The Weather and Its Influence on Plant Disease

The first general frost on the lower mainland of B.C. occurred 28 Oct., 1956, killing cucurbits, dahlias and some other tender plants. Herbaceous ornamentals in partly sheltered gardens were not killed back until 4 Dec. when a few inches of snow fell, the temperature dropping to 13°F. two days later. December was cool and rainy, followed by a colder, snowier January than normal. February, March and April were cloudy and cool with normal rainfall. Snowfall in February, however, was above normal. The last frost occurred in March.

May and June were fine and warmer than usual. A rainy period occurred near the end of June, delaying the ripening of strawberries and raspberries. Summer temperatures were normal with the rainfall in July above normal. The cool, wet conditions favored a heavy attack of rust on pole beans and the progress of an undetermined root rot of canning peas. August and September were warm and sunny. No frosts occurred until mid-October. October had more sun and less rain than usual (H.N.W. Toms).

The 1956-57 winter in the B.C. Interior provided an unusually long period of low temperatures, causing Okanagan Lake to freeze over. There were no sudden temperature drops in the fall or spring and no extremely low temperatures during the winter, hence, no significant tree damage was sustained.

The month of April and the first half of May were unusually warm and dry. Between mid-May and mid-June there were several prolonged wet periods. Temperatures were considerably below normal in July and early August. Late August and the entire month of September were warm and unusually dry, the total rainfall for September at Summerland being only 0.01 in. October and November rainfall were below normal, and temperatures were close to the 40-year average.

The effects of these weather conditions have been the following: (1) blossom infection by fire blight occurred in scattered districts; (2) the May rains favored foliage and fruit scab in the northern districts; June rains favored the development of foliage scab in some southern districts, but with the onset of dry weather in early fall there was less pin point scab than might have been expected; (4) the uneven and unpredictable ripening of peaches and Bartlett pears, with an unusually high incidence of Rhizopus rots, caused considerable trouble in canneries; (5) fruit size in most apple varieties was abnormally large; (6) early entry of trees into dormancy, and the absence of severe temperatures in October and November, have ensured that trees suffered no fall injury; (7) many orchards have gone into the winter with dry soil, which will allow deep frost penetration if extreme winter temperatures are experienced.

Tomato yields were the best in a number of years, and all vegetable crops grew satisfactorily. There was general occurrence of Verticillium wilt in tomato, probably favored by the subnormal temperatures in June, July and August.

Although onions were harvested under ideal dry weather conditions, 25-50% of the stored bulbs in some locations became infected with Botrytis neck-rot. It appears probable that infection occurred when rains fell shortly before the bulbs were ready for harvest (D.L. McIntosh).

In the Kootenays May and early June were dry through the pre-pink, pink and calyx periods. Between mid-June and mid-July there were several prolonged wet periods during which scab developed in unsprayed orchards. The disease, however, was controlled without difficulty in orchards where sprays were applied. The fall weather was mainly mild and dry. A cold period in late November caused some loss of unpicked late apple varieties (J.M. Wilks).

Winter temperatures and precipitation were about normal in s. Alta. permitting good survival of winter wheat and herbaceous perennials. Precipitation was, however, below normal in May and early June causing uneven emergence of spring sown dry-land crops. July, August, and September also provided sub-normal rainfall contributing materially to reduced foliage diseases in both the cereals and forage crops.

In the Edmonton district in 1957 it was very dry until the first of August, when some relief occurred. These drought conditions were not conducive to the development of plant diseases. All diseases except the smuts were, therefore, much less prominent than they have been during the last several years when rainfall was normal or above normal. There was, in late crops, some development of leaf diseases during August and early September. The Peace River district had a wet summer (W.P. Campbell).

Conditions in Sask. at seedling time were satisfactory to start the crops but reserve moisture supplies were limited in many areas. Throughout the growing season no general soaking rains occurred and the development of the grains was dependent on the receipt of local showers. This resulted in a considerable variability between districts and even between fields in the same district. Grains seeded on summerfallow held up fairly well under the extreme drought conditions while crops on stubble suffered sev. deterioration. Temperatures in July were above normal and rainfall during the growing season was as much as 60% below normal. Hail damage during the season was quite heavy and extensive with losses at near record levels. Drought, however, was the chief cause of lower crop yields in many areas of Sask. Diseases such as rust and leaf spots were much less common and less sev. than in previous years, but virus diseases, particularly yellows, flourished on flax, tomatoes, potatoes and ornamentals (H.W. Mead, T.C. Vanterpool).

Mean temperatures throughout the agricultural areas of Man. were about 1° above normal for April and 3° below normal for May, while precipitation was slightly above normal for April and slightly below normal for May. As a result, cereal crops were sown earlier in 1957 than for several years past, giving these crops a better chance to escape rust damage. The prevailing winds at Winnipeg were n.w. for April and n.e. for May, the normal for both months being north.

