The Weather and Its Influence on Plant Disease

After the severe freeze of 10-18 Nov., the weather on the lower mainland of B.C. was relatively mild in December but with some snow. Frosts occurred in January, February and March with less sun and more snow than usual, the last spring frost occurring on 18 March. April and May were sunny with little rain. May was a record month for sunshine and on the 30th the temperature rose to 81°F. It was also possible to set out ornamental annuals from the middle of the month. June was cooler with a higher rainfall and less sun than usual, all of which delayed ripening of strawberries in the few plantings which had survived the November freeze.

July, August and September were warmer and sunnier than usual with little rain. Bean rust was severe in all Lower Fraser Valley areas, but no reduction in yield was reported. All crops showed the effects of 2 1/2 months without rain - lawns browned, less grass on farm pastures, and plants injured in November continued to die all summer. Late blight infection was slight on potatoes until late August and little or no reduction in yield occurred. After mid-September temperatures were below normal, sunshine was low and rainfall high. A record rain of 2.35 in. in 24 hours occurred 18-19 Oct. and the first frost on 28 Oct. November and December were cooler than usual with some very heavy rains in November. The first snow fell on 4 Dec. (H.N.W. Toms).

Two periods of extreme temperature during the 1955-56 winter caused sev. damage to horticultural crops in the B.C. Interior. On 11 Nov., when many orchard trees, especially late apple varieties, were not yet dormant, the temperature dropped 33° within 20 hours. The drop continued to a minimum of -2°F. at Summerland on 12 and 13 Nov., and remained close to zero until 17 Nov. On 15 and 16 Feb. minimum temperatures of -8° and -6°F. were reached at Summerland. Lower temperatures were recorded in other districts.

Many thousands of orchard trees were killed by the combined effects of the two cold periods. Trunk and crotch injury to late apple varieties and stone fruit trees, especially cherries, resulted in loss of trees in all districts of the Okanagan Valley, and in the Creston Valley. Spur and bud injury reduced crops on large numbers of trees that were not killed.

Strawberries and garden perennials also suffered severely. Damage was especially serious in garden roses and many ornamental shrubs and trees.

The spring and summer of 1956 were almost ideal. Temperatures were above the 39-year average for all months between April and November, except June. Rainfall was almost nil in April and May, higher than average in June and July, normal in August, and much below average in September, October and November.

During the dry spring months apple scab did not become established. Light infections occurred in some districts in June and July, but the disease caused no economic loss. Records show that apple powdery mildew incidence is low after extremely cold winters. The disease was not found in Okanagan Valley orchards in 1956.

Brown rot in sweet cherry fruits was unusually sev. throughout the West Kootenays, occasioning heavy claims on shipments to Prairie markets. Presumably the wet weather in June and July favored its development. Symptoms of western X-disease of peach have not been apparent in Okanagan Valley orchards during the last cool wet summers. Even trees known to have been diseased in earlier years have shown no symptoms. Spot surveys of several orchards in 1956 revealed that some of these trees were again showing symptoms. Hot summer weather is presumed to be necessary for sympton expression.

Most diseases of vegetables caused less than normal damage in 1956. However, stem rot of beans became sev. during the moist period in June (M. F. Welsh).

In S. Alta., the winter was unusually long and severe. Snow and record-breaking low temperatures persisted from the early part of Nov. into March without an appreciable break. Snow persisted into April. Significant winter-killing occurred in winter wheat test plots at Lethbridge and in other fields in the Lethbridge area for the first time in several years. The scarcity of wheat streak mosaic this year may have been partly due to failure of vector-harboring volunteer winter wheat plants to survive the winter. Snow mold damage was more prevalent in forage crops and lawns than in 1955. Above normal precipitation in July and August appears to have aided in the development of stem rust on winter wheat and soft white spring wheat in Alta. Although damage to yield was not great in winter wheat the rust did materially reduce yield of soft white spring wheat (E. J. Hawn).

