of the amount of certain crop diseases observed in 1954 is presented along with some comparisons of disease losses in 1953 and 1952.

#### Carrot

Soft Rot (*Erwinia carotovora*). More than 90% of both harvested and unharvested carrots covered by flood water in October were affected.

Yellows (virus). Between 40 and 50% of the roots examined in one field (C. B. Kelly and O. T. Page) in the Springdale area of the Bradford Marsh exhibited proliferation of the fibrous roots and adventitious chlorotic shoots.

#### Cauliflower

Club Root (*Plasmodiophora brassicae*) was first observed in one field on the Bradford Marsh in 1953. In 1954 approximately 15% of the cauliflower plants in another field on the same farm were infected (O. T. Page and C. B. Kelly). The effect of flooding in October 1954 on the possible dissemination of this disease organism from a localized area will be investigated in 1955.

#### Celery

Bacterial Blight (*Pseudomonas apii*). A trace was found on the Horticultural Experiment Substation in early September. This disease was moderately severe in several acres of the Bradford Marsh in 1953.

Pink Rot (Sclerotinia sclerotiorum). A trace was observed on celery in a large storage in Bradford in December.

Late Blight (Septoria apii-graveolentis) was prevalent on late storage celery in all fields examined in early September. The severity of the disease in fungicide-dusted fields emphasizes the need for a critical evaluation of application techniques used by growers on the Bradford Marsh.

#### Lettuce

Root Rot (Botrytis cinerea) was reported by MacNeill (Plant Dis. Repr. 37: 618-619. 1953) to have affected in some instances more than 80% of the crop in 1952 and 1953. In 1954 this disease was again severe, particularly in fields in which lettuce followed lettuce.

Downy Mildew (Bremia lactucae). A trace was observed in most fields examined in August.

Aster Yellows (virus) affected more than 50% of the plants in some fields in 1953. The disease has proved difficult to evaluate because the severity of the symptoms varied from plant to plant. The time of infection is one factor which undoubtedly influenced this variation. Growers were urged to dust their crop regularly with DDT in 1954 upon emergence of the seedlings. The amount of yellows was very sharply reduced in both DDT-treated and untreated fields. It is estimated that less than 10% of the plants were infected in fields examined.

#### Onion

Purple Blotch (Alternaria porri). A trace was observed in one field examined.

Neck Rots (Botrytis allii and Botrytis squamosa). A trace of gray-mould neck rot (B. allii) was found in several lots of yellow bulb onions examined in storage in January 1954. White bulb onions which appear sporadically in fields of yellow bulb onions invariably were infected with the small sclerotium neck-rot organism (B. squamosa).

Leaf Spot (Botrytis spp.). A trace to 5% of this leaf spot caused by B. squamosa was present in 7 fields examined in 1954. It was reported by Page (Plant Dis. Repr. 37(10):513-514. 1953) to be severe in 1953, affecting 100% of the plants examined in widely separated fields.

Downy Mildew (Peronospora destructor). With one exception, over 90% of yellow bulb onion plants examined in mid-August were affected by downy mildew. One 13-acre field (Wm. Watson) sprayed regularly with a carbamate spray exhibited less than 10% infected plants.

Leaf Mould (Stemphylium botryosum) occurred concomitantly with downy mildew and was responsible for the black mouldy appearance associated with downy mildew injury in 1954.

Smut (Urocystis cepulae) was introduced into the Ansoveld area of the Bradford Marsh between 1944-1946. The spread of this disease has been followed by surveys conducted in 1952-53-54. Smut is now generally prevalent in that part of the Bradford Marsh between Highways 11 and 400. Counts of diseased seedlings varied from 0 to 55% in 15 fields selected for examination. In 5 fields examined west of Highway 400, a high incidence (50%) of diseased seedlings was found in a restricted area in one field.

#### Potato

Late Blight (Phytophthora infestans) was severe in some fields of the Bradford March by 12 Aug. Several fields of Canso potatoes showed severe foliage symptoms in late August.

Silver Scurf (Spondylocladium atrovirens) was present on more than 75% of certified seed potatoes examined in a large storage in Bradford in the spring, 1954. The severity of this disease increases in storage and results in reduction of commercial grade. It is of particular concern to growers who market washed potatoes in polyethylene bags.

#### ASPARAGUS

RUST (Puccinia asparagi). Sl. infection in the laboratory plots, St. Catharines, Ont. (J. Townshend).

#### BEAN

GREY MOULD (Botrytis cinerea) caused considerable loss to beans during early harvest in B. C. A pod rot, which started after the pods were picked but before the beans were delivered to or before they were processed at the cannery, continued to be troublesome as long as the wet weather continued. Grey mould also caused heavy defoliation with reduction in yield in many plantings during September (I. C. MacSwan). Only trace amounts were seen in early pickings about Canaan, N. S. There was some damage later when the plants suffered injury from wind and rain (K. A. Harrison). Grey mould caused sl. -mod. damage, particularly to the margins and tips of the leaves of Pencil Pod at York, Queens Co., P. E. I. Later it caused sl. amount of pod rot in the same planting (J. E. Campbell).

ANTHRACNOSE (Colletotrichum lindemuthianum). Diseased specimens received from Swift Current, Sask. (R. J. Ledingham). Infection was sl. -sev. in plantings, mostly of wax beans, at Baie St. Paul, about Lake St. John and

at Larouche, Que. (L. J. Coulombe). Infections in gardens was tr. -mod. about Quebec City and along the Lower St. Lawrence (D. Leblond). A mod. infection was present on samples received from Ste Catherine, Portneuf Co., (H. N. Racicot). A 40% infection was found in 2 garden patches at Salisbury, Albert Co., N. B. (S. R. Colpitts). Anthracnose completely destroyed a garden planting of Davis White Wax at Kentville, N. S. and was also prevalent on Black Seeded Pencil Pod in another garden. It was not reported from the canning areas in N. S. (K. A. H., D. W. Creelman). Anthracnose was quite general and often serious in P. E. I. (J. E. Campbell). Mod. infection was noted in a garden at Topsail and in one at Brigus, Nfld.; sev. infected specimens were received from Burin (G. C. Morgan).

DRY ROOT ROT (Fusarium solani f. phaseoli) was evident in all fields of Michelite examined in s. w. Ont.; Robust was also infected. The disease was most sev. in fields on sandy loam and in one on heavily manured soil. Infection ranged from 5 to 80%. Amount of damage was not estimated as the crop suffered from severe drought and nitrogen was deficient in some fields (R. N. Wensley).

HALO BLIGHT (Pseudomonas phaseolicola) was unusually scarce in s. Alta.; sl. infections were noted in a few gardens and 2 fields (M. W. Cormack). The disease was extremely sev. about Edmonton, where the worst outbreak in many years occurred (L. E. Tyner, W. P. Campbell). A 100% infection caused sl. -sev. damage to a block of Clipper at Ottawa, Ont. (R. V. Clark). One small lot of seed planted in the Canaan area, N. S., showed scattered infection areas. Most growers had good seed and suffered no loss. There is only one large grower left in the area, but he has had good crops for the last 2 years (K. A. Harrison). A light infection was present on a late planted crop at York, P. E. I. (J. E. Campbell).

Halo Blight and Common Blight (q. v.) were common and caused mod. damage in gardens in Saskatoon, Sask. (R. J. Ledingham).

STEM ROT (Sclerotinia sclerotiorum) was heavy late in the season in gardens in Saskatoon, Sask.; the attack came too late to affect yields noticeably (T. C. Vanterpool). A garden patch was reported to be sev. infected at Magog, Que.; diseased specimens were received (H. N. Racicot, Constance Bowerman). A trace of rot was seen in a basket of picked beans at Canaan, N. S. (K. A. H.).

RUST (Uromyces appendiculatus). For the first time since 1948 bean rust appeared in B. C. in September; it was sev. on Blue Lake 65 in the Abbotsford, Matsqui and Sumas districts. As a result of defoliation reduction of crop was common. Blue Lake 231 and Ferry Morse #1 were also affected but not as heavily as Blue Lake 65 (I. C. MacSwan). A tr. of rust was seen on Kentucky Wonder in a small garden at Kentville, N. S.

(K. A. H.) and on Pencil Pod at Charlottetown, P. E. I. (R. R. Hurst).

COMMON BLIGHT (Xanthomonas phaseoli) was heavy on a block of Clipper at Ottawa, Ont. (R. V. Clark). Infection was sl. -sev. in gardens about Quebec City and on the lower St. Lawrence, Que. (D. Leblond), and about Lake St. John (L. J. Coulombe). A trace was seen in a garden on Golden Wax Improved at Charlottetown, P. E. I. (R. R. H.).

MOSAIC (virus). A tr. was present in an acre field of Round Pod Kidney Wax and in a block of Clipper at Ottawa, Ont. (V. R. Wallen, R. V. Clark) and in a garden at Sillery, Que. (D. Leblond). Yellow mosaic (Phaseolus virus 2) was found on Kentucky Wonder beans in 4 gardens in Fredericton, N. B.; infection was 2-5%. The infected plants were growing near gladioli that showed a faint mottling (D. J. MacLeod). A 25% infection was observed in a planting of Kentucky Wonder at Kentville, N. S.; when this variety is grown near gladioli 20-30% of the bean plants become infected with mosaic that kills the bean plant before the crop matures (K. A. Harrison). Seed stocks of Ace and Yellow Eye grown at the Experimental Station were rogued 2 years ago, but 20% of the plants are again infected (K. A. H.).

#### B E E T

LEAF SPOT (Cercospora beticola). A tr. was observed in one garden at Rougemont, Que. (R. Crete), and in one at Kentville, N. S. (D. W. Creelman). Leaf spot was general and infection was heavy in many gardens in Charlottetown, P. E. I. (R. R. Hurst).

DAMPING-OFF (Rhizoctonia solani) almost completely destroyed late plantings in 2 gardens at Harrow, Ont. (C. D. McKeen).

SCAB (Streptomyces scabies). Infection was very sl. in a garden in Queens Co., P. E. I. (R. R. Hurst); mod. in 2 small plots at Topsail and sl. in 3 fields at Clarkes Beach, Nfld. (G. C. Morgan).

SEEDLING BLIGHT (various organisms). Around Montreal, Que., seedling blight is always serious in early seedings of beets intended for transplanting. Soil treatment with Arasan 3 oz. per each 6' x 12' bed has given excellent control (E. Lavallee).

INTERNAL BLACK SPOT (?boron deficiency) was noted in one field at Clarkes Beach, Nfld. (G. C. Morgan).

#### B R O A D B E A N

CHOCOLATE SPOT (Botrytis cinerea) was mod. -sev. on the leaves at Larouche and St. Jerome, Que. (L. J. Coulombe). It was also sev. at Ste Foy (D. Leblond).

WILT (Fusarium oxysporum f. fabae) was found causing tr. -sev. infections in plantings in gardens and fields along the north shore of the St. Lawrence River, e. of Que. and about Lake St. John; in one 1/4 acre field, 60% of the plants were affected and yield would be low (L. J. Coulombe).

MOSAIC (Pisum virus 2). Four plants showing sev. mosaic were found in a garden in Fredericton, N.B. (D. J. MacLeod). Tr. was seen in a garden at Murray Bay, Que. (D. Leblond).

#### BROCCOLI

SOFT ROT (?Erwinia carotovora) was general in plantings throughout the lower mainland, B. C., and caused sev. loss to many growers; one grower estimated that 75% of his crop was lost from a 5-acre field (I. C. MacSwan).

CLUB ROOT (Plasmodiophora brassicae) sev. affected about 10% of the plants in the laboratory plots, St. Martin, Laval Co., Que. (E. Lavallee).

#### BRUSSELS SPROUTS

SOFT ROT (?Erwinia carotovora) caused some rotting in a 2 acre field at Aldergrove, B. C.; loss was sl. (I. C. MacSwan).

#### CABBAGE

GREY MOULD (Botrytis cinerea) was found on 2 plants in plots at Ste Foy, Quebec Co., Que. in September; rarely seen on cabbage in the field (D. Leblond). The disease sev. infected about 200 bags of cabbage under poor storage conditions at St. John's, Nfld. (G. C. Morgan).

SOFT ROT (Erwinia carotovora) affected 5 plants of Penn State in a 1/10 acre plot at Ste Clothilde, Que. (V. R. Wallen). The disease affected an occasional head in a garden at Charlottetown, P. E. I. (R. R. Hurst). It also sev. affected 25% of the heads of imported cabbage in a wholesale warehouse at St. John's, Nfld.; shipment had previously suffered from frost (G. C. Morgan).

YELLOWWS (Fusarium oxysporum f. conglutinans) was sev. in 1 1/2-acre field at Merrickville, Ont. (H. N. Racicot). Yellowws was again present in cabbage on a St. Vincent de Paul farm. Damage was less on account of the cool season and the growing of somewhat resistant varieties. The disease was found on a second farm, which is on Cote St. Luc, Montreal Island; damage sl. (E. Lavallee).

CLUB ROOT (Plasmodiophora brassicae). A grower at Fort William,

Ont. , reported that he had been unable to raise any cabbage for the last 3 years on account of the disease; affected specimens received (H. N. R.). Club root was present in many fields on Isle Jesus, Que. , but the plants were less injured than usual on account of the cool wet weather that prevailed throughout the season (E. Lavallee). The disease was present in a 2-acre field at the Ste Clothilde Station in a steckling crop of Danish Ballhead (V. R. Wallen). A tr. was noted in a small garden at Kentville, N. S. (D. W. Creelman). Club root affected 20% of plants in a field in Queens Co. , P. E. I. ; infection took place from the compost soil used in flats for starting the seedlings (J. E. Campbell). Infection was very sev. in 3 fields at Clarkes Beach and sl. -mod. in many fields in Conception Bay, Nfld. (G. C. Morgan).

WIRE STEM (Rhizoctonia solani) was present as usual in early cabbage, cauliflower and turnip seedlings on Isle Jesus, near Montreal, Que. ; losses are often 100%. Treating the soil with Arasan 3 oz. , or Brassical 8 oz. per 6' x 12' bed has given excellent control (E. Lavallee). Head rot caused by R. solani caused considerable damage at Terrace in the Skeena Valley, B. C. ; mycelium permeated the tissues (W. Jones, W. R. Foster).

BLACK ROT (Xanthomonas campestris) was quite prevalent in a field at Birds Hill, Man. On 11 Aug. leaves and stalks showed vascular discoloration and on 23 Nov. the harvested crop was deteriorating rapidly. My informant stated that the seed had been imported by a local seed company (W. A. F. Hagborg).

OEDEMA (excess water) was general in a garden at Carleton-by-the-Sea, Que. in late June (D. Leblond).

### CARROT

GREY MOULD (Botrytis cinerea). Several affected roots were seen in the Marketing Board warehouse, Victoria, B. C. The roots were grown at Gordon Head (W. Jones). About 10% of the Nantes carrots in storage at Waterville, N. S. , were destroyed by March. Grey mould is much slower in developing than some storage rots but in all lots of roots held for some time in storage it is from year to year one of the most important causes of loss (K. A. Harrison).

SOFT ROT (Erwinia carotovora) affected about 25% of the plants in a 1/10 acre plot of Amsterdam at Ste Clothilde, Que. (V. R. Wallen).

ROOT ROT (Phytophthora megasperma Drechsl.) was general in a 2-acre field on muck soil at Matsqui, B. C. Decay began as a slight darkening mostly near the tip of the tap root. Flesh was rather dull and firm but watery under pressure. The fungus was isolated and the oogonia and antheridia obtained resembled those of P. megasperma,

which has been reported on carrots from Tasmania. The grower stated that he would have to discontinue growing carrots unless he can control the trouble (I. C. MacSwan, W. Jones).

**VIOLET ROOT ROT** (Rhizoctonia crocorum). A 100% infection was obtained in the check plots in an experimental area on Thedford Marsh, Ont. In commercial plantings in the Marsh, the disease was present in almost every one, but infection did not exceed 15%. Wherever it occurred the roots were sev. damaged (N. J. Whitney).

