The Weather and its Influence on Plant Disease

The winter of 1959-60 in the coastal areas of B.C. was again moderate with a minimum temperature at the seacoast of 19°F. Snowfall in January and March was above normal, but no snow fell in February. Cool, wet conditions developed in the last week of March and continued, almost without interruption, throughout April and May. This condition may have been responsible for an unusually large amount of potato seed-piece decay and planting of many crops was seriously delayed. The last spring frost was recorded on 19 March.

June was cooler than usual but rainfall was much below normal and drought conditions prevailed through July and August. Wet weather in September was responsible for the appearance of some late blight in commercial potato fields. Wet conditions prevailed throughout October and the first killing frost was experienced on 2 November (H. N. W. Toms, N. W. Mnyers).

The winter in the B.C. Interior was abnormally dry and temperatures fell below 10°F only once. This three-day period, however, was in mid-November and caused minor losses of buds of cherries and Delicious apples and serious injury to a number of strawberry plantings in the Shuswap and Kootenay districts.

In the period 19 Nov., 1959 to 18 Nov., 1960 the total precipitation at Summerland was only 6.85 in., well below the 39-year average of 10.92 in. Unusually high day-time temperatures in March and early April were followed by dangerously cold weather in late April and during several periods in May. In several districts a small proportion of cherry, prune and apple fruit buds were injured.

Total heat units between bloom and harvest at Summerland were the third highest in 18 years despite 2 periods, 11-31 May and 21 Aug. -10 Sept. in which heat units were half the long-term average. The month of July broke all records for heat units, hours of sunshine and lack of rainfall.

In the Okanagan Valley one minimal apple scab infection period occurred 20-22 May. By mid-June there were fairly general, but mild, leaf and fruit infections throughout the northern part of the Valley and in scattered orchards in the southern districts. In the Kootenays a possible infection period was recorded on 5-6 May and longer infection periods occurred later in the month. Unsprayed orchards developed a high percentage of scab.

Powdery mildew of apples was more severe than in any recent season. It has been increasing steadily since 1955-56, following a succession of relatively mild winters. Fire blight was at a very low level and low temperatures during the bloom period prevented blossom infection. Cool, wet weather during bloom in the Kootenays resulted in heavy infections of brown rot blossom blight in cherries. Conditions were dry before harvest, however, and little fruit rot developed.

Coryneum blight was unusually severe on peach and apricot fruits in the Kootenays and the Okanagan Valley, Several light rains shortly after bloom sufficed to provide fruit infection conditions. Dry weather during the

apple harvest period appeared to have reduced the incidence of bull's-eye rot. Damp weather at peach harvest, on the other hand, contributed to a high incidence of Rhizopus rot in that crop.

There was additional evidence that cool weather in the early part of the season favors symptom expression of apple virus diseases. Leaf pucker symptoms were especially severe on leaves that opened during cool periods. Ring russetting and fruit distortion symptoms were more severe than in any season since these diseases were first observed,

The cool, early season temperatures favored the development of onion smut, although most of the increase can be attributed to spreading infection of soils. Although conditions were favorable for Verticillium wilt of tomatoes, little of the disease developed (M. F. Welsh).

A cool, wet May in northern Alberta favored the development of ergot ascocarps and the infection of early-heading grasses, However, by early July the weather turned hot and remained that way during the flowering of cereals and ergot incidence in these crops was low. The high temperatures seemed to have curtailed scald infections in most areas but favored net blotch to the point where this disease became the most important one on barley. Warm, damp weather in August permitted early blight of potato and tomato to become quite prevalent. Moist conditions early in the season also favored the development of downy mildew of alfalfa (W.P. Campbell). Dry and hot conditions during the summer months in the Lethbridge area were unfavorable for plant disease development, particularly foliage diseases (J.B. Lebeau).

Weather conditions in Saskatchewan in May and June permitted the early development of leaf spotting diseases but continuing dry weather in July and August prevented their further development. As a result of the dry weather, most crops matured quickly and were relatively free of disease. Light showers and frequent dews in the north-east part of the province encouraged leaf spot diseases. Common root rots of cereals were increased by the dry weather (H. W. Mead).

Spring in Manitoba began with abundant soil moisture derived from the heavy rainfall of the autumn of 1959. Seeding began late and was further delayed by a snowfall on 25-26 April, but it became general in early May and emergence and early growth of cereals were generally good. Warm, sunny weather arrived late in June and continued into August, resulting in rapid plant growth. High temperatures in July caused a drain on moisture reserves but moderate to heavy rains in early August made possible an average grain crop which was largely harvested by mid-September.

Late seeding and the lushness of early cereal growth appeared to expose the crop to the threat of rust infection, especially in view of the considerable leaf rust and stem rust infection in eastern Kansas and Nebraska in June, Heavy spore showers of both rusts occurred over Manitoba on 24-27 June, However, the warm, dry weather of July prevented any considerable infection. Stem rust infection broke out on susceptible varieties of barley and oats following the rains of early August, but too late in the season to cause appreciable damage.

The same weather factors that prevented the development of severe rust infection also militated against the spread of mildews of cereals, of which only trace infection was found on barley. It is probable that the lightness of Septoria infection on wheat and barley was due to the same causes, The development of net blotch on barley, which was light to moderate in southern Manitoba but moderate to severe in the north-west areas, was less affected by the July drought.