In central and n. Alta. the autumn of 1955 was warm and open during September and October, with only 5 nights of freezing temperatures before 25 Oct. On 30-31 Oct. there fell 7 inches of snow which largely melted away one week later. Between 10 and 11 Nov. the temperature dropped from 38° to -11°F. Subzero weather without appreciable snow cover lasted until 12 Dec. when about 2 1/2 in. of snow fell. This weather pattern did not allow the herbaceous perennials to harden off and many died during the record cold winter.

April and May, 1956, were very dry, and this drought was not broken until 15-16 June when a 2 in. rain was recorded. The dry spell was possibly responsible for the low level of ergot infection. After 15 June the summer was warm with considerable rain; very good conditions for crop growth. Barley was subjected from a very early stage to conditions which were ideal for scald development.

Wheat stem rust spores arrived fairly early and farmers who were growing susceptible varieties such as Red Bobs suffered appreciable loss (W.P. Campbell).

Sev. frosts for several days after the snow had melted in the spring caused serious damage to experimental plots of grasses and legumes at Saskatoon, Sask. Cold wet weather and flooding persisted in many areas and general seeding was the latest on record. By 7 June, however, the weather turned dry and temperatures were high. These conditions left the top soil dry in large areas and germination was uneven. Continuing dry weather in s.w. Sask. caused wheat to head out on short straws. Moisture conditions, however, improved in most of the province and growth was rapid.

The first stem rust of wheat was found in the Saskatoon area on 12 July and leaf rust in the Landis area (w. central Sask.) on 19 July. Both rusts developed slowly during the relatively dry weather and little damage was done.

Cold injury to sweet clover in the spring was followed later by a root and crown rot caused by Fusarium spp.; it caused the death of many plants in the breeding nursery at Saskatoon. Leaf spots were abundant on legumes, grasses and cereals. Killing frosts in late August caused sev. damage to cereal, flax and rapeseed over a large area. Intermittent rainfall during harvest lowered quality of crops especially cereals (H.W. Mead).

Periods of bright sunshine lasting 12-15 hours on several days in June when temperatures reached 80-97°F. probably provided the conditions for heat banding of cereals and heat canker of flax. The critical days at Saskatoon for cereals were 1, 4, 8, 9 June and for flax 8-10, 19-20 June (T.C. Vanterpool).

Owing to very heavy snowfall (all-time record of about 99 inches) throughout Man. in 1956 and an abnormally cool spring, seeding of small grains was about 2 weeks later than normal. Temperatures were about 6°F. above normal for June, 3°F. below normal for July and about normal for August throughout most of the agricultural area. At the same time June precipitation was about 30% in excess of normal; July precipitation was 15% above normal over the whole province; and August precipitation was about 150% above normal in the Red River Valley and about 30% below normal in the other parts. Despite the moderately favorable weather conditions for rust development in Man. throughout most of the growing season, cereal rusts were much less prevalent than usual in 1956. The scarcity of cereal rusts may be attributed, at least partly, to the small amount of air-borne rust inoculum, particularly in early spring, as a result of excessively dry weather in the southern U.S.A. in the early part of 1956. Apparently the course of rust development in Western Canada in 1956, was affected to a greater extent by the weather which prevailed in the southern U.S.A. during the winter and spring of 1956 than by the weather which prevailed in Western Canada during the growing season (B. Peturson).

In s.w. Ont. the early spring season was one of the coolest and wettest on record. After a brief hot spell of one week in mid-June cool wet weather returned and prevailed for the remainder of the summer and early autumn. October was an exceedingly warm month with very low precipitation. The low temperatures to which the early cabbage and cauliflower crops were exposed in April in Essex county caused approximately 80% bolting in the latter crop. Prolonged cool weather in late May and in early June predisposed to severe root rot cucumbers and muskmelons that were set in the field under paper and hot caps. Frequent rain showers during May favored development of early blight and some Septoria leaf spot in the tomato plant beds in Essex county. A continuation of this weather in June and July led to a heavy infection of bacterial leaf spot in sweet pepper crops. Although throughout the entire summer and fall weather conditions appeared to be most favorable for a late blight epidemic in tomatoes, no blight was observed in s.w. Ont. (C.D. McKeen).