**SCLEROTINIA ROT** (S. sclerotiorum) was sev. in carrots in storage from a garden at Saskatoon, Sask., where bean plants were attacked late in the season (T. C. Vanterpool). In the same lot found affected by grey mould (q. v.) at Waterville, N. S., about 5% of the roots were attacked by Sclerotinia rot (K. S. H.). This disease was causing sl. damage to carrots in storage at Charlottetown, P. E. I., on 28 Dec. (J. E. Campbell).

**NEMATODES** (Meloidogyne sp.) were found in a few fields at St. Martin, near Montreal, Que.; damage was mod. (E. Lavallee).

**YELLOWWS** (Callistephus virus 1). Sl. infections were observed in fields at Barnwell and Medicine Hat, Alta. (F. R. H.) and in gardens in Edmonton. Affected dandelions were noted in the laboratory plots at Edmonton (W. P. C.). It affected 8-12% of the carrots in a farm garden at Wimmer, Sask. It was fairly prevalent elsewhere (T. C. Vanterpool). Yellowws affected about 25% of the plants in 2 fields examined near St. Catharines, Ont. (T. R. Davidson). In a variety test of 20 varieties in the laboratory plots at Harrow, marked differences were noted in the percentage of plants affected by yellowws. The 4 heaviest infections were: Chantenay 10.1%, Woodruff's Coreless 10.9%, Long Orange Improved 11.2% and Oxheart 13.9%. In the Thedford Marsh, infections up to 10% were present (N. J. Whitney). Yellowws affected about 10% of the plants in a 1/2 acre planting in Lincoln Co. (J. K. Richardson). Tr. infections were noted on Amsterdam in small plots at Ottawa, Ont., and Ste Clothilde, Que. (V. R. Wallen). Yellowws was observed in most carrot fields on Isle Jesus, near Montreal. Percentage of infection was 1-10%, the higher percentages being on the borders of the fields (E. Lavallee). Infection ranged from a tr. to 8% in 8 fields examined about Kingsclear and Maugerville, N. B. (D. J. MacLeod). Less than 1% of the carrots were affected in a 2-acre field at Waterville, N. S. (J. F. Hockey). Yellowws appeared to be more general this season than usual in P. E. I. Dr. F. MacEwen (Entomology) reported infections of 20, 30 and 50% in plantings visited. Leaf hoppers were very numerous in these fields (J. E. Campbell). Yellowws was noted in a few fields at Clarkes Beach, Nfld. (G. C. Morgan).

**ROOT RUSSET** (cause unknown). At Pine Ridge, Man., carrot roots were found to be normal in shape and size, but were blemished by

large rusty spots on the surface. Injury believed not to be due to mineral deficiency or caused by insects. Growers have noticed the condition for several years (J. E. Machacek).

### CAULIFLOWER

CLUB ROOT (Plasmodiophora brassicae) affected 25% of the plants in a field at York, P. E. I.; seedlings apparently became infected from the compost soil in which the seed was sown (J. E. Campbell).

BLACK ROT (Xanthomonas campestris). In an acre planting in Lincoln Co. Ont., where there was a sl. general infection, about 10% of the tied heads showed severe leaf infection originating in injuries caused by the cord (J. K. Richardson).

WHIPTAIL (molybdenum deficiency) was so sev. in a 3-acre field at St. Martin, Laval Co. Que., that the crop had to be plowed up (E. Lavallee). A few plants showed mod-sev. symptoms in a market garden plot at Southport, P. E. I. Whiptail is general in cauliflower plantings in market gardens both in Charlottetown and Summerside. In certain plantings the crop would have been a complete failure without the addition of sodium molybdate either in a soil or spray application (J. E. Campbell).

### CELERY

EARLY BLIGHT (Cercospora apii). Several plantings of Utah celery were visited at Burlington, Ont., 12 July; about 5% of the plants were infected in one, with lesser amounts in the others (J. K. Richardson). Although C. apii has been previously reported by Mr. Richardson on green pascal celery, its identification was only confirmed when specimens were submitted this year (I. L. C.). A mod. infection was found in 2 neighboring fields of 6 acres at St. Martin, Que. (E. Lavallee).

VIOLET ROOT ROT (Rhizoctonia crocorum) occurred in a few fields on the Thedford Marsh, Ont.; infected plants were few, but these were sev. damaged (N. J. Whitney).

LATE BLIGHT (Septoria apii-graveolentis) was again general on Isle Jesus, near Montreal, Que., but it was more sev. than usual because bad weather hampered dusting operations (E. Lavallee).

NEMATODES (Pratylenchus spp.). In most celery fields surveyed on the Thedford Marsh, Ont. nematodes were causing a root rot in 80-100% of the plants. In one 20-acre field, the crop was almost a total loss (W. B. Mountain, N. J. Whitney).

MOSAIC (cucumber mosaic virus). A few plants were found infected in a field in Wentworth Co., Ont.; the identity of the virus was established by inoculation of Nicotiana glutinosa and tobacco (J. K. Richardson).

YELLOW (Callistephus virus 1, western strain) was observed in 6 plantings of green pascal varieties in Wentworth Co. Ont.; growers stated that the disease was much more prevalent than in 1953 (G. C. Chamberlain). Yellows affected 3% of the plants in the plots at St. Catharines (J. K. Richardson) and 2% in a field near Maugerville, N. B. (D. J. MacLeod).

#### CUCUMBER

LEAF SPOT (Alternaria tenuissima) was general on many varieties at Kentville, N. S., by the end of the season (K. A. Harrison).

GREY MOULD (Botrytis cinerea) was found causing a stem rot in a few greenhouses around Leamington, Ont., in May. Little damage resulted because it was successfully controlled (C. D. McKeen).

SCAB (Cladosporium cucumerinum). Diseased specimens were received from North Bay, Ont.; according to the grower, the cucumber crop in the district has been sev. damaged by disease in the last two years (H. N. Racicot). Scab was general in fields on Isle Jesus, near Montreal, Que.; frequently 15-25% of the crop was lost. In field tests, 16% of the cucumbers were affected in the untreated plots while 4% were infected in plots sprayed 4 times with captan (E. Lavallee). Scab almost completely destroyed 2 acres of pickling cucumbers at Hampton, N. B.; it also caused sev. damage (45-60% infection) in 2 fields at Maugerville (D. J. MacLeod). An early crop of Straight Eight escaped damage but a late crop was completely destroyed at The Narrows (S. R. Colpitts). Scab was unusually abundant in gardens in late summer about Kentville, N. S. Fields of pickling cucumbers were planted to resistant varieties and were free of the disease (K. A. Harrison). Scab was heavy on Straight Eight in a market garden at York, P. E. I. (J. E. Campbell).

BACTERIAL WILT (Erwinia tracheiphila) affected and destroyed up to 3% of the plants in several fields in s. Essex Co., Ont. (C. D. McKeen). A few affected plants were observed in the plots at Ste Clothilde, Que. (R. Crete). Wilt recurred in tr. amounts in a few crops of pickling cucumbers in Kings Co., N. S. (K. A. Harrison).

POWDERY MILDEW (Erysiphe cichoracearum) was as prevalent in greenhouse crops in Essex Co., Ont., this year as in any of the last three. Regular applications of Karathane have kept the disease from becoming destructive. Karathane smokes are outstandingly effective against powdery mildew. (C. D. McKeen).

WILT (Fusarium equiseti) affected about 1% of the plants in a field in Kings Co., N.S. The organism was isolated from the base of the wilted plants, but it seemed probable that the organism was secondary following injury by fertilizer (K. A. Harrison).

STEM CANKER (Phomopsis sp.) A sl. infection occurred in one greenhouse crop at Leamington, Ont., in July. By lowering the greenhouse humidity the disease became less prevalent and caused less damage as the crop matured (C. D. McKeen).

ANGULAR LEAF SPOT (Pseudomonas lachrymans) was unusually prevalent in s. Alta. this year. Infection was sl.-mod. on the leaves and tr.-sl. on the fruit at Barnwell, Taber and Moose Jaw. Infection was reported to be sev. and the late-maturing fruit a total loss in a sprinkler-irrigated field at Scandia (F. R. H., M. W. C.).

DOWNY MILDEW (Pseudoperonospora cubensis). About 50 beds of cucumbers were affected with a loss of 25% of the crop at Ste Dorothee, near Montreal, Que. In this district downy mildew often develops at the end of June and generally is so sev. that the balance of the crop is destroyed in about a week (E. Lavallee).

DAMPING-OFF (Pythium ultimum) caused sl.-mod. losses in several greenhouse and field crops in Essex Co., Ont., until 10 days after transplanting (C. D. McKeen).

MOSAIC (virus) was rather common in gardens at Saskatoon, Sask.; damage was sl. The disease is usually of rare occurrence in Sask. (R. J. Ledingham). About 1-1.5% of the plants were affected by mosaic (Cucumis virus 1) in 3 fields inspected about Maugerville, N. B. (D. J. MacLeod). Mosaic affected 3 plants of White Spine in a small garden planting at Kentville, N. S., to which it may have spread from nearby gladiolus. No mosaic was seen in several large fields (K. A. Harrison).

RING SPOT (virus, unidentified strain) affected a few plants in many greenhouse crops in Essex Co., Ont. There is strong evidence that the virus is seed-borne. The virus is intolerant of high temperatures and causes little damage in the summer months, but plants infected during the winter months are severely stunted (C. D. McKeen).

CRACKING and GUMMOSIS (cold night temperatures). In mid-July when the temperature fluctuated from 70° F. in the daytime to 35° F. at night for 2 consecutive nights in Essex Co., Ont., cracking of the skins with gummosis was sev. on field-grown cucumber fruits; the affected fruit were unmarketable. The condition disappeared when normal night temperatures returned (C. D. McKeen).

FOOT and ROOT ROT (cause unknown) was again sev. in greenhouse

crops in Essex Co. , Ont. , where the soil was not sterilized before the crop was planted. The disease begins as a root rot (C. D. McKeen).

#### EGGPLANT

DAMPING-OFF (Rhizoctonia solani). Seedlings and young plants were destroyed in a greenhouse at Harrow, Ont. ; contaminated pots proved the source of the infection (C. D. McKeen).

#### HORSERADISH

LEAF SPOT (Ramularia armoraciae) was heavy on a few plants in a garden at Rimouski, Que. (D. Leblond).

#### LETTUCE

GREY MOULD (Botrytis cinerea) mod. infected plants grown for seed in a low area at Saanichton, B. C. (W. Jones). The disease caused 5% loss to much of the lettuce grown on muck in Chatauguay Co. , Que. (E. Lavallee). Grey mould was quite general in the Annapolis Valley, N. S. Loss was usually 3-4% of the crop, but in one planting 20% was destroyed (K. A. Harrison).

DOWNY MILDEW (Bremia lactucae). In May some 12 beds of lettuce were destroyed by downy mildew at Ste Dorothee, Que. In August, most lettuce plantings around Montreal were sl. infected; the infection was mostly on the lower leaves, which had to be trimmed away before the heads were marketed (E. Lavallee).

ANTHRACNOSE (Marssonina panattoniana) heavily infected the lowest leaves of a few plants in a small planting at Leamington, Ont. (C. D. McKeen).

RUST (Puccinia extensicola). A few infections were found on 2 plants in a home garden at Saskatoon, Sask. (T. C. Vanterpool).

BOTTOM ROT (Rhizoctonia solani) destroyed about 6% of the plants in one field at Leamington, Ont. (C. D. McKeen).

DROP (Sclerotinia sclerotiorum). A few plants grown for seed were killed at the Station, Saanichton, B. C. (W. Jones). A tr. to 1% of the plants were affected in lettuce fields in Kings Co. , N. S. (K. A. Harrison).

BIG VEIN (virus). Specimens received from the Montreal district, Que. , showed the typical symptoms of big vein (H. N. Racicot).

YELLOW S (Callistephus virus 1) was found affecting 2% of the plants in a field at Maugerville and 6% in a garden at Kingsclear, N. B. (D. J. MacLeod). Yellow S caused 30% damage to lettuce in a field at Grand Pre,

N. S. This disease, locally known as "white heart" is the most sev. disease affecting the fall crop. It is rarely observed in the spring crop (K. A. Harrison).

**MOLYBDENUM DEFICIENCY.** A case of suspected molybdenum deficiency was seen causing mod. damage to a fall crop of lettuce in a market garden at Southport, P. E. I., where the soil must be treated with sodium molybdate to produce a crop of cauliflower. The lettuce plants were yellow and the heads were not developing properly (J. E. Campbell).

### MELON

**LEAF SPOT** (Cladosporium cucumerinum) was mod. in a garden at St. Apollinaire, Lotbiniere Co., Que. (D. Leblond).

**ANTHRACNOSE** (Colletotrichum lagenarium) caused sl. loss in a 2-acre field at Harrow, Ont.; the first-formed fruits were sev. spotted (C. D. McKeen).

**BACTERIAL BLIGHT** (Erwinia tracheiphila) was reported on melons in a small garden at Napierville, Que. (R. Crete).

**POWDERY MILDEW** (Erysiphe cichoracearum) appeared in most fields in the Harrow-Leamington area, Ont., by mid-August; varietal resistance was noted (C. D. McKeen).

**WILT** (Fusarium bulbigenum var. niveum). This soil-borne disease has greatly limited the acreage in s. Essex Co., Ont., that may be cropped to susceptible varieties; resistant varieties are now being grown (C. D. McKeen).

**DAMPING-OFF** (Pythium ultimum) destroyed 10% of the zucca melon plants set in a 2-acre field at Harrow, Ont. (C. D. McKeen).

**MOSAIC** (virus). An early infection wiped out all 6 melon plants in a garden at Kentville, N. S.; infection was apparently from a sev. affected volunteer gladiolus (K. A. Harrison).

### MUSHROOM

**GREEN MOULD** or **VERDIGRIS** (Myceliophthora lutea Constantin). A grower in Surrey, B. C., estimated that he suffered a reduction of crop, valued at \$1800, caused by infection by Myceliophthora and Fusarium sp. (I. C. MacSwan). Green Mould appears to be a new disease in Canada (I. L. C.).

## ONION

NECK ROT (Botrytis allii) affected all bulbs of a yellow variety in a market sample at Quebec received in January (D. Leblond).

FUSARIUM ROT (F. spp.) affected 1-3% of the plants in one 8-acre field of Sweet Spanish in Essex Co., Ont.; in 9 fields examined on the Leamington Marsh, a tr. -1% was found in one. High summer temperatures favoured the disease. (R.N. Wensley).

DOWNY MILDEW (Peronospora destructor). In 1/10 acre plots of the Horticultural Division, Ottawa, Ont., infection was: Yellow Globe Danvers #44, tr. -sev. on 75% of the plants; Mountain Danvers, tr. -mod. on 100%; Yellow Globe Danvers #11 tr. -mod. on 50%; and Red Weathersfield, tr. (V.R. Wallen). By mid-August downy mildew was general and sev. in most onion fields about Montreal, Que. In fields of young onions, where the disease is always worse, the loss was 20-50% of the crop (E. Lavallee). In a 27-acre field at Sherrington, Napierville Co., the disease appeared in large patches in one corner near a neighboring bush. The average infection for the field was 10% of the plants. Applications of zineb checked the spread of disease (L. Cinq-Mars).

PINK ROOT (Pyrenochaeta terrestris, etc.) caused sl. -mod damage in 8 out of 9 farms visited on the Leamington Marsh, Ont. High soil temperatures prevailed during the growing season (R.N. Wensley).

SMUT (Urocystis cepulae) infected fields appear to be steadily increasing in the Montreal district, Que. This year 3 diseased fields were found at Ste Rose and one at Riviere des Prairies. In each field at least a third of the seedlings were killed and another third more or less affected (E. Lavallee).

YELLOW (Callistephus virus 1) affected 3% of the plants in a small garden patch at Kentville, N.S. (J. F. Hockey).

