The Weather and Its Influence on Plant Diseases

In the Coastal areas of British Columbia during 1941, the weather was characterized by a mild winter, a dry early spring and midsummer and a wet period in late summer and early fall.

The rainy weather in late summer and early fall, accompanied by relatively high temperatures, favoured the spread of some diseases of economic importance. This influence was particularly noticeable in late blight of potatoes, which became epidemic and caused heavy losses. In fact late blight appeared in areas where blight was previously unknown. Downy mildew of hops was similarly influenced. It was held in check by spraying during the dry mid-summer, but it became rampant on the cones at harvest during the rainy periods. Various vegetable-seed and fruit crops were also adversely affected by disease during the ripening period. In localized areas on Vancouver Island, Pythium ultimum did considerable damage to early harvested tubers in storage. As it is a high temperature organism, it developed rapidly during the prevailing hot weather.

In Alberta, the weather was not favourable for the development of most plant diseases until relatively late in the summer. It was a season of extremes and growing conditions were never uniformly satisfactory. The crops were sown late under rather dry conditions and their early growth was hastened by unusually warm weather. The general heavy rains which fell during the latter part of June temporarily checked crop deterioration, but came too late to save many of the early-sown stands. Under these conditions, browning root rot of cereals was prevalent, and often severe, in the brown soil areas centering on Drumheller. Primary stem and leaf rust infections appeared unusually early. Extremely hot, dry weather in late July, however, checked the development of rust and of other stem and foliage diseases. As a result, most of the crop was prematurely ripened and escaped damage from disease. Root rots, often masked by drought injury, were also apparently much less severe than usual. With the return of more normal temperature and moisture conditions in late August, the rusts and other diseases developed rapidly and severe infection occurred in late sown cereals, especially in the southern sections centering on Lethbridge. During September and October long periods of wet weather delayed harvesting operations and caused considerable deterioration and shattering.

The 1941 season in Saskatchewan was marked by extremes of temperature and moisture supply. May was cool and moisture fairly good, except in the south-west. Rains occurred in early June and were followed by frost which damaged wheat in some areas and its effects masked browning symptoms. Rising temperatures during June together with dry weather caused crop deterioration. Some stunting and weak growth were evident in summerfallow crops of wheat, indicating injury by browning which was accentuated by continued drought and hot weather. Rains at the end of June relieved the situation, but these were followed by hot winds and steadily rising temperature which reached 103°F. on July 20. Common root rot increased rapidly during this latter period and became prevalent and

moderate to severe. Stem rust appeared in very small amounts about July 10 and it did not develop to any extent in central and northern Sask. where it remained dry. In south-central and south-eastern Sask. rains provided good conditions for spread of rust, but very little was found because most of the acreage was sown to resistant wheat. Rust developed on susceptible varieties, however. Crops were relatively free of leaf spots. In the dry areas, the leaves were burnt during July and early August. This checked the development of leaf spot fungi.

The weather conditions prevailing in Manitoba are briefly discussed under stem rust of wheat.

The effect of the wet season of 1940 in the Niagara Peninsula, Ont., and the early frost of October 23, 1940, was apparent in an unusual amount of dead wood in peaches and the loss of young trees in heavier and poorer drained soils in the early season of 1941. Winter injury also occurred in grapes and other orchard fruits showed an unevenness of development associated with winter injury.

The weather during the growing season of 1941 was distinctly unfavourable for fungus and bacterial diseases. The season was early in development, ten days to two weeks in advance of the average. It was an excellent spring, providing ample opportunity for efficient protective spray applications. Most stone fruits were in full bloom early in May, during which time fair, cool weather prevailed. There was almost no blossom blight infection.

The month of May continued dry, the rainfall being 0.76 in. and moderately warm with a low mean relative humidity. Rains were light and of short duration, the weather clearing quickly afterwards. Thus there were no prolonged wet spells or fogs, as in 1940, to initiate primary infection. Primary ascospore discharge of the apple scab fungus occurred on April 20, and was followed by seven discharge periods in May during light showers, none of which were followed by sufficiently wet conditions to be critical for infection except on May 31. This rain (0.29 in.) was followed by some fog and relatively high humidity for two days; these conditions favoured primary scab infection, which was evident on June 20. This proved the only critical time during the ascospore discharge period. The heavier ascospore discharges previous to this time were not critical because of clearing weather following immediately after rains. Primary infection was extremely light and little further spread occurred.

Leaf spot of sour cherries, a disease epidemic in 1940, was practically absent in 1941 and of very minor importance. Primary ascospore discharge of the causal fungus occurred on May 16, and reached a peak during the precipitation of May 31 which, because of subsequent damp and fog, was considered critical for infection. However, little disease developed and this was thought to be the result not only of the advanced development of the host owing to the early season, but also because good weather and spraying conditions had permitted growers to effectively protect the trees.