In the Niagara peninsula the growing season was featured by much cool wet weather. In May 5.26 in. of rain fell on 17 days, the 2nd highest amount recorded in 25 years at St. Catharines. The mean maximum and minimum temperatures with several periods of sharp frosts were also below the 25-year means. As a result development of tree fruits was late and growth slow. Strawberries suffered 10-15% frost damage on 8 May and grapes an estimated 20% injury from low temperatures on 24-25 May. Cool overcast conditions during bloom resulted in almost complete failure of the sweet cherry crop and greatly reduced fruit set of some varieties of peaches and prunes.

Apple scab got off to a good start during a 72-hour wet period 27-29 April. At this time apple buds were green-tipped and primary ascospore discharge was recorded during the rain period. The fact that much of the infection recorded on the fruit at harvest was sepal infection suggested that it occurred at this period. Primary scab lesions were first observed on 21 May. Secondary lesions were present on 4 June and fruit infections on unsprayed trees on 8 June. Rainfall was excessive in both July and August. In August particularly scab was actively spreading to terminal growth and late scab lesions developed on the fruit. Pin-point scab is expected to develop in storage.

Powdery mildew was extremely heavy in the laboratory orchard. First observed on 15 May it caused marked delay in growth of terminals infected in 1955 and greatly stunted and weakened infected fruit buds. Such clusters failed to open. The mildew developed rapidly to overrun the terminal leaf growth and continued in epidemic proportions all summer. In the drier, warmer season of 1955 mildew was quite prevalent but not nearly as general and severe as in 1956.

On stone fruits the brown rot situation at the blossom stage was of particular interest. Apothecia were first observed on 14 May following a succession of wet days. On 15-16 May a 13-hr. wet period occurred when trees

were in partial to full bloom. This was considered a critical infection period. The weather turned quite cool and the infection progressed slowly. On 21-22 May a shorter infection period occurred but accompanied by higher temperatures. By 21-22 May much of the infection had progressed to form twig cankers and caused die-back. Sporulation on blighted blossoms and cankered twigs became heavy. Infection of apricot bloom was specially common. In the orchards rot on developing fruit was more common than usual because of wet weather in July and August and increased insect damage. Conditions were very favorable for rot development and abundant sporulation; continued damp weather and weathering of spray residues by rain were factors contributing to the prevalence of rot in the harvested fruit of early and mid-season peach varieties. It was a season in which the value of the pre-harvest or pre-pick spray applications was clearly evident.

Heat spot and drought spot of Italian prunes was a widespread disorder. Unexpectedly the disease was very prevalent in a season when neither heat nor drought conditions existed to any marked degree. However, reports of its occurrence were received early in August following one of the few times during the summer when the temperature reached 88°F. and the weather had been dry for 10 days. This was broken by a week-end of rain. A light crop may also have contributed to the prevalence of heat spot.

Leaf spot was epidemic on sour and sweet cherries in the Niagara peninsula and on sour cherries in other areas. In the peninsula the disease was well controlled until after harvest. At this time with frequent rain in August and a relaxation in the spray schedule the disease spread rapidly with the result that trees were prematurely defoliated throughout the district.

The mildews of grape were present throughout the area. Downy mildew destroyed many fruit clusters of Fredonia and continued to spread in the post-bloom period with the continued wet weather and heavy vine growth. On Agawam downy mildew became serious in the late season, suddenly becoming epidemic on unprotected leaves over a wet week-end, 4-6 Aug.

Powdery mildew on grapes was prevalent in the late season and caused much shelling of fruit on some susceptible varieties (Seneca, Lincoln).

Fire blight of pears was destructive in vigorously growing Bartlett, Clapp's Favorite and Bosc varieties. Temperature and rainfall during bloom period is very important in the blossom blight phase of the disease.