## PARSNIP

LEAF SPOT (Ramularia pastinacae) was heavy in a garden planting at Riverport, Lunenburg Co., N.S. (D.W. Creelman).

YELLOW (Callistephus virus 1). Three plants were found affected in a garden at Maugerville, N.B. (D. J. MacLeod).

## PEA

Dr. V.R. Wallen prepared a special report on "Pea Diseases in Ontario in 1954".

In 1954, 23 fields were surveyed as follows: canning peas 12, field peas 5, and garden peas 6, located in the Georgian Bay area, Prince Edward Co., about Renfrew and at Ottawa.

Leaf and Pod Spot (Ascochyta pisi) was again quite widespread but was less destructive than in 1953. Infection was a trace in 7 of the 12 fields of canning peas inspected, nil in garden peas, tr. -sl. in 2 fields of Chancellor field peas in the Renfrew area, and tr. in Valley, sl. in Chancellor and mod. in Arthur at Ottawa.

Mycosphaerella Blight (M. pinodes) was prevalent in 3 fields of canning peas in the Georgian Bay area; tr. infection in one (Dark Green Perfection) and mod. in 2 (Surpass).

Ascochyta Foot Rot (A. pinodella) occurred in tr. amounts in one field (Surpass) in Prince Edward Co.

Anthracnose (Colletotrichum pisi), a rare disease, was found in tr. amounts in 2 fields of Surpass and one of Dark Green Perfection in the Georgian Bay area, in a field of Chancellor in the Renfrew area, and on the garden variety Selkirk at Ottawa. Infection appeared to be secondary to Mycosphaerella Blight.

Bacterial Blight (Pseudomonas pisi) infection was tr. in a field of Canner King in the Georgian Bay area and tr. -sl. in one field each of Chancellor and Valley at Ottawa.

Garden peas were rather heavily infected by Wilt and Root Rot (cause undetermined) at Ottawa. In 5 fields infection was a tr. -75% of the plants. A tr. also occurred in a field of Valley peas.

Leaf Blotch (S. pisi): infection tr. in one garden variety at Ottawa. Pea Streak (?virus) occurred in tr. amounts on Chancellor and sev. infection on Valley. Mosaic (virus) occurred in traces on Arthur and Selkirk and affected 5% of the plants of Onward.

Rust (Uromyces fabae) was present in traces on the garden varieties, Selkirk, Onward and Ottawa PE11 at Ottawa.

#### Other Observations

ROOT ROT (?Aphanomyces euteiches). Several fields were a complete loss at St. Michel and St. Eduard, Napierville Co. Que. Heavy rainfall favoured the disease (L. Cinq-Mars).

LEAF and POD SPOT (Ascochyta pisi). Infection was 5-tr. 1-sl./13 fields examined in s. Alta. (F.R.H.). The disease was observed in 2 gardens in Sask; few specimens were received (H.W. Mead). Sl. -mod. infections were seen in 5 plantings mostly in home gardens along the St. Lawrence and about Lake St. John (L.J. Coulombe). A tr. was

recorded in a garden at Charlottetown, P. E. I. (R. R. Hurst).

POWDERY MILDEW (Erysiphe polygoni) was heavy on Fenland Wonder at Kentville, N. S. ; the crop was almost mature before the disease appeared (K. A. Harrison). Traces were observed on American Wonder at Charlottetown, P. E. I. (R. R. Hurst).

ROOT ROT and WILT (Fusarium sp.) caused 30% damage in a garden at Kentville, N. S. It is a disease of small gardens in towns and villages of the area; it has not been found causing loss in fields of canning peas (K. A. Harrison).

DOWNY MILDEW (Peronospora pisi). Infection was 5-tr. 1-mod./13 fields examined in s. Alta. (F. R. H.).

BACTERIAL BLIGHT (Pseudomonas pisi). Infection was a tr. in 8/13 fields examined in s. Alta. (F. R. H.).

ROOT ROT (Rhizoctonia solani, etc.). Infection was 4-tr. 1-sl./13 fields in s. Alta. (F. R. H.).

BLIGHT and ROT (Sclerotinia sclerotiorum). Pod blight and rot was very sev. affecting 60% of the pods in a 2-acre field at Victoria Beach, Kings Co., N. S. Apothecia were readily found. About 10% were affected in adjacent fields. Additional reports of the disease were received from other districts in both Kings and Annapolis counties (J. F. Hockey).

LEAF BLOTCH (Septoria pisi). A sl. infection was observed in one field in s. Alta. (F. R. H.).

RUST (Uromyces fabae) sev. damaged pea plants in the plots at St. Jean, Que. Rust was heavy in a 10-acre field at St. Michel, but it appeared to cause little damage. It was also noticed in the plots at Rougemont (R. Crete, L. Cinq-Mars). A sl. infection was found in a small garden at St. Jerome, Lake St. John district (L. J. Coulombe). A sl. infection was found only in one small garden in Kentville, N. S. (K. A. Harrison).

MOSAIC (Pisum virus 1) affected 2% of the plants in a garden in Fredericton, N. B. (D. J. MacLeod).

#### PEPPER

DAMPING-OFF (Pythium sp. and Rhizoctonia solani). A small amount occurred in several transplanting beds at Harrow, Ont. (C. D. McKeen).

MOSAIC (virus). The infection of tobacco and cucumber mosaic observed this year in Essex Co. Ont., was the lightest in recent years.

The green peach aphid, the vector of cucumber mosaic, did not infect pepper crops in s. Essex Co. to any extent this year (C. D. McK.). Mild mosaic (*Solanum virus 2*) was found affecting 3 Golden Dawn plants in a garden at the Station, Fredericton, N. B. (D. J. MacLeod).

BLOSSOM-END ROT (non-parasitic). On account of the drought this year blossom-end rot caused much greater losses than those caused by other troubles in Essex Co., Ont. (C. D. McKeen).

### POTATO

The Plant Protection Division, Science Service, has supplied the data contained in Tables 3-6 on Seed Potato Certification. All fields entered for certification are planted with Foundation or Foundation A seed.

Although the acreage entered for Seed Potato Certification was slightly less than the previous year, the acreage that passed inspection was higher than last year when the percentage of fields passing inspection was unusually low. This year's drop in rejections was due to a slight decline in the number of fields rejected under each category. The two varieties, Sebago in P. E. I. and Ketahdin in N. B., accounted for 70% of the acreage of seed potatoes produced. The varieties Canso and Keswick have declined rapidly in popularity since there appeared races of the late blight organism to which they were susceptible.

EARLY BLIGHT (*Alternaria solani*) was reported as follows: Infection 74-sl. 18-mod. 3-sev. / 556 fields inspected in B. C.; most prevalent in the Grand Forks and Okanagan areas (H. S. MacLeod); recorded in 50 (39%) of the fields in central and n. Alta.; quite prevalent and sev. on Warba (J. W. Marritt); probably commoner than usual in Sask., in areas where late blight was not prevalent (T. C. Vanterpool); sev. late in the season at Estevan (A. Charlebois); only sl. infections seen in Man. (D. J. Petty); sl. in fields of Canso and Irish Cobbler in the London district, Ont. (F. J. Hudson); rarely observed in district 2 (W. L. S. Kemp); chiefly in early crops in Dufferin and Simcoe counties in district 3 (H. W. Whiteside); infection 1-tr. 24-sl. 12-mod. / 51 fields inspected in e. Ont. (E. H. Peters); 242-sl. 26-mod. 2-sev. / 1155 fields in Que., mostly in the Lake St. John district (B. Baribeau); in a few fields chiefly of Keswick early in the season in N. B., but later obscured by late blight; no *Alternaria* tuber rot observed (C. H. Godwin); first reported in N. S. on 30 July; infection usually sl. but and mod. in a few fields of Irish Cobbler, etc.; absence of long periods of dry weather or extreme heat resulted in little early blight developing (R. C. Leyton, K. A. Harrison); infection sl. in P. E. I. (H. L. McLaren), but mod. in an early field of Irish Cobbler (J. E. Campbell); tuber rot caused 25% of the tubers in a lot of Irish Cobbler in Queens Co. to be unfit for sale in January 1954 (D. B. Robinson). Infection heavy in a field at Mount Pearl and sl. in 3 fields at Clarkes Beach, Nfld.; disease of little importance in Nfld. (G. C. Morgan).

Table 3. Seed Potato Certification: Fields and Acres Inspected and Passed in 1954

Province	Number of Fields		Fields	Number of Acres		Acres
	Entered	Passed	Passed %	Entered	Passed	Passed %
P. E. I.	6,512	5,724	87.9	27,152	24,063	88.6
N. S.	276	242	87.7	512	457	89.3
N. B.	4,023	3,676	91.4	22,708	19,283	84.9
Que.	1,155	802	69.4	3,298	2,173	65.9
Ont.	679	596	87.8	1,759	1,579	89.8
Man.	121	99	81.8	480	404	84.2
Sask.	52	45	86.5	92	86	93.5
Alta.	229	204	89.1	1,023	906	88.6
B. C.	736	571	77.6	2,336	1,735	74.3
<b>Total</b>	<b>13,783</b>	<b>11,959</b>	<b>86.8</b>	<b>59,360</b>	<b>50,686</b>	<b>85.4</b>

Previous Yearly Totals

1953	14,411	11,875	82.4	60,173	47,706	79.3
1952	12,169	10,985	90.3	45,988	41,315	89.8
1951	12,093	10,580	87.5	46,176	40,402	87.5
1950	16,203	13,292	82.0	75,352	61,933	82.2

Acres Entered

1954 59,360

1953 60,173

Decrease of 813 or 1.4%

Acres Passed

1954 50,686

1953 47,706

Increase of 2980 or 6.2%

Table 4. Seed Potato Certification: Acreage  
Passed by Varieties, 1954

Variety	P. E. I.	N. S.	N. B.	Que.	Ont.	Man. - Alta.	B. C.	Total
Katahdin	1,846	91	13,689	168	778		30	16,602
Sebago	16,080	48	349		57		3	16,537
Irish Cobbler	3,385	65	892	126	136	32	3	4,639
Green Mountain	1,509	55	466	1,351	38	15	55	3,489
Netted Gem	60	48	196		6	834	1,316	2,460
Pontiac	450	3	1,036			131	24	1,644
Kennebec	120	78	768	346	1	30	1	1,344
Canso	439	12	530	74	109	2		1,166
Bliss Triumph	32	18	656			19		725
Russet Rural			470		59			529
Keswick	69	14	148	56	92	5	3	387
Warba	49	10	4		15	113	89	280
Chippewa	13	4	19		200		1	237
White Rose			10			10	146	166
Ontario			42		76			118
Others	11	11	8	52	12	205	64	363
<b>Total</b>	<b>24,063</b>	<b>457</b>	<b>19,283</b>	<b>2,173</b>	<b>1,579</b>	<b>1,396</b>	<b>1,735</b>	<b>50,686</b>

Table 5. Seed Potato Certification: Fields  
Rejected on Field Inspection, 1954.

Province	Leaf Roll	Mosaic	Ring Rot		Black Leg	Wilts	Adjacent Diseased Fields	For- eign Var.	Misc.	Total
			in field	on farm						
P. E. I.	34	181	-	-	214	25	45	165	124	788
N. S.	2	13	-	-	3	6	5	5	-	34
N. B.	15	77	96	32	40	-	12	64	11	347
Que.	5	65	96	27	69	-	34	34	23	353
Ont.	11	4	7	24	11	8	-	8	10	83
Man.	7	-	-	-	5	-	3	1	6	22
Sask.	1	-	-	-	-	-	1	-	5	7
Alta.	-	2	2	11	6	-	-	-	4	25
B. C.	54	15	-	-	12	-	10	4	70	165
TOTAL	129	357	201	94	360	39	110	281	253	1,824

Rejection as a percentage of fields:

Inspected	0.9	2.6	1.5	0.7	2.6	0.3	0.8	2.0	1.8	13.2%
Rejected	7.1	19.6	11.0	5.2	19.7	2.1	6.0	15.4	13.9	100%

Table 6. Seed Potato Certification: Average  
Percentages of Diseases found in  
Fields, 1954.

Average Percentage of disease found in	P. E. I.	N. S.	N. B.	Que.	Ont.	Man.	Sask.	Alta.	B. C.
Fields entered (first inspection)									
Black Leg	.37	.09	.13	.34	.04	.23	.06	.22	.05
Leaf Roll	.07	.09	.04	.02	.04	.27	.16	.04	.12
Mosaic	.17	.32	.13	.23	.02	.01	.07	.01	.08
Fields passed (final inspection)									
Black Leg	.20	.06	.09	.13	.19	.13	.05	.09	.02
Leaf Roll	.02	.05	.03	.01	.03	.01	.09	.03	.05
Mosaic	.03	.10	.06	.04	.02	.01	.05	.01	.02

GREY MOULD (Botrytis cinerea) was observed in a field of Bliss Triumph at Glenmount, N.S. Grey mould regularly causes some leaf spot wherever the dead floral parts fall on the green leaves (K. A. Harrison). Grey mould attacked young plants in a late blight resistance test in a greenhouse at Laval University, Quebec, P.Q. (D. Leblond). A sl. infection appeared in a lot of Green Mountain being tuber-indexed at Charlottetown, P. E. I. (R. R. Hurst).

BLACK DOT (Colletotrichum atramentarium). Although the disease was not observed on the potato stems in the field, 25% of tubers in a crop of Green Mountain at Ste Anne de la Pocatiere, Que., showed sl. necrosis at the stem end at harvest. Isolations yielded C. atramentarium. Some seed planted on loam soil gave a sound crop (H. Genereux). The organism was isolated from some Netted Gem tubers found affected by stem-end necrosis in Kings Co., N.S. (K. A. Harrison).

BACTERIAL RING ROT (Corynebacterium sepedonicum) was not found in any crop grown for certification in B. C. (H. S. MacLeod). Since 30 Nov. 1953, ring rot has been found on 7 farms in 3 districts (Ladner-East Delta, Cloverdale and Kamloops); two were in 1953 crop and five in 1954 crop. In every case the amount of the disease was negligible. During 1954, infected tubers were found in 7 carlots of potatoes shipped into the Vancouver area; 3 were from Washington, 2 from Oregon, and 1 each from California and Alta. (I. C. MacSwan). Ring rot was detected in tubers received from Bella Coola, an isolated district on the west coast; in the opinion of the grower the disease had been present in the district for several years (W. R. Foster, W. Jones).

Ring rot was found in s. Alta. in 2 fields inspected, which caused the rejection of 11 other fields on the 2 farms; origin of the infection is unknown, but imported certified seed is suspected (R. P. Stogryn). No ring rot was found in fields inspected in n. Alta. (J. W. Marritt). In the 1954 provincial survey for ring rot, 631 farms comprising 7604 acres were visited and ring rot was found on 27 farms (4.3%), comprising 317 acres (4.2%). These figures represent a marked reduction in the incidence of ring rot over 1953. However, ring rot may have escaped detection in some fields on account of the exceptional poor growing conditions and the lateness of the crop especially in the Brooks and Edmonton districts, although late fields were reinspected, some more than once, to avoid missing diseased fields. In the Lethbridge area, where conditions were ideal for inspection of the crop ring rot was found on only 17 farms (6.2%), comprising 144 acres (3.7%). It is believed that the practice of providing quality seed to growers who have to dispose of their diseased stock, keeping a close check on available seed, much extension work on potato improvement among growers in each area and the regular inspection of potato shipments into the province are the factors that are keeping the incidence of ring rot to a minimum (W. Lobay).