The occurrence of yellow dwarf of barley and red leaf of oats was related to the development of aphid infestations which, in turn, were influenced by weather conditions, Lush growth, particularly of barley in May and June, combined with above normal temperature and humidity, encouraged aphid infestation which continued well into July but was eventually checked by the hot, dry weather. Yellow dwarf of barley was reported in several places in July but it did not appear to spread after the effect of the drought became manifest.

An unusual occurrence was the development of what farmers called "green rust" on standing and swathed grain after the rainfalls in early August. The condition was caused by the abundant growth of Cladosporium and Alternaria which were favored by ample moisture and premature ripening of the plants by hot weather leaving a considerable amount of untranslocated carbohydrates in leaves and stems and thereby creating a favorable substrate for fungus growth (T. Johnson).

The amount of sunshine recorded in southwestern Ontario in January, February and March was only 60% of the 40-year average. Reduced sunshine caused poor setting of tomatoes on the first trusses of the greenhouse crop and resulted in a below average yield in many cucumber crops.

A prolonged period of cool weather without sunshine resulted in heavy losses of cucumbers and melon plants set under paper in the Harrow-Leamington area. Reduction in stands caused by Pythium root rot varied from 10-95%. Many fields were reset and others planted to other crops. Scab reached serious proportions on Burpee hybrid field-grown cucumbers by mid-July. Minimum ground temperatures in the low fifties were recorded on consecutive nights from 4-10 July, These low temperatures predispose cucumbers to attack by scab.

Verticillium wilt was epidemic in 1960. It was found affecting all the usual susceptible woody and herbaceous hosts, Environmental conditions conducive to Verticillium wilt epidemics, as reported by McKeen, Can. J. Res, 21:95-117, 1943 appear to have been met during the late epring and early summer. Dry weather set in after 8 August and favored the harvesting of one of the largest tomato crops on record in Essex and Kent counties. Fruit cracking was virtually non-existent and anthracnose and foliage diseases were easily controlled (C. D. McKeen).

The 1960 season in the Niagara Peninsula, Ontario was featured by wet weather in May and June and hot, dry conditions in August and September. Rainfall was excessive in May and there were five apple scab infection periods. Primary infections were observed on 17 May and were quite general by 24 May, Rain on 30-31 May resulted in much spread of scab and by 20 June unsprayed

trees were heavily infected. Another important scab infection period occurred 14-17 June. Showery weather of 7-13 May seriously affected the set of sweet cherries aiid favored the development of brown rot on the green fruit. This infection was unusually prevalent and destructive. Another showery period on 16-18 May with maximum temperatures above 70°F in the latter part of the pear bloom period provided conditions for the development of fire blight. Infected spurs were observed on 7 June and spread of infection occurred with the rains of 14-17 June. Pear scab was serious in several orchards of Bsrtlett and Flemish Beauty at this time. The same period of rain was important in the development of cherry leaf spot which became a serious factor in many orchards early in July. The excessive soil moisture in May resulted in a poor condition of peach foliage and there were instances of collar rot of apple and pear trees in poorly drained locations. The June rains also provided particularly favorable conditions for downy mildew of grapes as they occurred before protective sprays were applied. Wet soil conditions also interfered with spray practices and the mildew continued to be a threat throught the season.

Dry weather, high temperatures, heavy dews and continued high relative humidity in late August and September favored a widespread outbreak of powdery mildew on grapes. The dry weather permitted the harvest of stone fruits with a minimum of brown rot and of the apple crop without exposure to late-season scab infections. The apple crop suffered some damage in a hail storm on 19 June (G.C. Chamberlain).

The summer was dry in the lower St. Lawrence region. Only in June was precipitation near normal and abundant rains early in the month accelerated the development of all crops and favored the initiation of apple scab which was well established by the end of-the month. Willow blight was also quite prevalent by the end of June.

Dry weather in July and August slowed the development of foliage diseases but promoted disorders such as blossom-end rot of tomatoes. Cucumber scab began to develop but was checked by the onset of drought (L. J. Coulombe).

The mean temperature during May at Fredericton, New Brunswick was the highest on record and the precipitation was well above the 47-year average, The first ascospore discharge of the apple scab organism took place 10 May and continued until **14 May.** Many orchards were infected but drier weather in June minimized the threat. Temperatures in June wexe also above average and with the drier weather seedling disorders of the wire stem type were noted in peppers and broccolii.

July temperatures were below average but precipitation was above normal. Late blight was first reported on 10 July but with the onset of drier weather in August it did not progress from the foci of July infections. July weather conditions were also favorable for the development of cucumber scab and severe outbreaks occurred in the Fredericton area,

September was both warmer and drier than normal, Early blight of both potato and tomato and Alternaria leaf blight of cucumber were unusually severe in the Fredericton area. Leaf hopper damage to unsprayed potato plots

was excessive and aster yellows developed in carrots. Movement of aphids was apparently also excessive during the summer and many solanaceous ornamentals were found to be infected with potato virus Y. Dry weather during the late growing season resulted in a virtual absence of late blight tuber rot in potatoes (K. M. Graham, S.F. Clarkson, J. Munro).

Apple scab infection periods in Nova Scotia in May and June were fairly numerous but July and August were very dry and scab infections were easy to control, No late scab was found (R.G. Ross). The July-September season of 1960 was the second driest on record in Prince Edward Island, Although late blight was first recorded on potatoes on 14 July, it failed to develop beyond a few trace infections. Exceptionally high fall temperatures were, in part, responsible for a serious incidence of Fusarium dry rot in potatoee in Prince Edward Island (L. C. Callbeck).