May 30-31, with rain and a temperature of 65-75°F. was the one period in which conditions were favorable. At St. Catharines, this period came at the latter end of the bloom period but in the western area of the peninsula where the disease was more serious it coincided with full bloom or an earlier stage. The advance from the blossom blight to spur, terminal-twig, and branch

blight stages took place with the warm, rainy weather in early July. Exudates were heavy at this time and a heavy driving rain on 20 July washed the bacteria to new areas and spattered them on neighboring trees; it marked the period of extensive spread. Rains served to keep trees in a succulent susceptible condition and the advance of the infection in the trees was rapid and destructive. Continued wet weather in August kept the disease active much later than usual.

The wet season favored an outbreak of anthracnose on raspberry. Plantings of Taylor were seen where the cane growth was white with lesions extending to the tip leaves. Infection was common on foliage, petioles, fruit-stems and fruit. Abundant rain and the moderate temperatures prevailing in July and August along with strong heavy cane growth and a lack of protection by sprays contributed to heavy anthracnose infection (G. C. Chamberlain).

Weather conditions were very favorable for plant disease development in s. w. Que. in 1956. Over 3 in. of rain fell each month spread over 12-13 days in May, June and July. The season was also unusually late. For instance the first spray on apples applied after bud burst was not made until 15 May, fully 2 1/2 weeks later than usual. The late season adversely affected cereals and vegetable crops and the humid weather favored the development of apple scab, late blight of potatoes, pea root rot and club root of crucifers (L. Cinq-Mars).

In general, the growing season of 1956 was unfavorable for disease development in e. Quebec. The two most important factors responsible for checking the development of pathogens were temperature and humidity. Temperatures were relatively low even in July and August when the average maximum and minimum temperatures recorded were 71-73°F. and 49-52°F. respectively. Precipitation was also below the average from May to September except for June when it was about normal.

Apple scab infection was mod. in unsprayed orchards and easily checked in those under regular spray schedule. Vegetable diseases of economic importance were due to improper water relations and low temperatures. On tomatoes, losses were due to blossom-end rot and fruit cracking. In general, fruit ripening was much delayed by low temperatures. Sweet corn, in most cases, did not reach maturity before the first white frost which was recorded on 26 Sept. on low lands at Ste. Anne de la Pocatiere. Other diseases observed such as anthracnose and bacterial blight of beans, early and late blight, anthracnose, and Phoma rot of tomatoes appeared only as traces throughout Que. except in the Montreal district and Baie des Chaleurs where late blight especially was more prevalent (L. J. Coulombe).

Late blight was first observed in Que. about 25 July in the Montreal district. It was also reported at that time mostly in Irish Cobbler in Laval, Chateauguay and Napierville counties. However, weather conditions in July

were unfavorable for its spread. Temperatures also remained low throughout August, but in western Que. rainfall was very abundant and late blight could be found by mid-August in small amounts in many western counties and along the Bay of Chaleurs.

There was some spread of late blight to other parts of Quebec in the last 15 days of August and the 1st week of September and the disease was reported to be severe in w. Quebec and the Bay of Chaleurs. A light frost on 10 Sept. killed potato foliage in many districts and checked the disease. Severe frost occurred on 20 and 26 Sept. At most only traces of tuber rot were reported (H. Genereux).

In general, the winter was milder than usual at Fredericton, N.B. with much precipitation, both rain and snow, in January. However March was colder than usual and 30 in. of snow fell in the month.

Potato planting was general in the Upper Saint John River Valley in the 1st 2 weeks of May, but unfavorable weather postponed further planting until early June. Frosts in late May and the 1st week in June severely injured vegetable crops above ground and much of the vegetable seed already planted rotted during this wet cold spell. However grass and clover crops made a good start only to mature slowly during the cool wet summer.

The first ascospore discharge of the apple scab fungus occurred on 3 May. It and later spore discharges were light.