Bacterial ring rot was present in a sample of Pontiac received from near Regina, Sask.; the grower reported 10% of the tubers affected

(A. Charlebois). Tubers infected by ring rot were found in one shipment of table stock imported from North Dakota. Only one specimen showing ring rot has been received from the 1954 crop. Probably ring rot was actually more prevalent, but its presence was obscured by late-blight tuber rot (R. J. Ledingham). Ring rot was not observed during field or bin inspections in Man. (D. J. Petty). Three fields of Katahdin were rejected for ring rot in the London district, Ont. (F. J. Hudson). None found in district 2 (W. L. S. Kemp). Ring rot was found in 3 fields in district 3; infection of Canso and Keswick in Dufferin Co. probably arose from previous infection on the farm, that in Katahdin in Simcoe Co. was attributed to the use of old bags (H. W. Whiteside). Ring rot was found in e. Ont. in a field of Katahdin, which also caused the rejection of a second on the same farm (E. H. Peters). For the 12th year the Ont. Department of Agriculture has carried out a survey for ring rot. A total of 232 cases of ring rot was reported in table stock potatoes in Ont. in 1954, compared with 186 in 1953 and 214 in 1952. The total number of fields inspected each year was approximately the same (D. S. MacLachlan).

Bacterial ring rot was found in 96 or 8.3% of the fields inspected in Que.; the disease was particularly prevalent in the n. w. district, where the disease was found in 38 or 24% of the fields inspected. Ring rot also caused the rejection of 27 fields as it occurred in other fields on the same farm (B. Baribeau). Ring rot was found in N. B. in 96 fields inspected and caused the rejection of 32 others on account of the disease occurring in table stock on the farm. The figures are an improvement over last year, but it is possible that cases of ring rot were overlooked because many fields were so badly infected with late blight by mid-Aug. that the detection of ring rot was virtually impossible (C. H. Godwin). Ring rot was not detected in N. S., although fields of late varieties entered for certification were given a third inspection and the disease was looked for in table stock in districts where it was last reported (R. C. Leyton). Although occurrence of ring rot in P. E. I. is not shown in Table 5 (I. L. C.), it was found in one field during field inspection and 15 cases were located at harvest time. One crop was also rejected because it was placed in a contaminated storage (H. L. McLaren). A similar survey to the one carried out last year in P. E. I. for ring rot is in progress this year. By 6 Jan. 1955, 26 positive cases had been found in tubers of the 1954 crop. Most of these were in Prince Co. (J. E. Campbell). A sl. infection was again noted in 2 fields in Nfld. (G. C. Morgan).

According to O. W. Lachaine, Plant Protection Division, Ottawa, bacterial ring rot can still be detected with considerable certainty in fields in which the tops have died down. The stems of plants affected by ring rot retain their green colour after the stems of healthy plants have faded. The presence of ring rot can then be confirmed by the presence of affected tubers in the hill (I. L. C.).

**BLACK LEG** (*Erwinia atroseptica*) was found in 96 (13%) of the fields inspected and caused the rejection of 12 (67 acres) compared with 13 (35 acres) in 1953 (H. S. MacLeod). Black leg was found in 65 (70%) of the fields in s. Alta.; it continues to be destructive in table-stock fields under irrigation (R. P. Stogryn). Although black leg was less serious than last year in central and n. Alta., it was found in 61 (47%) of the fields inspected and caused the rejection of 6. The disease was sl. more prevalent in Warba than Netted Gem. For the first time black leg was found in foundation stocks in the Andrew district (J. W. Marritt). In the main commercial fields, some containing 100 acres, in the Edmonton district, infection was tr. -sl. in 2 fields, 5% in 2, and 8%, 25% and 75% in one each (W. P. C.). Black leg was recorded in 25% of the fields inspected in Sask.; it caused 10% or more loss in several table stock fields at Lumsden and a 15% loss was reported by a grower in the Estevan district (A. Charlebois). Black leg was observed in 45% of the fields inspected in Man. and 5, showing 1-3.5% infection, were rejected (D. J. Petty). A sl. infection was noted in a garden at Waskada (J. E. Machacek).

In Ont., black leg was observed in several fields in the London district; in one of SeBago 4% of the plants were affected (F. J. Hudson); recordable amounts of black leg occurred in 19 fields in district 2; 2 were rejected and 4 disqualified for Foundation grade (W. L. S. Kemp); in district 3, 3 fields, seed of which was not treated, were rejected on account of black leg; most of the affected fields were in Dufferin and Simcoe counties (H. W. Whiteside); black leg was found in 16 fields in e. Ont.; the highest infections (2.8%) was in fields planted with seed from P. E. I. (E. H. Peters). Black leg was reported in 509 or 55.7% of the fields inspected in Que. and caused the rejection of 65 fields; its increased prevalence in 1954 was attributed to the wetness of the growing season (B. Baribeau). Black leg was common in some fields along the Lower St. Lawrence (H. Genereux). Black leg was prevalent in N. B. and caused the rejection of 40 fields; here also extremely wet cool weather prevailed throughout the season (C. H. Godwin). The disease sev. affected 5% of the plants in a 2-acre field of Canso at Keswick, York Co. (D. J. MacLeod). Black leg was found in 80 of the 278 fields inspected and caused the rejection of 3 in N. S.; the highest infection recorded was 7% (R. C. Leyton). Black leg continues to be a problem in P. E. I., where 214 fields were rejected (H. L. MacLaren). The disease was less sev. than usual in Nfld. In this connection it may be noted that more certified seed was sold in this province in 1953 than during any year since confederation in 1949 (G. C. Morgan).

**SOFT ROT** (?*Erwinia carotovora*). Several samples of soft rot were received from the Medicine Hat and Vauxhall areas, Alta., in early harvested crops. In one crop the tubers had decayed very rapidly when packaged in plastic bags (M. W. Cormack). The disease was rather prevalent in Canso in district 3, Ont. (H. W. Whiteside). Soft rot was common in blighted tubers received from the Maritime Provinces and Quebec this year. In N. B., when storage conditions were favourable,

soft rot was prevalent in tubers that were encased in muddy soil (J. E. Howatt).

POWDERY MILDEW (?*Erysiphe cichoracearum*) was sev. on the leaves of plants of *Solanum demissum* in the greenhouse at Fredericton, N. B., and interfered with use of the plants as differentials in virus studies (J. L. Howatt). Although the disease is rather widely reported on various species of *Solanum* in the United States, the present report appears to be the first for Canada (I. L. C.).

WILT (*Fusarium oxysporum*, *Verticillium albo-atrum*) was found in 12 or 1.6% of the fields inspected in B. C.; lack of warm weather probably accounts for its low incidence (H. S. MacLeod). Wilt, usually only a tr., was recorded in 24 (25%) of the fields inspected in s. Alta. (R. P. Stogryn). Not recorded in central and n. Alta. (J. W. Marritt). Tr. infections, the lowest in several years, were seen in 9% of the fields inspected in Sask. (A. Charlebois) and tr. -5% in 7% of the fields in Man. (D. J. Petty).

Some wilt was found in most fields inspected in the London district, Ont. In one field of Kennebec in Norfolk Co. 75% of the plants were affected; wilt was also rather heavy in Canso (F. J. Hudson). Isolations made from the Kennebec plants yielded 4 isolates of *Fusarium* sp. and one of *Verticillium* sp. (D. S. MacLachlan). Wilt was noticed in several fields and caused the rejection of 3 in district 2 (W. L. S. Kemp). Little wilt occurred in district 3 (H. W. Whiteside). Wilt was found in 10 fields in e. Ont. and caused the rejection of 3. On a farm near Richmond, wilt has been consistently troublesome and despite change of seed and varieties a crop is rarely produced that will meet certification standards (E. H. Peters). At the Substation, Fort William, it was noted by J. K. Knights that most of over 30 Fredericton seedlings on trial showed a wilt, whereas in other potato trials on the substation at some distance from these plots, no sign of the malady was seen. Isolations were made from the plants of F515, 5117 and 5120 which were received and a species of *Fusarium* was isolated (H. N. Racicot, D. S. MacLachlan). Wilt, less prevalent than last year, was observed only in a few fields inspected in N. B. (C. H. Godwin).

DRY ROT (*Fusarium* sp.) was observed in a few lots of Keswick this spring in Que.; infection was 5-8%. A sl. infection was also present in a few lots of Green Mountain (B. Baribeau). A sl. amount was observed in a few bins in the winter and spring 1954 in N. B. (C. H. Godwin). Dry rot was quite common in tubers affected by late blight obtained from the Prairie Provinces and B. C. (J. L. Howatt). Dry rots affected about 1% of the tubers in storage in P. E. I. (H. L. McLaren).

RHIZOCTONIA (*Pellicularia filamentosa* (R. solani). Infection was 317-sl. 198-mod. 41-sev./736 fields inspected in B. C. It causes heavy losses each year by reducing the production of marketable tubers (H. S. MacLeod). In Oct. 1954, about half the tubers in a shipment of

Canso from a farm on Salt Spring Island were found unmarketable upon grading at Victoria. The chief defect was a dry brown decay and cracking of the tissue around the stem end (Plate 1, fig. 1, p. 100). Sometimes the decayed areas extended from the stem end for an inch with the periderm russetted and cracked and the lenticels occasionally discoloured. Strands of mycelium of Rhizoctonia solani were present on the surface of the tuber and in the cracked periderm and although sclerotia of the fungus were observed they were inconspicuous. In some tubers, the stem end was depressed on account of shrinkage of the decayed tissue. These tissues were dry chocolate brown and somewhat spongy; mycelial strands of the fungus were abundant in them. Mites, now present, were apparently hastening the breakdown of the tissue (W. Jones).

Rhizoctonia was present in nearly every field inspected in s. Alta., but there was little scurf development on the tubers on account of the wet fall (R. P. Stogryn). Rhizoctonia was found in most fields inspected in central and n. Alta. but infection was sl. -mod.; Sclerotia were few or none on tubers at bin inspection (J. W. Marritt). The disease infected 50% of the plants in one field in the Edmonton area; in the other 8 fields examined infection was tr. -sl. (W. P. C.). Rhizoctonia was present in most fields and plantings in Sask., infection was usually sl. (A. Charlebois, R. J. Ledingham). The cool moist conditions this year favoured the development of the basidial stage on the stem bases, for it was found in virtually every garden patch or farm field examined; on the other hand sclerotium development on the tubers was comparatively sl. (T. C. Vanterpool). Infection was sl. in most fields in Man., but mod. on the heavier soils about Winnipeg (D. J. Petty).

In Ont., sl. infections were noted in the London district, (F. J. Hudson). Development of sclerotia on the tubers was less than usual in district 2, especially in areas where rain was abundant throughout the season (W. L. S. Kemp). Rhizoctonia appeared to be more prevalent than in 1953 in district 3, especially in parts of Simcoe Co. (H. W. Whiteside). The disease was observed in 31/51 fields inspected in e. Ont.; it appeared to be more prevalent on account of the wet season (E. H. Peters). Infection was 101-sl. 3-mod./1155 fields inspected in Que. and was about as heavy as last year; infection on the tubers was common but usually sl. (B. Baribeau). Rhizoctonia appeared to be more prevalent and infection in the field slightly more sev. than usual in N. B.; sclerotium development on the tubers was rather heavy on some lots of Bliss Triumph and Pontiac but none were rejected (C. H. Godwin). The disease was not sev. in N. S. (R. C. Leyton). Only sl. amounts of rhizoctonia developed in P. E. I. this year (H. L. McLaren). Sl. infections were noted in 4 fields in Nfld. (G. C. Morgan).

PINK ROT (Phytophthora sp.) About 20% of the tubers showed symptoms of pink rot when a garden plot of Sebago in the Victoria area, B. C., was harvested in August. The fungus was isolated and its pathogenicity established. The species was not P. erythroseptica, which has been previously reported in B. C. (cf. P. D. S. 23:63 and 25:68). Although

antheridia and oogonia have not yet developed, the fungus resembles P. cryptogea (W. Jones).

LATE BLIGHT (Phytophthora infestans) was first observed in B. C. by N. Meyers on Lulu Island on 17 July. However, on account of prevailing dry weather very little further spread occurred at that time. Toward the end of August the disease became general in many of the potato growing areas and by mid-September was sev. in many fields. From 1 June to 10 July the rainfall had built up ideal conditions for its development. A press release was issued jointly with N. S. Wright on 7 July, warning growers that late blight could be expected if the damp weather continued and that they apply recommended fungicides. However, on 11 July, dry weather, albeit cool, set in and continued until 14 Aug. By 23 Aug. as a result of rain, conditions were again favourable for blight development. Another press release was issued.

Frequent intermittent showers during the growing season made it difficult for growers to keep a fungicide on the potato tops and consequently even some growers who had sprayed their crops regularly suffered considerable loss from late blight. The loss is estimated at 10-15% of crop, the highest loss since 1948 (I. C. MacSwan). As many seed crops became infected with late blight after the last inspection the observations up to that time only provide information on the early stages of the epidemic in B. C. Late blight appeared to be more prevalent on the lower mainland than elsewhere. Its lesser prevalence on Lulu and Sea Islands is attributed to the fact that spraying and dusting of the crop to control the disease is more general on these Islands than on the mainland. Losses in some crops were as high as 20% or over, but in general these losses occurred where the crops had not been sprayed or dusted. Crops that were well protected by fungicides up to the time of top-killing were practically free from tuber rot (H. S. MacLeod). Late blight was epidemic on Vancouver Island; one grower who had not sprayed lost 50% of his crop although the tops were killed with rotovator (W. Jones).

Although late blight was not observed in the seed crops during inspection in s. Alta., it may have occurred at the close of the season. However, early frosts destroyed the tops to prevent its development (R. P. Stogryn). Late blight occurred in every field examined in the Edmonton area on 13 Sept. Infection was 50-100%. Loss from reduction in yield and tuber rot was estimated to vary from 20 to 90%. A single field 20 mi. e. of Edmonton showed only 10% infection, which probably caused no loss (S. B. Hrushovetz). Late blight became prevalent about Edmonton by mid-August. The epidemic that developed proved to be one of the most destructive ever experienced in the area although the severity of the disease varied greatly in the plantings examined (A. W. Henry). In the immediate vicinity of Edmonton late blight was also prevalent and sev. on potato in 1950, but in 1954 on account of high soil moisture at harvest the loss of crop was considerably greater (G. B. Sanford). In central and n. Alta., late blight was present chiefly in the Edmonton

district. Tuber infection was particularly heavy in Warba. When frost injury followed by soft rot were added to late blight rot the combined loss was very high in some lots. (J. W. Marritt).

Late blight was much more widespread and sev. in Sask. in 1954 than in any previous year. Many fields were sev. affected from Saskatoon e. to the Man. border. Fields around Saskatoon were almost completely defoliated by 15 Sept. Killing frosts did not occur until the end of September (R. J. Ledingham). Late blight was reported as far west as Wilkie (T. C. V) and probably caused heavy losses throughout n. e. Sask. (A. Charlebois). Frequently, bacterial soft rot followed the late blight rot (T. C. Vanterpool).

Late blight was first observed in Man. on 3 Aug. near Winnipeg and a few days later at Portage la Prairie. Later mod. -sev. infections occurred over much of s. Man. Considerable loss from tuber rot occurred in table stock in some areas, particularly about Winnipeg (J. E. Machacek, D. J. Petty).

In Ont., little late blight developed in the London district (F. J. Hudson). The disease was quite prevalent in district 2, but heaviest losses were in fields which were dusted rather than sprayed, or sprayed too infrequently or they were fields of Katahdin rather than of an early maturing or blight resistant variety (W. L. S. Kemp). The amount of late blight in the tubers was surprisingly small despite its general prevalence in the field in all parts of district 3. The probable explanation is that for a time weather conditions were unfavourable for blight before the crop was dug. In the Cochrane and Temiskaming areas a killing frost occurred and in the other areas the practice of vine killing is quite general (H. W. Whiteside). Late blight was first observed in e. Ont. on 17 Aug. in Renfrew Co., over a month later than in 1953. Infection was a tr. -mod. in 20/51 fields inspected. Tuber infection was heavier than in previous years. Canso tubers were found infected for the first time (E. H. Peters).