Much below normal temperatures prevailed during all of June. At Winnipeg the mean temperature for the month was 3.5° below normal. Precipitation was above normal in most of the agricultural areas of the province. In many parts of Man. precipitation it was 1 to 2 in. above normal. The prevailing winds in June at Winnipeg were north, the normal being south. There were no extended periods during May or June with strong persistent southerly winds. Probably owing to the persistently northerly wind during May and June, air-borne rust inoculum was scarcer than usual over Man. and e. Sask. during these two months. All cereal rusts were later than usual in becoming established in Western Canada. This was, no doubt, an important factor in determining the course of rust development in the prairie areas in 1957.

Temperatures were abnormally high during July. At Winnipeg the mean temperature, at 72.3°, was the third highest average July temperature on record. Measurable precipitation occurred on 10 days in July with a total rainfall of 1.68 in., 1.2 in below normal. South winds prevailed over the eastern prairie area during the month. The abnormally high temperatures and low precipitation greatly hastened crop maturity. The premature ripening of cereals restricted rust development.

Temperatures for August were generally slightly above normal throughout Man. and precipitation was considerably above normal (B. Peturson).

The unusual feature of the weather in Essex Co., Ont. in 1957 was the cool, wet summer. Between 1 April and 30 Sept., 28 inches of precipitation were recorded at Harrow. This is approximately 1 in. less than the yearly average. Much of the precipitation occurred in the form of torrential rains during the growing season. The cloudy, wet, cool weather in May and early June favored root rot of cucurbits set in the field under paper. The high greenhouse humidities prevailing during this period favored the development of tomato leaf mold and Botrytis infections in cucumbers, tomatoes and lettuce. Cool, wet weather in August and September provided ideal conditions for the sporulation and spread of infection by the late blight fungus. Rainy periods of two and three days duration prevented the operation of spraying equipment during critical infection periods. The damp weather in late August and early September led to serious outbreaks of brown rot in tree fruit crops (C.D. McKeen).

There was a sharp frost in the Niagara peninsula on 16 May. The minimum grass temperature at St. Catharines was 25°F. and the air temperature was 31°. Considerable damage was sustained by strawberries in full bloom and young tender shoots of grapes. Tree fruits in some locations suffered damage in the form of russet areas on the fruit. The entire crop of one orchard of Astrachan apples was ruined by heavy roughened russet bands. In one pear orchard 50% of the fruit showed frost bands. A high percentage of prunes in many orchards were russeted due to cold weather checking. Internal necrosis and excessive fruit drop in one orchard of Burbank plums was attributed to the low temperature in the early stages of fruit development. This trouble did not occur in a second orchard nearer Lake Ontario. The likely occurrence of frost was forecast by the weather bureau and growers resorted to smudges, sprayers, irrigation lines and airplanes to protect such crops as strawberries and grapes. The use of sprayers proved the most successful.

The week of 9-15 May was almost continually wet. This coincided with the full bloom period of apples and proved very critical for primary scab infection. Ascospore discharge was active and the peak discharge was recorded 11 May. Primary infection was observed 21 May and was prevalent by the end of the month.

Symptom expression of the cherry yellows virus was unusually severe in 1957 and was related to warm weather in the pre bloom period and the cool temperatures at petal fall.

Heavy rains, fog, and high humidity on the weekend of 20-21 Sept. were followed by a serious development of brown rot and Rhizopus rot in Elberta peaches in common storage, in transit, and at market outlets. Losses of 50-60% were common. Losses were much less where the fruit remained on the trees over this weekend (G.C. Chamberlain).

In s.w. Que. frost was the weather factor having the greatest influence on crops and causing the heaviest losses in 1957. Fruit trees in low locations were sev. damaged when temperatures dropped to -40°F between 14-16 Jan. Buds and branches were killed or sev. injured; there was a sparse and delayed bloom; crops were reduced, and many injured trees are unlikely to survive. Silver leaf was a common symptom following the frost damage and was frequently observed in the spring. During the summer and fall many frost damaged trees oozed from wounds, cuts and openings on trunks and branches. Although pear trees were all heavily damaged, some varieties of apples showed a high degree of resistance to frost damage. Cortland was one of the most severely affected varieties.

Another frost caused damage in May. Temperatures of 30°F. on 16 May and 22°F. on 17 May occurred when most apple trees were in the early bloom period and young vegetable plants had just been transplanted

into the field. Many young plants were killed necessitating replacement and a further reduction in the fruit crop was suffered. Orchards on hill slopes with adequate air drainage escaped frost injury, but those in the valleys had practically no crop in 1957. Several species of wild trees, such as Amelanchier, Crataegus and Prunus were also affected and did not bear fruit in 1957.

The weather was cool and humid in May, June and July. At Rougemont, the rainfall for the three months was 2.85, 3.80, and 4.30 in. respectively. Most of the diseases caused by parasitic fungi were favored by these conditions. Fortunately August, though cool, was very dry with a total rainfall of only 0.2 in. The dry weather checked many of the diseases or made control measures effective in the latter part of the season. The abrupt change in weather conditions, however, favored physiological disorders in several crops (L. Cinq-Mars).