The weather from June to September was wet and cool, the temperature being 2-6° below the monthly daily mean. Strawberry, raspberry and blueberry crops were good, but cucurbit crops were failures. The harvested crop of corn and tomatoes was small. A bumper, relatively clean grain crop was harvested. The potato crop was average and it was sev. damaged by frost before all the tubers were lifted (J.L. Howatt).

The winter of 1955-56 was one of heavy and prolonged snowfall in N.S. A total fall of 162.8 in. fell at Kentville from Nov. 1955 to April 1956 inclusive, compared to a 40-year average of 86.9 inches. The mean temperature for May 1956 was nearly 4 degrees below the 40-year mean and vegetation was late. June was close to average except for a deficiency of 1.5 inches in total rainfall. July, August and September were approximately 3 degrees below the 40-year temperature mean and from July to October 7.56 in. of rain fell compared to an average of 14.08 in. for these months.

There were several infection periods for fungi such as Venturia, Botrytis, and Phytophthora but there were also many favorable periods for control operations so that the loss from disease in most crops was not serious. Early frosts in the autumn caused more damage to some crops than disease in 1956.

These weather conditions caused a loss of cucumbers for the pickling industry and a reduction in the apple crop. Apples were of small size and reduced eating quality. Many other crops were reduced in size and quality but such cool weather crops as peas were exceptionally good (J. F. Hockey).

There were no serious epidemics or unusual outbreaks of disease during 1956 in P. E. I. The weather picture for the whole year did not deviate from the 47-year average; however, there were a number of notable variations when the weather factors are considered on a monthly basis. January was unusual in all respects. The mean temperature for the month was 28.9°F. compared with 19.2°F., the 47-year average; total precipitation 8.32 in. compared to 4.20; rain, 5.27 in. compared to 1.56; sunshine 31.9 hours compared to an average 85.5. There was very little frost penetration during the winter. Farmers were able to plow in January and harvest fields of turnips which had been snowed under since early November. Potatoes were harvested in May in a sound condition after being in the ground all winter. As a result of a lack of frost many volunteer potato and turnip plants occurred in grain fields. Where potatoes were planted for the second consecutive year in the same field, mixed varieties was a problem.

Late blight was first observed in P. E. I. on 19 July, almost 2 weeks earlier than in 1955; however, the cold dry season prevented it from gaining serious headway. The total precipitation for August, September and October 1956 was 5.13 inches compared with 11.26 average. July, August and September had below average temperatures and September had considerably below average sunshine. This meant a very late grain harvest. The Septoria disease of oats was of less importance on the susceptible varieties than the previous year. October was an ideal harvest month with only 1.25 inches of rain compared to the average 4.05, and 172.5 hours sunshine compared to 132.0.

Weather conditions were favorable for apple scab and it was of considerably more importance than the previous year. An isolated case of Sclerotinia wilt in snap beans occurred early in August; cold damp weather and heavy foliage favored disease development. A combination of weather and soil factors produced the most serious molybdenum deficiency symptoms in cauliflowers seen in this province to date. Considerable club root developed in some of the June-planted turnips; a fact that could be correlated with high soil moisture in that month (J. E. Campbell).

The total precipitation in snow and rain in March and April was about normal for Nfld. Rainfall during the growing season, however, was above normal, especially in May and June (2 in.) and in September (3 in.). Temperatures during the same period were below normal and freezing temperatures were recorded at St. John's on 9 and 20 June and again by 9 Oct.

Seeding was not as late as in 1955 on the East Coast, but because of the late frost in the spring, many farmers in the Conception Bay area were forced to reseed their rapeseed and turnip fields.

Seeding was delayed considerably on the West Coast by cold wet weather and it was not completed until mid-June. A frost on 17 Sept. completely defoliated the potato crop in this area and yields were seriously reduced at the government-sponsored settlement of Cormac.

Weather conditions were again ideal on the East Coast for the spread of many diseases, particularly potato wart and late blight (G. C. Morgan).