Late blight was first observed in Que. on 7 July at Mascouche, Terrebonne Co., and in the Montreal district on 13 July. It was found s. of Montreal and in Quebec district on 21 July. The month was cool and precipitation rather low along the St. Lawrence above Quebec City and about Lake St. John, whereas along the Lower St. Lawrence and the Gaspé Peninsula, the total precipitation was much above normal. August was cool and rainy days frequent throughout the province, heavy rains were recorded on 4 and 12 Aug. Late blight began to spread and by 14 Aug. was reported from all potato areas of the province. The weather continued favourable for its spread and by 20 Aug. the disease was epidemic in many areas except in the Lake St. John and Chicoutimi districts. Rain was frequent in September and in excess in many regions and monthly mean temperatures were also above normal. Late blight was reported finally in Abitibi and at Clark City near Seven Islands. The foliage of resistant varieties such as Keswick, Canso, and Kennebec

became infected, but the severity of infection varied greatly in different fields and regions. Frequent rains interfered with spraying and harvesting the crops. Losses from tuber rot varied from a tr. to 100%. Traces of tuber rot were quite common in the resistant varieties and in an occasional field the incidence was high (H. Genereux, B. Baribeau). Late blight was very sev. in the Montreal district. By 16 Aug. the tops were dying and many tubers were rotting. Many crops were a total loss. In our plots at St. Martin no late blight developed on Canso and Kennebec (E. Lavallee).

Late blight was first reported in N. B. on 16 July in York Co. The disease developed rapidly and by mid-August practically every field in the potato growing areas showed some infection. Some fields, particularly Irish Cobbler were already completely killed. As a result of continued heavy rain it was inevitable that tuber rot would develop at harvest. It was present in nearly every field, the amount varying from a tr. to sev. The muddy condition of the crop made grading difficult and in some lots rot has continued to develop. The 1954 crop season was one of the most adverse on record. (C. H. Godwin).

Late blight was first noted in N. S. on 7 July on a warehouse dump at Pereaux and on 13 July in a commercial field at Glenmount. The disease increased rapidly in unsprayed areas. By mid-August susceptible potato varieties in Yarmouth and Digby counties were dead. Resistant varieties gave good crops. Little rain during late August and September permitted growers to keep the disease well in check. Losses were light in commercial areas (K. A. Harrison). In areas where the spray program was carefully carried out rot from loss did not exceed 10% and averaged about 1%. Resistant varieties, on which no spray was used continue to be largely free of blight and tuber rot (R. C. Leyton).

In some sections of North America potato production was curtailed by lack of sufficient moisture. In the northeastern part of the continent, however, meteorological conditions combined to permit the development of a devastating epidemic of late blight, some sections probably suffering the severest attack in their history.

In P. E. I., the frequent rains and high humidities that prevailed from mid-July until 3 August provided ideal conditions for the development and spread of late blight. Trace infections were observed on 19 July and the epidemic built up rapidly. During this period frequent application of fungicides was of the utmost importance, and the growers who kept their plantings well protected brought them through the danger period in very good condition. Finer weather, with humidities below the critical point, moved in during the latter part of August and the situation was alleviated.

A study of the weather records in 1954 reveals that frequent wetting of the foliage rather than the total rainfall favoured development of the epidemic. Precipitation from July to September at Charlottetown was

8.85 in. compared to 11.87 in. in 1953, and 15.61 in. in 1951. Frequent rains and poor drying conditions (e.g. a 60-hour period when the humidity was constantly over 90%) kept the foliage moist for long periods, allowing the fungus to sporulate abundantly.

Losses from late blight tuber rot, however, were below average. Farmers who sprayed thoroughly through August and who later completed the program by applying a chemical vine killer, harvested big crops in which little rot occurred. Unsprayed fields were wiped out so rapidly that there was little time for tubers to become inoculated from spores washed off the foliage and into the soil. In general, the greatest losses occurred in fields where spraying had been done in a haphazard manner, a program that merely slowed down the advance of the disease and provided a long period for rains to wash spores into the soil. Considerable losses, however, were encountered in potatoes for the early market, the tubers being dug when the epidemic was at its worst and the soil covered with viable spores. A ten-day holding period was put into effect by the table stock inspectors in order to prevent serious losses in transit.

The advisory service, set up in 1947 to guide growers in their control programs, was particularly effective in 1954. Weekly bulletins were issued from the Science Service Laboratory at Charlottetown. These were released to the public through the newspapers and radio stations of Prince Edward Island and Nova Scotia. (L. C. Callbeck). However, it should be noted that damage to the foliage by late blight probably reduced the yield 15%, or 30bu. per acre (H. L. McLaren).

Late blight was first noted in Nfld. on 21 July in the St. John's area. In early August infection was sev. on Irish Cobbler at Conception Bay and by early September the disease was widespread in all varieties. Infection was sev. in well known susceptible varieties, but it was sl.-mod. on the foliage of Sebago, Keswick and Canso. Several farmers in Conception Bay lost about 75% of their crop of Irish Cobbler. Tuber infection in late varieties were sl.-mod. at harvest, but losses in storage were sl. (G. C. Morgan).

A survey of the races of Phytophthora infestans was undertaken this year at Fredericton, N.B. From potato vines and tubers and tomato fruits that were received, 260 mass isolations were made. These isolations were used to inoculate the differential hosts. The results are shown in Table 7.

These results are based mainly on a single determination on the differential hosts. Although no accurate determination of race 0 is possible when other races are present, the data suggest its probable absence from many collections. This survey revealed that race 4 of the fungus was the prevailing form. It was found in about 43% of the collections made in Canada. This race is commonly encountered throughout the world in all countries where late blight is prevalent.

Table 7. Distribution by provinces of physiologic races of *Phytophthora infestans* in Canada in 1954.

Physiologic Race	P r o v i n c e s						Total
	P. E. I.	N. S.	N. B.	Que.	Man.	B. C.	
0				1			1
1	1		1	1			3
2	4		7	4		1	16
3	9		18	8	1	2	38
4	38	1	78	46	2	6	171
1, 2	1		2	3			6
1, 3	6		32	10		3	51
1, 4	7	2	17	37			63
2, 4				6			6
3, 4			21	11		1	33
1, 3, 4			1				1
1, 2, 3, 4			1				1
Total	66	3	178	127	3	13	390

Specialized races of the fungus appear to be more numerous in regions near the sea. There was some evidence that a simple race of the fungus tended to prevail from w. Que. to Alta. However, this condition was modified to some extent by the extensive growing of blight resistant varieties, which seem to favour the appearance of specialized races. The most common race found on tomato fruits was also race 4. The races are designated according to the scheme proposed by Black *et al.* (Euphytica 2:173-178. 1953). On the basis of four genes for resistance, there are possible 16 physiologic races (J. L. Howatt, P. N. Grainger).

LEAK or PYTHIUM ROT (*P. ultimum*) was quite common in potatoes being graded at Victoria, B. C. It was most prevalent in badly skinned immature tubers (W. Jones). Leak was again reported in tr. amounts from Grand Forks and Pemberton. It was also fairly prevalent on Vancouver Island. In 54 lots given tuber inspection 12 were affected; in the affected lots 0.25-6.25%, av. 2.1%, of the tubers showed leak (H. S. MacLeod). The stand was poor in many fields and garden plots in the Edmonton district, Alta., because of decay of the seed pieces in the water-logged soil. Later in the season many immature tubers decayed in the wet soil (W. P. C.). Quite a sprinkling of leak occurred in a variety test at Mindemoya, Manitoulin Island, Ont. In plots or parts of plots that happened to be in low spots, nearly all the tubers were affected. Isolations were made from 4 tubers; 3 yielded *P. ultimum* and one *Phytophthora erythrosepatica*, the cause of pink rot (H. N. Racicot, D. S. MacLachlan). About 0.5% of the tubers were affected in 2 lots of

Green Mountain in Que. (B. Baribeau).

**SILVER SCURF** (Spondylocladium atrovirens). Numerous tubers were sev. infected in a lot of Burbank in storage at Courtenay, B. C. in February (N. Siefert). The disease was not prevalent when bin inspections were made from October to December in district 3, Ont. (H. W. Whiteside). A very sl. infection was noted in 3 lots of Green Mountain out of some 600 bin inspections in Que. in the fall months (B. Baribeau). Four tubers received from a 1953 crop grown on muck soil at Ste Clothilde showed sl. -sev. symptoms of silver scurf (D. S. MacLachlan). A sl. infection was noted in a few crops grown in N. S. (R. C. Leyton). Silver scurf was sev. on a lot of Irish Cobbler that had been stored in damp potato sacks in Queens Co., P. E. I., when the tubers were examined on 7 May (R. R. Hurst).

**POWDERY SCAB** (Spongospora subterranea) was found in 2 crops of White Rose in the Cloverdale area in the Lower Fraser Valley, B. C. (H. S. MacLeod), and on a few tubers of Early Rose in storage at Cedar, Vancouver Island (N. Siefert, W. Jones). Powdery scab was reported in most potato lots grown along the Lower St. Lawrence, Que. It affected 1-20% of the tubers and in a few sev. cases 25-80%. Soil moisture was high throughout the growing season (B. Baribeau). Powdery scab affected about 10% of the tubers in a field at the Alma Station, N. B.; the disease appeared to have been checked somewhat by treatment of the soil with Phygol (J. L. Howatt). Powdery scab has been observed this year in N. S., but no estimate is yet available of its prevalence (R. C. Leyton). A tr. was noted on tubers of Green Mountain on one market lot at Charlottetown, P. E. I. (R. R. Hurst).

**COMMON SCAB** (Streptomyces scabies) was again prevalent in the Cariboo, in central B. C., and in the Okanagan Valley. In the Cariboo, a small percentage of tubers are affected in most crops. Some growers have had to give up growing potatoes on account of sev. scab. This year only the smooth skinned varieties, Warba, Irish Cobbler and Canus, were affected (H. S. MacLeod). In central and n. Alta., infection was sl. and confined to Warba (J. W. Marritt). Scab was not particularly troublesome in Man. this year (R. J. Petty). Very little scab was observed in the London district, Ont., in 1954; comparatively few tubers were sev. affected (F. J. Hudson). Scab was little trouble in Durham Co. where rain was plentiful throughout the season; in other counties in district 2, up to 25% of tubers had to be culled out on account of scab (W. L. S. Kemp). The incidence of scab was much less in district 3 than in 1953. Ontario generally shows high resistance to scab, but when the variety is affected the lesions are deep. Cherokee was tested in several places and showed high resistance to scab (H. W. Whiteside). Infection from scab appears to have been light in e. Ont. (E. H. Peters). Infection was 150-sl. 6-mod. 2-sev./574 bins inspected in Que. The disease was less prevalent than usual on account of high soil moisture during the growing season (B. Baribeau).

A sl. increase of scab was observed in this year's crop in N. B. despite the wet season. A plot of Cherokee grown at Woodstock showed promise as a scab resistant variety; it has not yet been licensed for sale in Canada (C. H. Godwin). Little scab has been observed in the bins inspected this fall in N. S. (R. C. Leyton). Common scab was mod. in P. E. I. (H. L. McLaren). Some scab was observed in the Conception Bay area, Nfld. (G. C. Morgan).

WART (Synchytrium endobioticum). Infection was sev. in Conception, Trinity and Bonavista Bays, Nfld., in 1954 and diseased specimens were received from Burin Peninsula, Notre Dame Bay and Grand Falls. The prevalence of the disease in the 47 fields examined in the Conception Bay area can best be shown by giving the severity of the infections present on a large percentage of the tubers. The fields showing such infections were: 15-sev. 22-mod. 7-light and 3 showing no visible wart infection. The losses in marketable tubers might be considered high, but as provincial grading regulations contain no reference to the disease, farmers can easily make the diseased tubers marketable by breaking off the wart nodules while they are grading their crop. Such potatoes do not break down in storage unless attacked by some secondary organism nor do fresh wart growths appear unless the potatoes are held for a long time in storage.

Infections were sev. in fields of Arran Victory, Arran Comrade, Irish Cobbler, Green Mountain and Warba whereas they were light on those of Canso, Katahdin and Keswick. Sebago (mauve blossom) continues to show very high resistance to wart. Fields planted with certified Sebago were practically free from wart although those planted with local seed showed a certain amount of infection (G. C. Morgan).

WILT (Verticillium albo-atrum) was reported in 44/276 fields inspected in N. S. Of these 6 fields, 5 of Kennebec variety and one of Sebago, were rejected. Growers who treated their seed obtained good control of wilt with one exception. In one field Kennebec was planted for the second year in the same field; in some spots 50% of the plants were affected yet in a few rows where no potatoes were planted last year infection was less than 5% (R. C. Leyton). Wilt was less prevalent than last year and the number of fields rejected fell from 55 in 1953 to 25 in 1954 (H. L. McLaren).

CALICO (virus) was reported in tr. amounts in 11 fields in the Grand Forks area, B. C. (H. S. MacLeod).

LEAF ROLL (virus). In general there was a sl. increase in the amount of leaf roll in potatoes across Canada. The increase is reflected in a sl. increase, as shown in Table 5, in the number of fields rejected on account of the disease (I. L. C.). In B. C., leaf roll was reported in 218 (29.9%) of the fields inspected. Both the amount of leaf roll and the size of the aphid population have risen in the last 3 years. The

increase of leaf roll was particularly marked in 1954. This increase is attributed to the early appearance of aphids in 1953 before roguing operations were completed and failure of the spraying program to control the aphids (H. S. MacLeod). In central and n. Alta. leaf roll was reported in 34 (26%) of the fields inspected. The growing of pet varieties for which no certified seed is available in back yards and vacant lots in centres such as Edmonton and Red Deer are a distinct menace to other gardens in the area and even of commercial fields on the perimeter. Such varieties are often 100% affected by leaf roll (J. W. Marritt). The program of bringing seed of early varieties from the Cochrane area to central Ont. each year has greatly reduced the incidence of the disease in the southern half of district 3, Ont. The absence of aphids in the Cochrane area appears to insure crops of great freedom from leaf roll (H. W. Whiteside). Leaf roll was reported in 264 (22.8%) of the fields inspected in Que. (B. Baribeau). Sl. -sev. infections were noted in garden plots in St. John's, Nfld.; sl. infections also occurred in the wart plots in Conception Bay (G. C. Morgan).

MOSAIC (virus) was also somewhat less prevalent across Canada than in 1953 except chiefly in B. C. The drop is reflected in a decreased number of fields rejected for mosaic, (cf. Table 5) (I. L. C.). Mosaic was found in 119 (16.2%) of the fields inspected in B. C., an increase over the 2 previous years. This increase is attributed to the same causes mentioned for leaf roll (q. v.) (H. S. MacLeod). The disease was found in 11 (8%) of the fields inspected in central and n. Alta.; it is not a problem in fields inspected for certification (J. W. Marritt). Mosaic was recorded in 17/51 fields inspected in e. Ont. (E. H. Peters) and in 469 (40.6%) of those inspected in Que. (B. Baribeau). As in past years, mosaic was most prevalent in Green Mountain grown in Madawaska Co. N. B. (C. H. Godwin). Mosaic was recorded in 145/276 fields inspected in N. S.; in recent years, very few fields are entirely free of the disease (R. C. Leyton). Mosaic was less prevalent in P. E. I. than in 1953. However, the reduction may be due to the reduced acreage of Green Mountain (H. R. McLaren, J. E. Campbell). Mosaic was sev. in several fields of Arran Victory, Arran Comrade, Green Mountain and Kerr's Pink in Conception Bay (G. C. Morgan).

SIMPLE MOSAIC (*Solanum virus 1*, S strain) was observed in fields of Canso, Katahdin, Keswick and Sebago in York and Sunbury counties, N. B.; infection was tr. -3% (D. J. MacLeod).

TOP NECROSIS (virus X or *Solanum virus 1*). The tops of one of the Fredericton potato seedlings from the Experimental Substation at Fort William, Ont., submitted for examination appeared to be affected by a top necrosis, suggestive of the reaction of seedlings hypersensitive to virus X. Such seedlings are usually field immune (H. N. Racicot).