Only 4 in. of rain and approximately 5 feet of snow fell in the winter months of January, February and March at Fredericton, N.B. During this period the soil had only a light covering of snow which disappeared during the third week of March. Partially as a consequence of this light snow blanket considerable killing of clovers and alfalfa occurred. Seeding began about 10 May which is an average date for the locality. During the latter part of May and the months of June and July frequent, timely rains occurred ensuring an average hay and berry crop.

Ascospores of the apple scab fungus matured early in the season but the first spore discharge was delayed until 15 May, after which date three more discharges were recorded. Scab was controlled in a satisfactory manner in orchards that were sprayed frequently and well, otherwise much early and considerable late pin-point scab developed, the latter because of the saturated atmospheric conditions which prevailed almost nightly during Aug. and Sept.

In low-lying areas along the lower St. John River cucumber scab was destructive and considerable late blight developed in late-harvested tomato fruit.

The growing season was very favorable for the expression of potato ring rot symptoms and as a consequence many new sources were located. The harvesting season was dry and frost free and excellent crops of grain and bumper, relatively clean crops of potatoes were realized (J.L. Howatt).

Although the precipitation in P.E.I. for the July-Sept. period was 2.71 in. below the 36-year average, late blight of potato was a serious problem in 1957. The first lesions were found on plants in a cull pile on 17 July, and on 22 July scattered lesions were found in a low area of a field of Irish Cobbler at Augustine Cove. The attack was soon general.

The initial outbreak and spread of the epiphytotic were forecast from a study of the rain-temperature-humidity pattern composed of data collected at five points in the province. July was not a wet month, but there were five successive days with showers beginning on the 13th of the month. At this time a 4-week period of high humdiity occurred during which late blight became rampant, moved into all areas, and seriously threatened unsprayed fields of which the Irish Cobbler composed a considerable portion. Proper attention to the application of fungicides, however, resulted in excellent control. This danger period was followed by 3 weeks with little rain and low relative humidities.

The weeks of 2, 9, and 16 Sept. produced ideal weather for late blight with considerable rain and high relative humidities. Again, the disease moved rapidly but little loss was experienced by growers who followed a proper spray schedule.

Losses from late blight tuber rot, except in unsprayed or rarely sprayed fields, were light in 1957. Most tuber infection occurred during the week of 2 Sept., long before harvest. Because of the early inoculation, almost all the diseased tubers were discernible at digging time and were discarded by the pickers (L.C. Callbeck).

In Nova Scotia a severe freeze in February eliminated all prospects for peach and sweet cherry crops in all but the Digby basin district. Many peach trees were severely killed back. Unmulched strawberries also suffered severe winter injury in many areas of the province.

The spring and summer weather in the Annapolis Valley brought a soil moisture deficit to wells, lakes and streams. Crop growth, however, was favored by timely rains and yields of apples and potatoes were above anticipation. Apple scab was favored by several severe infection periods throughout the summer and unsprayed orchards were defoliated and the crop severely damaged before harvest. Late blight of potatoes struck early but did not spread appreciably until well into August. Losses have not been greater than usual from this source. There was no general frost in the area until 22 Oct., but isolated districts experienced frosts in Sept. (J.F. Hockey).

Precipitation in Nfld. during January, February and March was 5 in. above normal while that during April, May and June was more than 6 in. below normal and approximately 9 in. below the total precipitation recorded during the same three months in 1956. Precipitation during July and August was 5.88 in. as compared to the normal of 7.87 in. and to 10.46 in. recorded during the same period in 1956. Temperatures during the winter months were much lower than normal and reached record lows on several occasions. Mean temperatures

during July and August were approximately 10° below the normal means for this 2-month period.

Even though precipitation was low during the growing season, potato wart infection was severe and late blight infection of the foliage was moderate to severe in many fields. Statistics contained in the Meteorological Reports (Torbay) show that rain occurred on as many days in July and August as during the same period in 1956 and the average daily precipitation, although lower than in 1956, was as high as the average for the past seven years. Precipitation readings taken at the St. John's Experimental Farm show that most of the rainfall recorded during July and August occurred during the period 5 p.m. to 8 a.m. (on 16 dates) while only on four days did rainfall occur during the period 8 a.m. to 5 p.m. On five occasions rainfall occurred during the day and night.

Temperatures during July and August this year averaged 10° above those during the same period in 1956, but they were low at night; sunshine was about normal; humidity was high; evaporation was low and, therefore, the high atmospheric moisture, resulting from these climatic conditions, prevented any serious reduction of the soil moisture by transpiration of the root crops.

Infection of root crops by certain diseases such as potato wart and late blight are influenced more in Newfoundland soils by periodic rainfalls than by excessive rainfalls at long intervals.

The growing season was much longer than normal and a killing frost did not occur on the east coast of Nfld. until late in October. Killing frost usually occurs during last week of September or the first week in October. (G.C. Morgan).