RUGOSE MOSAIC (*Solanum viruses 1 and 2*) was observed in 5 table

stock fields of Green Mountain in York and Sunbury counties, N. B. ; infection ranged from a tr. to 4% (D. J. MacLeod).

MILD MOSAIC (Solanum viruses 1 and 3) was common in commercial fields of Green Mountain, Bliss Triumph, Netted Gem and White Rose in York and Sunbury counties, N. B. ; infection was 0.5-5% (D. J. MacLeod).

LATENT DISEASE (virus S) was found at Fredericton, N. B. , on 10 August in growing potato plants of the variety Green Mountain by a seriological method, for which virus S antiserum obtained from Prof. van Slogteren of the Flower-Bulb Research Laboratory, Lisse, Holland, was used.

The virus was first reported by Maria P. de Bruyn Ouboter at the Int. Congress on Potato Virus Diseases, Wageningen-Lisse, August, 1951. (cf. R. A. M. 32:144-145. 1953). Dutch, German, English and American varieties tested in Holland were found to be infected with virus S. It is claimed that a disease is caused in some varieties by infection with the virus. This is the first report of its presence in Canada by tests conducted in this country (J. Munro).

NET NECROSIS (virus). Three Green Mountain tubers, obtained from a commercial field near Fredericton, N. B. , in 1953 and that showed severe net necrosis, produced plants that exhibited symptoms of leaf roll and a slight rosetting and chlorosis of the top leaves. When scions from these plants were grafted on Bonny Best tomato, symptoms resembling those of the purple (bunch) top virus developed on the tomato. When scions from the infected tomatoes were grafted to Green Mountain potato plants, purple (bunch) top developed in the tops and net necrosis on the tubers. When the leaf roll virus was transmitted by the aphid Myzus persicae to Green Mountain plants only the symptoms of leaf roll appeared in the tops and no net necrosis was present in the tuber. These experiments indicate that the purple (bunch) top virus has a definite bearing on the development of net necrosis in the Green Mountain variety. Two Green Mountain tubers, also from a commercial field in 1953, that showed net necrosis for about 1/2 in. at the stem end produced plants that exhibited a mild leaf roll and a chlorosis of the terminal leaflets. When scions of these plants were grafted to Bonny Best tomatoes, the symptoms on these plants resembled those induced by potato witches' broom virus, strain 2 of N. S. Wright (D. J. MacLeod).

PURPLE or BUNCH TOP (virus). A tr. of purple top was observed in only one field, of Netted Gem, in s. Alta. (R. P. Stogryn). Haywire symptoms were recorded in 27 (20.8%) of the fields inspected. These fields were located in the n. and w. parts of Alta. (J. W. Marritt). In one experimental plot at Saskatoon, Sask. , near other species of plants affected by yellows, 12% of the potato plants were affected by purple top (T. C. Vanterpool). Most fields inspected in Man. showed tr. -0.5% of the

plants affected by purple top (D. J. Petty). Two affected plants were noted in one field at Strathroy, Ont. (F. J. Hudson) and tr. amounts in 2 fields in Ontario Co. (W. L. S. Kemp). Little purple top was observed in district 3, but it appeared again to be more prevalent n. and w. of North Bay (H. W. Whiteside). The disease was recorded in one 1/2-acre field in e. Ont. (E. H. Peters). Purple top was present in Que. in 2 fields of Canso, one of Keswick, and one commercial field of President (B. Baribeau). Bunch top was scarcely observed in fields of certified seed in N. B. this year. The disease was even less prevalent than in 1953 (C. H. Godwin).

Bunch top was found in commercial fields of Canso, Chippewa, Keswick, Kennebec, Katahdin, Pontiac, Green Mountain, Irish Cobbler and Bliss Triumph in York and Sunbury counties, N. B.; infection was tr. -2.5%. The late leafroll stage was found affecting 2-37% of the plants in fields of Canso, Keswick, Katahdin, Kennebec, Irish Cobbler and Bliss Triumph. Haywire was noticed affecting 3 plants in a field of Green Mountain (D. J. MacLeod). A tr. or slightly more of purple top was reported in 3 fields in N. S. (R. C. Leyton). Very little purple top was reported this year in P. E. I.; however, a few fields were affected. In one 3-acre field of Sebago 30% of the plants showed symptoms (J. E. Campbell). About 5% of the plants were affected in two fields of Sebago and Katahdin at Topsail, Nfld. (G. C. Morgan).

SPINDLE TUBER (virus) was of no importance in Man. (D. J. Petty). The disease was present in several fields, especially in the n. part of district 3, Ont.; in one lot of Keswick in the Cochrane area 1% of the plants were affected (H. W. Whiteside). A sl. infection was observed in a few fields of Kennebec in Que. (B. Baribeau). Small amounts of spindle tuber were recorded in a few fields in N. B. (C. H. Godwin). Spindle tuber was found in 7 commercial fields of the varieties Canso, Kennebec, Irish Cobbler, Green Mountain and Bliss Triumph in York and Sunbury counties. Infection was tr. -3%. The disease appears to be increasing in commercial fields in the province (D. J. MacLeod). Spindle tuber was observed in fields of Irish Cobbler, Sebago and Kennebec in N. S.; the highest infection recorded was 1% in a field of Sebago (R. C. Leyton). Spindle tuber was less prevalent than in 1953; 19 fields were rejected compared to 83 the previous year (H. L. McLaren).

STEM-END BROWNING (virus) was observed in tubers of Green Mountain, Keswick, Kennebec, Netted Gem, and Russet Rural; infection was tr. -4%. The bunch top virus was found in 52% of the Green Mountain (37 tubers) and 32% of the Keswick (19 tubers) sources examined. This type of stem-end browning appeared only in tubers kept at 44-55°F. but not in tubers stored at 33-36°F. Both the xylem and phloem tissues are affected (D. J. MacLeod).

STREAK and ROLL (virus). A disease, which I have designated Streak and Roll appeared in severe form in the varieties Cherokee, Sebago, Irish Cobbler, Golden, Katahdin and Chippewa in experimental plots on a farm

near Fredericton, N. B. Bliss Triumph and Green Mountain grown on the same farm showed no evidence of the disease. A trace, however, was found in a field of Irish Cobbler near Keswick. The virus causing the disease was transferred by stem grafting and sap inoculation from Cherokee to U. S. D. A. Seedling 41956, and Irish Cobbler in which it produced the characteristic rolling of the leaves and a necrosis of the petioles and stems. It was also transmitted by grafting and sap inoculation to Datura tatula, in which it produced a ruffling and chlorosis of the leaves and a necrosis of the petioles and stems. In all plants affected a severe leaf-drop streak finally developed and the top of the plant was destroyed. The virus failed to produce symptoms in Nicotiana tabacum, Capsicum annuum and Lycopersicon esculentum when it was introduced by stem grafting (D. J. MacLeod).

WITCHES' BROOM (virus) was found in 40 (5.5%) of the fields inspected and caused one to be rejected in B. C. The disease is much less serious in the Cariboo, than it was from 1948-51 (H. S. MacLeod). Witches' broom, a rare find in s. Alta., was observed in 3 fields (R. P. Stogryn). Witches' broom was found in 7 (5%) of the fields inspected in n. w. parts of Alta. (J. W. Marritt). The disease was again observed in several varieties in the North Bay and Cochrane areas of Ont. (H. W. Whiteside). A single affected plant of Irish Cobbler was seen in a garden at Charlottetown, P. E. I. (R. R. Hurst).

YELLOW DWARF (virus). A few plants of Keswick were again found affected with yellow dwarf about Cochrane and in Simcoe Co., Ont. (H. W. Whiteside).

BLACK HEART (non-parasitic) was sev. in one lot of certified Netted Gem seed grown at Duncan, B. C.; storage conditions were poor (W. Jones). Affected tubers were received from Janson, Sask.; the soil was very wet late in the season (T. C. Vanterpool). A few affected tubers were noticed in a bin of Irish Cobbler in Drummond Co., Que. (B. Baribeau). Typical black heart symptoms were seen in Sebago tubers from the bottom of a deep pile in storage at Bedeque, P. E. I. (J. E. Campbell).

ENLARGED LENTICELS were found on a few tubers of Warba, Green Mountain, Kennebec and Canso varieties at bin inspection in Que. (B. Baribeau).

FROST DAMAGE. No frost injury was reported in the early part of the season in central and n. Alta., as on account of excessive moisture in the soil, most fields were not planted until late May or early June, when danger from frost was past. However, heavy frosts in September caused 10-20% loss in the field. In addition considerable breakdown of tubers touched by frost took place after the crop was placed in storage. In the Edmonton area, the loss was still greater on account of late blight causing much tuber rot. (J. W. Marritt). One killing frost throughout

district 2, in Ont., and two killing frosts in some areas occurred before or at digging time. The resulting injury coupled with the damage caused to the tubers by late blight caused a 25% reduction of the certified seed crop (W. L. S. Kemp). In the Kemptville-Prescott area, frost injured 0.5-10% of the crop (E. H. Peters). Frost injury was reported in 145 (25.2%) of the bins inspected in Que.; injury varied from 0.5 to 5%, with some lots showing 25%. In general, wet weather delayed the harvest, and heavy frosts in late October were destructive (B. Baribeau). A sev. field frost on 8 Oct. in N. B., when a third of crop was still unharvested, resulted in mod.-sev. frost injury in late harvested potatoes. In a few bins break-down caused complete loss of the crop (C. H. Godwin). Early frost caused sl. damage in many potato fields in P. E. I. (J. E. Campbell). Frost injured many fields in Conception Bay, Nfld.; the tubers showed typical frost necrosis and breakdown at harvest (G. C. Morgan).

Frost killed the heavy vine growth a few days before digging in a field of Columbia Russet at Estevan, Sask., in 1953. When the tubers were examined in April 1954, 25-30% of the larger tubers were affected by frost necrosis, with also some low temperature breakdown; smaller tubers were less affected (H. N. Racicot).

**GIANT HILL.** A tr. was found in 7 fields inspected in s. Alta. (R. P. Stogryn). A few plants of several varieties were affected in district 3, Ont. (H. W. Whiteside). The disorder was reported in a few fields in the Chicoutimi and Lake St. John districts, Que. (B. Baribeau). Plants suspected of being affected with giant hill were found in fields of Green Mountain and Irish Cobbler planted in tuber units. Although these plants are very coarse and tall, they produce quite normal appearing tubers. In 1953, selections made from normally appearing plants in tuber-unit fields, indexed in the greenhouse and planted this year, gave plots containing no off-type plants (R. C. Leyton).

**HOLLOW HEART** affected about 1% of the Canso tubers grown at Fournier, Ont. (E. H. Peters). The disorder was found affecting not over 1% of the tubers in a few lots of Canso and Kennebec at bin inspection in Que. (B. Baribeau). Hollow heart affected about 1% of tubers of Irish Cobbler and a few tubers of Sebago grown in the Charlottetown area, P. E. I. (R. R. Hurst). The disorder was particularly troublesome in Sebago grown in low fields in Clarkes Beach, P. E. I. (G. C. Morgan).

**INTERNAL BROWN SPOT** affected an occasional tuber of Canso in a bin at Charlottetown, P. E. I. (R. R. Hurst).

**MAGNESIUM DEFICIENCY** was rather sev. in a field of Irish Cobbler at Union Road, P. E. I. (R. R. Hurst).

**NET NECROSIS.** Phloem necrosis (virus) has been observed in B. C. in tubers of many crops, especially in the Grand Forks area. In part, at least, its occurrence is connected with infection with leaf roll. Net necrosis, as

a result of heat, drought or frost was noted in only a few crops in small amounts (H. S. MacLeod). A tr. was reported in a bin or two of Green Mountain in Madawaska Co., N.B.; it is much less prevalent than formerly (C. H. Godwin). Net necrosis (0.5%) has been reported in one lot of Netted Gem in N.S. (R. C. Leyton).

**NO-SPROUT TUBERS.** Misses again appeared to be more prevalent than usual in all fields and varieties in district 3, Ont. The condition is attributed to faulty storage (H. W. Whiteside). Several poor stands occurred in Que., particularly of Canso in the Kamouraska district. The buds failed to produce a sprout; instead, small tubers were formed about the eye on short stolons. In one field 16% of the sets failed to produce tops (B. Baribeau).

**STEM-END BROWNING.** Some stem-end browning was observed in both Keswick and Canso crops grown in district 3, Ont.; mostly larger tubers are affected (H. W. Whiteside). It was found affecting 14% of the tubers in a lot of Canso and 1% in a lot of Green Mountain at bin inspection (B. Baribeau). In a lot affected by net necrosis in N.S., 4% of the tubers showed stem-end browning (R. C. Leyton). As a result of 30% of the tubers showing mod. stem-end browning, 3 carloads of Irish Cobbler grown at Union Road, P. E. I., were turned down for seed (J. E. Campbell).

**STEM STREAK** (manganese toxicity). A sl. amount of stem streak was seen in an early planting of Irish Cobbler at Charlottetown, P. E. I. The soil was very acid (pH 4.7) (J. E. Campbell).

**WIND DAMAGE** caused by hurricane "Edna" on 11 Sept. was heavy in potato fields in P. E. I. Often the tops were twisted off (R. R. Hurst).

#### PUMPKIN

**POWDERY MILDEW** (Erysiphe graminis) was observed on foliage of most plantings in late August and September in s.w. Ont. (C. D. McKeen).

#### RADISH

**SOFT ROT** (Erwinia carotovora) affected by 26 Aug. about 25% of the seed crop plants of Comet in an acre plot at the Central Experimental Farm, Ottawa, Ont. (V. R. Wallen).

**SCAB** (Streptomyces scabies) had so sev. infected a shipment received on the market, Toronto, Ont., that the radishes were unmarketable (J. K. Richardson).

#### RHUBARB

**CROWN ROT** (cause unknown) was reported on Strawberry rhubarb from Deep River, Ont., as follows: "First, the outer leaves develop brown

dead areas at the edges; then the outer stalks go limp; then leaves go brown and shrivel up - leaving only the small central shoots to die last. The roots, on examination, have gone black and appear to have rotted" (H. N. Racicot). Only one specimen of crown rot was received this summer in Sask.; it came from Golden Prairie. The cool summer probably slowed its development (T. C. Vanterpool).

RED LEAF (cause unknown) is present in nearly all plantings of rhubarb observed in the Lethbridge area, Alta. In all 35 reports of diseased rhubarb were received from householders in an area extending from Taber to the foothills and from Claresholm to the international border. Several of these reports were checked and the symptoms resembled the general condition described as Red Leaf. There are indications that the disease is at least in part attributable to a virus (J. T. Slykhuis). The disease was noted in several plantings around Edmonton and Lacombe (W. P. Campbell). Red leaf was sev. in the variety plots at the Station, Melfort, Sask.; all varieties were affected, some more sev. than others. The disease was noted at Saskatoon both in city and farm gardens (R. J. Ledingham).

#### SALSIFY

WHITE RUST (Cystopus cubicus) was heavy at the Botanical Garden, Montreal, Que. (P. Duval). A sl.-mod. infection was also noted at Ste Foy (D. Leblond).

#### SQUASH

GREY MOULD (Botrytis cinerea) affected about 5% of the squash in storage at Hortonville, N. S. Rhizopus also affected about 1%. Apparently rot developed as a result of rough handling or injuries at harvest (K. A. Harrison). Botrytis cinerea caused some fruit rotting of pumpkin and squash in a field at Ste Foy, Que. Other organisms observed on the decaying fruit were Fusarium, Alternaria and Phoma (D. Leblond).

POWDERY MILDEW (Erysiphe cichoracearum) affected most crops in s. Essex Co., Ont., in August and September (C. D. McKeen). The disease was found in a half-acre patch in Lincoln Co.; there were several evident centres of infection in the field (J. K. Richardson).

STORAGE ROT (Mycosphaerella citrulina). The fungus was isolated from 2 Acorn squash from a small garden patch at Kentville, N. S. The disease was not found in some 50 tons of Buttercup and Hubbard squash being held in storage at Grand Pré (K. A. Harrison).

MOSAIC (virus) caused a mottling of the leaves and concentric brown rings on the fruit in some fields in Essex Co., Ont. (C. D. McKeen).

YELLOWWS (Callistephus virus 1) was found sev. affecting 3 plants in a

station plot, Fredericton, N. B. (D. J. MacLeod).

### SWEET CORN

RUST (Puccinia sorghi) caused a tr. infection in the plots at St. Jean, Que. (R. Crete).

SMUT (Ustilago maydis) infection was a tr. in a planting at Medicine Hat, Alta. (F. R. Harper); in the Botanical Garden, Montreal, Que. (P. Duval); and in gardens in Kings Co., N. S. (K. A. Harrison).

### TOBACCO

A special report on tobacco diseases in Ontario and Quebec was prepared by Dr. Z. A. Patrick and Dr. L. W. Koch.

#### Seedbed Diseases

BLUE MOULD or DOWNY MILDEW (Peronospora tabacina). As usual mould outbreaks occurred late in the season both in the Old and New Tobacco Belts of Ontario. The outbreak occurred around 27-30 May in a number of greenhouses around Simcoe and groundbeds around Cedar Springs. It did not cause much damage in the New Tobacco Belt because much of the transplanting was completed and also the outbreaks were confined to a few greenhouses. In the Old Tobacco Belt, especially around Cedar Springs, the damage was more extensive. On account of the cold wet spring the plants were small in this area and only about 50% of the fields were planted when blue mould appeared. As a result there was a shortage of burley plants for transplanting. To date this disease has not appeared in Quebec.

YELLOW PATCH (excessive nutrients) was very common seedbed trouble this year. Many growers still tend to over fertilize their tobacco seedbeds. If such beds are also watered unevenly the plants in areas of the seedbed remain stunted and patchy through lack of proper nutrient balance in the soil. Above-ground symptoms consist of chlorosis and stunting of affected seedlings in patches of irregular shape. Roots are stunted and to various degrees discoloured. Recovery often occurs if the plant bed is allowed to dry out and then watered very heavily to leach out some of the fertilizer.

COLD INJURY was very common this year in ground seedbeds of burley tobacco. Two types of cold injury were noted. The usual type was present where the plants show a yellow to white growing point and narrow leaves and the new leaves as they develop are white and cup-shaped. In some beds, soft rot bacteria entered the leaves and caused further injury. With warmer weather the affected plants recover and grow normally except that the affected leaves do not recover completely and appear mottled, somewhat like those on plants affected by mild mosaic.

**DAMPING-OFF** (Pythium spp. and Rhizoctonia solani) was widespread and caused mod. to heavy damage during the early part of the season when the weather was cold, cloudy and wet. Most sev. damage was caused where plants in the seedbed were too crowded and where water was applied in excess. It was noted that in beds where damage was heavy the grower had not followed the recommended program for control of blue mould. This program consists of a spray application of ferbam 4 lb. in 100 gal. of water, using 4-5 gal. per 100 sq. yd. of seedbed. The dust can also be used. First application is made when the leaves on the young seedlings are the size of a dime and the applications are repeated twice a week until transplanting time.

**ANGULAR LEAF SPOT and WILD FIRE** (Pseudomonas tabaci and P. angulata). Symptoms of both angular leaf spot and wild fire were found in two ground beds of burley tobacco near Woodslee, Ont., on 14 May. Wild-fire symptoms observed were scorched leaf tips surrounded by broad yellow halos, the whole leaf often turning yellow. Small plants were wilted or dead. Individual lesions on the leaves consist of white dead centres surrounded by yellow halos. However, other lesions consisted of more irregular water-soaked areas, which turned brown or black. Although wild fire and angular leaf spot have been considered to be caused by two distinct species, P. tabaci and P. angulata, some workers now consider the pathogens are variants of a single species. After a period in storage cultures of the wild-fire organism often produce symptoms of both wild fire and angular leaf spot even when the cultures were started from a single cell. In tests at the Harrow laboratory with some of the isolates both yellow halos and irregular water-soaked lesions were produced on burley tobacco leaves.

The disease first appeared in the plant beds during cold wet weather and a survey of plant beds showed that the disease was present only on burley tobacco planted in ground beds where ditch water was used for watering. No wildfire or angular leaf-spot was present where well water was used. The disease was successfully controlled when a fixed copper was used as a spray or dust. The plants were sprayed twice a week with fixed copper, 8-10 lb. per 100 gal. of water, and 10-12 gal. were applied per 100 sq. yd. of seedbed. No carry over of the disease from seedbed to the field was noted.

**MUSHROOMS** caused mild damage throughout the burley and dark tobacco areas of Kent County where outside seedbeds are used.

**GREEN SCUM** (algae). About the time that plants are coming up, some beds develop a green or reddish green growth over the entire soil surface. This condition causes a stunting and suffocation of the plants because of improper soil aeration. It can be overcome by breaking the crust at regular intervals and the application of bordeaux or fixed copper as described for wild fire.

**CHEMICAL INJURY.** A number of cases of 2,4-D injury were noted. Injury from this herbicide is becoming less common because the growers realize the danger of using improperly cleaned sprayers or of drift from adjacent weed-spraying operations.

A few cases of creosote toxicity were noted in new greenhouses where this wood preservative had been used.

#### Field Diseases

**BLUE MOULD** (*Perenospora tabacina*). No cases of blue mould in the field were observed in the tobacco growing areas of Ont. and Que. this year.

**BROWN ROOT ROT** (nematodes) is becoming one of the most serious diseases of burley and flue varieties throughout Ont. The disease was most severe in light sandy soils where it causes much stunting and reduction of yields. The disease was widespread occurring throughout both tobacco belts. In most of the fields visited some brown root rot damage was noted. 1/

**BLACK ROOT ROT** (*Thielaviopsis basicola*). Very little root damage was attributed to black root rot. Its low incidence is probably due to the widespread planting of several resistant burley varieties and of the resistant flue-cured variety Delcrest.

**FRENCHING** (?soil toxins). A few fields of tobacco were sl.-mod. damaged by frenching. The disorder was limited to fields where the soil type is marginal or unfavourable for growing tobacco and on poorly drained soils.

**SOFT ROT** (*Pythium* spp.) occurs soon after setting. The recently set plants wilt and, when removed from the ground, they will be found to be affected by a soft watery rot of the buried stem. The disease occurred in scattered areas throughout the fields usually in low spots with poor drainage.

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1/ In a recent study, W.B. Mountain (Can. J. Bot. 32:737-759. 1954) has shown that root-lesion nematodes, *Pratylenchus* spp., are the primary causal agents of brown root rot of tobacco in Ontario. In this province, "brown root rot is caused by *Pratylenchus minyus*, *Pratylenchus* sp. and probably to some extent by *Pratylenchus penetrans*". These species are distinct from those encountered in the southern United States (I. L. C.).

**SORE SHIN** (*Rhizoctonia solani*). On account of the wet spring, sore shin, along with the *Pythium* soft rot, caused mod. losses in the new transplants. Decay starts at or near the surface of the ground usually at a bruised spot on the stem. Affected plants show brown or black discoloured areas occurring on one side or entirely around the stem near the ground. In mild cases only superficial tissues are involved and the plants recover if favourable growing conditions exist. In sev. cases during wet cold weather both cortical and vascular tissues are invaded and the plant dies.

**LEAF-SCALD** (cause undetermined) is characterized by the tip ends of the leaves becoming wilted and failing to recover. The wilting occurs in hot weather following periods of rapid growth. The damaged leaves turn brown and die. This disorder is often attributed to the sting of one of the stink bugs.

**NONPARASITIC LEAF SPOT** (cause undetermined) was more prevalent than for some years past. It is characterized by small brown spots on the leaves which later become dead and often turn greyish-white. No parasitic fungus or bacterium can be found in the spots. The degree of spotting varies from a few widely separated spots on the leaf to a condition where the entire leaf is covered with spots.

**MOSAIC** (virus). Injury from tobacco mosaic was widespread throughout the burley, dark and flue-cured tobacco growing areas of Ont. and Que. Most of the fields visited had a few diseased plants. Damage was heavy only in those fields where the growers failed to take proper sanitary precautions in their transplanting operations.

**ETCH** (virus) caused some damage to burley and black tobacco in the Old Tobacco Belt of Ont. It was not observed on flue-cured tobacco.

**RING SPOT** (virus). A few ring-spot infected plants were found in most of the tobacco fields visited. It occurred on burley, black and flue-cured varieties. Though ring spot was found in nearly every tobacco field it is rarely destructive to individual plants and usually very few plants in the field are infected.

**OTHER VIRUS DISEASES.** Several other viruses affect tobacco in the field. They only affect very few plants and are usually not very injurious. These include the streak virus, vein-banding virus and several of the cucumber mosaic viruses. These viruses although still unimportant may become more prevalent because most of them together with the etch viruses are aphid-transmitted and the peach aphid has now become established in most of the tobacco-growing areas of Ont.

**HOLLOW STALK** (*Erwinia carotovora* and *E. atroseptica*). A few cases of stalk soft rot and hollow stalk were observed. They were due to topping damage and the use of suckering oils.

### Other Observations

**MOSAIC (virus).** Infections were heavier than usual in flue-cured tobacco fields in Que., as much of the cultivating had to be done under wet conditions. Where tobacco followed tobacco, often nearly 75% of the plants were infected (F. Godbout). A few plants in a plot at Kentville, N.S., showed sev. symptoms of mosaic (K.A. Harrison).

### TOMATO

**EARLY BLIGHT (Alternaria solani)** infections were noted on Early Chatham at Medicine Hat and on Farthest North at Brooks, Alta. (F.R.H., J.S.H.). A tr. infection was found on the foliage of most early marketing and canning crops in Essex Co., Ont. (C.D. McKeen). Infection was general and quite sev. in many plantings in Lincoln Co. but growers were little concerned (J.K. Richardson). On Isle Jesus, near Montreal, Que., early blight caused the foliage to dry up and about 20% of the fruits became affected through the many growth cracks present (E. Lavallee). A mod. infection occurred on staked Chatham plants at Normandin (L.J. Coulombe). It was heavy on greenhouse plants at Mastai in early September (D. Leblond). Early blight was very general in the principal tomato growing areas in N.B. (S.R. Colpitts). Early blight was present at Kentville, N.S., but caused little damage (K.A. Harrison). A sl. infection was noted on Harkness in Queens Co., P.E.I. (J.E. Campbell). A sl. infection was present on the foliage at St. John's, Nfld. (G.C. Morgan).

**NAIL-HEAD SPOT (Alternaria tomato).** Infection was sl.-sev. on tomato fruits imported from Mexico when they were examined in Quebec City in January (D. Leblond).

**GREY MOULD (Botrytis cinerea)** was reported from the city greenhouses, Edmonton, Alta. (W.P.C.). Grey mould affected about 35% of the fruit in a planting at Ste Foy, Quebec Co., Que. (D. Leblond). Grey mould caused about 5% damage in a planting of Early Chatham at Berwick, N.S. The disease increases with increased fertility and on plants grown under sprinkler irrigation so that it is a problem in intensive tomato production. About 1% of the stand of Improved Bay State was affected in greenhouses in King, Hants and Annapolis counties, N.S. Dull weather made humidity control in greenhouses very difficult this season (K.A. Harrison).

**LEAF MOULD (Cladosporium fulvum)** was sev. on Vetomold in a greenhouse on Lulu Island, B.C. Loss was probably sl. as in an effort to retard mould development the grower kept the soil dry. As a result ripening of the crop was hastened, an asset at that time (I.C. MacSwan). Leaf mould caused sl. damage in 2 greenhouses at Medicine Hat, Alta. (M.W. Cormack). Leaf mould caused a loss of 20% of the crop in a

spring greenhouse crop in Annapolis Co., N.S. In one lot of Improved Bay State seed about 10% of the plants were susceptible. The plants were used for the fall crop in 6 greenhouses. About 50% loss in yield was suffered by the susceptible plants (K. S. Harrison).

**ROOT ROT (Colletotrichum atramentarium)** Blair H. MacNeil (Plant Dis. Repr. 39:45-46, 1955) reports the sporadic occurrence of a root rot of greenhouse tomatoes in s. Ont. in recent years. He gives an excellent description of the disease, the isolation of the pathogen and how it may be controlled (I. L. C.).

**ANTHRACNOSE (Colletotrichum phomoides)** caused a sl. infection on a few canning crops in Essex Co., Ont. Spraying with ziram or maneb has been effective in reducing the damage caused by the disease. Zineb has not been tested (C.D. McKeen). A sl. -mod. infection was observed on green fruits at Burlington on 10 July. Lesions on the blossom-end of the fruit could be confused with blossom-end rot as the fungus was not yet sporulating. Lesions on other parts of the fruit formed the more typical circular sunken areas. (see Plate 1, fig. 2, p. 100). The pathogen was readily isolated. Spraying with maneb appeared to check disease spread (J.K. Richardson). A single affected fruit received from St. Pierre les Becquets, Que. (D. Leblond). Infection was sev. on fruit from a garden at Kentville, N.S., where the disease has been present before. A sl. infection occurred on fruits from spray plots on ground on which tomatoes have not been grown for several years (K.A. Harrison).

**BACTERIAL CANKER (Corynebacterium michagense)**. Sl. mod. infections were noted in home gardens at Ste Anne de Beaupre, Baie St. Paul, and St. Alexis de Port Alfred, Que. (L.J. Coulombe).

**WILT (Fusarium lycopersici)** was observed in tomatoes grown on infested soil in Essex Co., Ont. (C.D. McKeen).

**ROOT KNOT (Meloidogyne sp.)** caused a variable amount of damage to roots of plants in Essex Co., Ont., where the greenhouse soil had not been sterilized. (C.D. McK.).

**PHOMA ROT (P. destructiva)** was prevalent on tomato fruits in the area about Quebec City in September. In one crop at Ste Foy, 50% of the fruit were affected (D. Leblond). Very little Phoma rot was seen or reported in N.S. this year (K.A. Harrison).

**LATE BLIGHT (Phytophthora infestans)** was general in most gardens on Vancouver Island, B.C. and caused much damage; it was more prevalent than in any previous year except perhaps 1948 (W. Jones). It was general throughout home and commercial plantings on the lower mainland; loss moderate (I.C. MacSwan). From specimens received,

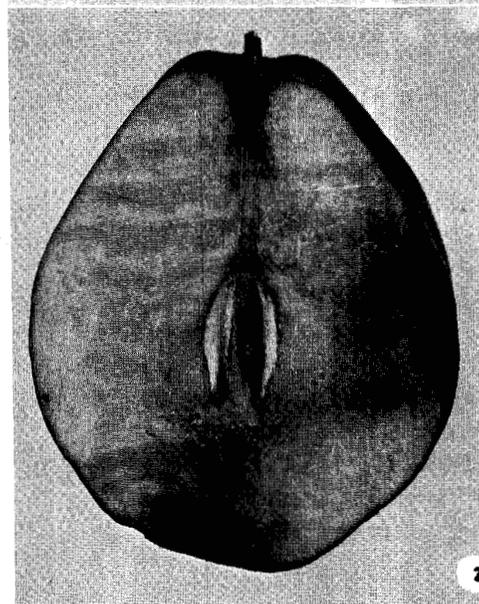
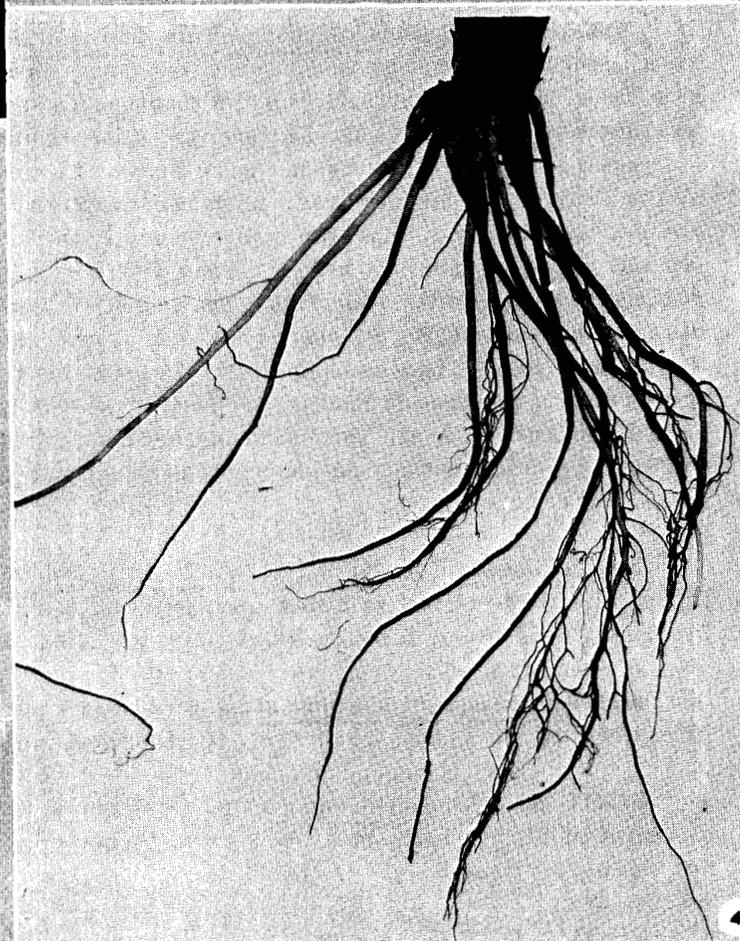
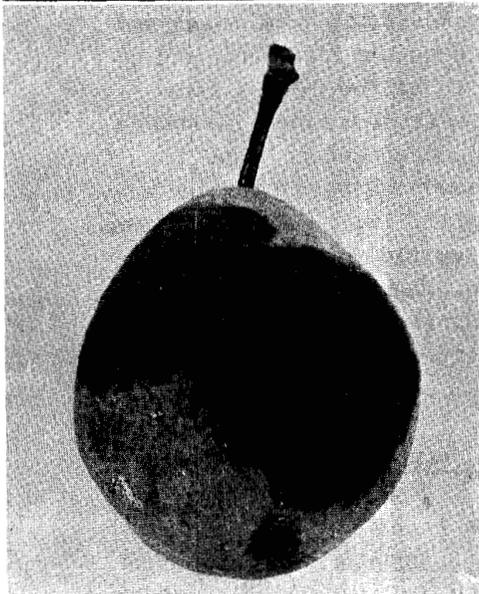
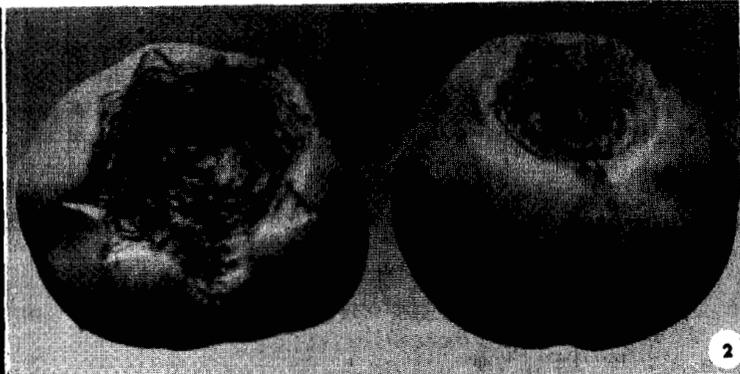


Fig. 1 Stem-end browning and cracking in tubers of Canso potatoes caused by *Rhizoctonia solani*. Salt Spring Island, B.C. October 1954.

Fig. 2 Anthracnose lesions on green tomato fruits caused by *Colletotrichum phomoides*. Burlington, Ont. July, 1954.

Fig. 3 Rot of Kiefer pears caused by *Phytophthora cactorum*. St. Catharines, Ont. October 1954.

Fig. 4 Blackened root tips and rat-tail appearance of roots of strawberry plants affected by red stele (*Phytophthora fragariae*). Lincoln Co., Ont. 31 May 1954.

it was evident that tomatoes were sev. affected and losses heavy in fall-harvested fruit in e. Sask. (R.J. Ledingham, T.C. Vanterpool). Late blight was fairly general on tomatoes in Man.; in some fields 25-50% of fruit were affected (J.E. Machacek, W.A.F. Hagborg). As usual, late blight was noted in the Montreal area, Que., much later on tomatoes than on potatoes. In the laboratory plots at St. Martin it was found on potatoes on 13 July and on tomatoes on 13 August. On Isle Jesus, about 30% of the crop was lost, and losses were probably higher elsewhere where the crop is not so early (E. Lavallee). In many gardens about Quebec City the crop was a total loss (D. Leblond). A sl. infection was already present at Baie St. Paul on 27 Aug. (L.J. Coulombe). The disease was observed in most regions of Que. and losses amounted to 5-100% of the crop (H. Genereux). Late blight was sev. on tomatoes throughout the vegetable area of N.B.; loss was 60% of the crop (S.R. Colpitts). Although late blight was found on potatoes in early July it was mid-August before it was observed on tomatoes. Dull weather favoured its gradual spread and in unsprayed plots 30% of the fruits were destroyed. As a result of low rainfall in late August and September, growers were able to secure excellent control by spraying (K.A. Harrison). Late blight was first noticed on the foliage on 17 Aug. and on the fruit on 30 Aug. in Queens Co., P.E.I. (J.E. Campbell). A sl. infection was observed on the foliage of Vulcan and Vetomold in a greenhouse in St. John's, Nfld. (G.C. Morgan).

**BUCKEYE ROT** (Phytophthora parasitica) mod. affected Bonnie Best in a garden at Victoria, B.C.; previously found only in greenhouse crops (W. Jones).

**DAMPING-OFF** (?Pythium sp.) caused the death of 40% of the 18,000 seedlings being grown by one grower at Gagetown, N.B. (S.R. Colpitts). The damping-off was attributed to Fusarium, but Pythium is usually the primary pathogen (I.L.C.).

**STEM ROT** (Sclerotinia sclerotiorum) affected several plants of one variety in a variety trial at Chilliwack, B.C. (I.C. MacSwan). Tr. observed in the spray plots at Kentville, N.S., this fall (K.A. Harrison).

**LEAF SPOT** (Septoria lycopersici), as usual, caused varying amount of damage in several early and canning crops in Essex Co., Ont. Irrigation of early crops increased its incidence (C.D. McKeen). A sl. infection was seen at Charney, Que. (H. Genereux) and in the plots at Kentville, N.S. (K.A. Harrison).

**WILT** (Verticillium spp.) affected some 150 Vetomold plants in patches in a greenhouse on Lulu Island, B.C.; the loss was sl. (I.C. MacSwan). Nearly 50% of the plants were sev. affected in the plots at Lethbridge, Alta. Damage was sl.-mod. in the plots at Brooks and sl. in a greenhouse at Medicine Hat (F.R. Harper).

MOSAIC (tobacco mosaic virus) affected specimens of greenhouse tomatoes were received from Carmacks, Yukon. The presence of tobacco mosaic virus at least was established by inoculating tobacco. (H.N. Racicot, D.S. MacLachlan). Mosaic (tobacco and cucumber mosaic viruses) affected a high percentage of the plants in most greenhouse crops in Essex Co., Ont. The amount of mosaic on field crops varied from field to field (C.D. McKeen).

GREY WALL (virus). Symptoms of grey wall were pronounced on fruits in one canning crop near Dresden, Ont.; infected fruits were most prevalent during mid-harvest. A strain of tobacco mosaic virus was definitely identified from these home-grown plants (C.D. McKeen).

Mosaic affected 50% of the plants in 3 home gardens at Sorel, Que., and about 25% in an acre field examined at St. Martin (F. Godbout, E. Lavallee). The greenhouse crop was 100% infected by mosaic in the spring 1954 in N.S. The fall crop was not so severely affected. In one house, where the plants were sprayed with 10% solution of milk in water, the spread of mosaic appeared to be held in check <sup>3/</sup>. The field crop was comparatively free of mosaic, average infection being about 10% (K.A. Harrison). Mosaic affected about 25% of the plants and injured 5% of the fruit in a greenhouse in St. John's, Nfld. Tobacco mosaic virus was found to be present on inoculation of Nicotiana glutinosa (G.C. Morgan, H.N. Racicot).

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<sup>3/</sup> The milk spray was developed by J. Newell, John Innes Horticultural Institution (The Grower 41:1409. June 26, 1954), as a result of a discussion with J.C. Bawden. In his article "Milk spray cured tomato mosaic," he points out that "Mosaic is probably the most widespread disease of glasshouse tomatoes". He estimates that when infection occurs early, the yield may be reduced by at least 20%. He relates that, "In spite of . . . extreme precautions the spread of mosaic has worsed (at Merton and now at Bayfordbury) year by year and in 1953, with the exception of one house, we had 100 per cent infection everywhere. This one house we were able to keep entirely free of mosaic by spraying at ten-day intervals with milk diluted in nine parts water and sprayed on through an atomiser in sufficient quantity to give a good cover to the leaves". His recommendation is to spray with 10% solution of skimmed milk before pricking out and regularly at ten-day intervals afterwards. "It is particularly important to spray before handling the plants rather than afterwards. Infection must be prevented -- it cannot afterwards be cured". (I.L.C.).

In a paper entitled, "Some Viruses of the Field Tomato" to appear in the Plant Dis. Reporter, Blair H. MacNeill reports on a survey that he has made of the mechanically transmitted viruses occurring in field tomatoes in Ontario in 1952 and 1953. Tobacco mosaic virus (*Nicotiana virus 1*) was the most common virus in seedlings before transplanting and after the plants are set in the field. It causes a mild mottle with little or no distortion. Streak symptoms were common. They were caused by *Lycopersicum virus 1*, apparently a strain of TMV but for the most part they are due to the combined action of TMV and *Solanum virus 1* (potato X virus). Etch (*Nicotiana virus 7*), which frequently causes only a faint mottle and slight curl, is confined to s. w. Ont. Contrary to expectations the virus was not present in imported seedlings from the southern United States. There is considerable evidence that etch virus drastically reduces tomato yields by inducing flower drop. Cucumber mosaic virus was infrequently isolated from the samples. Some strains produce the familiar "shoe-string" symptoms, although this reaction is often the result of TMV infection. On two successive years tomato spotted wilt (*Lycopersicum virus 3*) was found in a field in the Fort Erie district.

Undoubtedly tomato streak accounts for the major part of the visible crop loss. The incidence of double virus streak is increased if potatoes are growing nearby or if tomatoes are planted in fields in which potatoes were grown the previous year. The situation is complicated by the occurrence of necrotic strains of TMV and the presence of *Solanum virus 2* (potato Y). There is little evidence that viruses that are exclusively insect-borne are of great significance in the Ont. canning districts yet the role of insects in spreading many of the viruses noted above must be considered, especially where related susceptible crops are grown contiguous to tomatoes or where lack of weed control permits the presence of weeds that may act as reservoirs of tomato viruses (I. L. C.).

PURPLE TOP (virus) was found affecting 3 plants in a garden at Doak, N.B. The virus was transmitted by grafting to Bonny Best tomato and Katahdin potato. Typical bunch (purple) top symptoms developed in the plants (D. J. MacLeod).

BLOSSOM-END ROT (non-parasitic) was present on greenhouse-grown fruits from Carmacks, Yukon (H. N. Racicot). As usual, blossom-end rot affected a considerable percentage of the fruits found in canning crops in Essex Co., Ont., in August, when transpiration was high and precipitation was low (C. D. McKeen). It caused mod. damage in a field at Port Weller, Ont. (G. C. Chamberlain) and at Normandin, Que. (L. J. Coulombe). About 15-20% of the fruit were injured in a field at Rougemont (R. Crete). Little blossom-end rot was seen or reported in Kings Co., N. S. (K. A. Harrison).

BLOTCHY RIPENING (non-parasitic). Many of the new hybrids and crosses seem particularly subject to the disorder. Several growers in

Kings Co., N.S., reported some loss from the touble (K.A.H.).

**POTASH DEFICIENCY.** In a half-acre planting at Malvern Square, N.S., about 75% loss of crop occurred; tests showed the soil was very low in potash (K.A.H.).

**SUNSCALD.** Mod. injury was reported by a grower at Ste Rose du Lac, Man. (J.E. Machacek).

**CHEMICAL INJURY.** 2,4-D caused foliage distortion and uneven ripening of fruits in a few canning crops in Essex and Kent counties, Ont. (C.D. McKeen).

In a field at Berwick, N.S., a grower sprayed a sprinkler irrigated crop of Early Chatham with a heavy application of Bordeaux to check a sev. outbreak of late blight. Blossoms were abundant and open at the time. As a result they failed to set fruit causing an estimated loss of 1500 baskets (20% of crop) (K.A. Harrison).

### TURNIP

**LEAF SPOT** (Alternaria brassicicola) was abundant on swede turnips in plots at Ste Foy, Que., in September (D. Leblond).

**SOFT ROT** (Erwinia carotovora) caused a heavy loss in 150 bags of Laurentian swedes in storage at St. John's, Nfld. (G.C. Morgan).

**DOWNY MILDEW** (Peronospora brassicae) was general on foliage of Laurentian at Courtenay, B.C.; no evident damage (W. Jones).

**DRY ROT** (Phoma lingam) was found on swede roots shipped from Alta. and on sale in a store at Sidney, B.C. The pathogen was isolated (W. Jones).

**STORAGE ROT** (various organisms). A survey of swede stecklings of 25 seed growers in June revealed that stecklings of 8 growers were a complete loss and others suffered 5-75% loss. Organisms recognized or isolated were: Phoma lingam, Rhizoctonia solani, Botrytis cinerea, Sclerotinia sclerotiorum, Fusarium spp. and Penicillium spp. (K.A. Harrison).

**CLUB ROOT** (Plasmodiophora brassicae) affected about 15% of the plants in 1/2 acre planting of Laurentian at Kingsport, N.S.; loss 10% (K.A.H.).

**ROOT ROT** (Rhizoctonia solani). Sclerotia were numerous on 2% of the roots in a planting near Taber, Alta. (M.W. Cormack). Some affected Laurentian roots were seen in P.E.I. Isolations yield R. solani (K.W. Harrison, J.E. Campbell).

SCAB (Streptomyces scabies) was mod. -sev. on two swedes received from Belleville, Ont. (H.N. Racicot).

BLACK ROT (Xanthomonas campestris). A few roots of Laurentian from Belmont, P.E.I., showed typical symptoms of black rot in the crown and root; infection tr. (J.E. Campbell).

MOSAIC (virus). Only two infected plants were seen in a field in Hants Co., N.S. (K.A. Harrison).

STERILITY (virus) Four plants showing marked phyllody were seen in a small seed plot at Taymouth, N.B. (D.J. MacLeod).

BROWN HEART (boron deficiency) was reported in several small lots of swedes in Kings Co., N.S.; the growers had neglected to apply boron. One grower at Grand Pre claims that boron deficiency has never affected his crops although he has never added boron. He uses manure under his crop (K.A. Harrison). A small amount of brown heart was present in the plots at Upton, P.E.I., where boron had not been applied (J.E. Campbell). Brown heart caused sev. losses in 4 small plantings of Laurentian at Clarkes Beach, Nfld. Specimens showing brown heart and soft rot were received from Burin (G.C. Morgan).

#### WATERMELON

ANTHRACNOSE (Colletotrichum lagernarium). A sev. infection was present in a small planting at Altona, Man. (J.E. Machacek). The disease was quite common in an acre planting in Lincoln Co., Ont. (J.K. Richardson).