The month of June was also dry, warm and unfavourable for disease development. The effect of the dry weather was serious on the strawberry crop. Root rot was reported more prevalent and its effect along with the general drought, reduced the crop 60-75%. Dry weather affected orchard trees planted on shallow soils, especially apples which lacked growth and showed a marked paling and yellowing of the foliage. The dry weather was also considered a factor in the prevalence of "physiological" yellow leaf and drop in sour cherry trees, a suspected form of spray injury more pronounced where copper sprays, especially Bordeaux, were used or where sulphur and copper were used on the same trees. Dry weather apparently brought about a chlorosis of grape and accentuated the effect of soil deficiencies.

The prolonged dry spell was broken in early July by a severe storm accompanied by hail in a number of local districts, which caused severe damage to grapes, cherries, peaches and apples. Fortunately this rain was followed by fair, cool weather which prevented the splitting of maturing sweet cherries which are so subject to this injury, followed by brown rot and decay by other fungi. With no damp murky or foggy weather during harvest of the cherry crop, the fruit was handled free from brown rot.

Harvest periods for peaches and plums were free from wet weather and brown rot was a very minor factor. Light gales in early September caused loss to apple growers in heavy windfall and bruising. A heavy gale on September 25 caused damage to the grape, late apple and pear crops and many orchard trees suffered breakages.

Weather conditions during the growing season were in general favourable to the various crops in eastern Quebec. However there were two periods, one in May and the other covering the last week of July and the first half of August, during which various crops suffered from drought.

The excessively dry weather in May and early June delayed ascospore liberation and consequently early scab infection. The apple crop was almost free from scab. Unsprayed orchards did not suffer to any extent from this disease. However, late varieties showed some infection towards the end of September on account of the frequent rains during the first half of the month.

Late blight of potatoes was observed rather late in the province. In eastern Quebec it was not until Sept. 16 that the disease was noticed. At digging time the disease was occasionally observed on the foliage but it did not cause any damage. However, in unsprayed fields the crop suffered from tuber rot and the loss was heavier as digging was delayed.

Cereal rusts were much less severe than in 1940, owing to the dry spell in July and August. On certain dry soils the crop matured so rapidly that diseases were unable to cause any infection.

Bacterial blight of beans was favoured by hot moist weather conditions. The disease was severe in fields situated between hills and surrounded by trees while open fields sowed with seed obtained from the same source were practically free from blight.

In New Brunswick, the winter of 1941 was free from extremes of any kind. Sub-zero temperatures were registered for 20 days during the months of January, February, and March. A light to moderate blanket of snow covered the ground until the first week of April, after which it gradually melted away during a period of fine, sunny weather. The Saint John River cleared of ice on April 15, and the frost was out of the ground by the end of the month.

Clovers and grasses wintered well, as also orchard trees, strawberries, and perennial plants. There was, however, considerable tip killing in raspberries.

The first half of May was clear, but cool and dry, and many fields were worked and planted during this period. However, cold rainy weather predominated during the last few weeks of the month, delaying considerably seeding operations in many sections. During the month of June and the first two weeks of July, the weather remained cool and dry. These conditions adversely affected the growth of hoed and grain crops. The latter half of July was warm and crops made excellent growth.

Considerable rain fell during August and the first half of September. The average temperature during this period was 4°F. below the 28 year average. These conditions delayed the ripening and harvesting of grain, particularly in the eastern section of the province. This period was unfavourable for the ripening of squash, beans, tomatoes and soybeans. Late blight infection of potatoes became general, but it did not reach epidemic proportions due to the early maturation of the vines and sporadic, dry, cool weather periods, all of which tended to reduce sporulation to a minimum.

Cold rain fell almost every day in the first half of October, considerably delaying potato digging. However, the last two weeks of the month were clear and dry and most favourable for digging operations. The fall remained open until November 23, when ploughing ceased. A slight fall of snow covered the fields December 8. This was removed by rain on December 24 and 25. At the end of December, frost had penetrated the soil to a depth of 15 inches.

The season of 1941 in Nova Scotia may be known as a "wet year". There was no drought period. A heavy blanket of snow provided good ground coverage until the end of March. Perennials wintered well with few exceptions and winter injuries were of no consequence. An early fall freeze in 1940 caused more injury than any winter condition.

May was wet. From about May 8 to the end of the month the weather was wet or dull, making it very difficult to get the land seeded or orchards sprayed except in districts on well-drained light soils. These

conditions favoured damping-off, root rots, apple scab, and blossom blights. June was average in temperature and rainfall but was 25% below average in sunshine. These conditions favoured grass and hay growth as well as fungus leaf spots. July was the most favourable month of the season; the farmer was able to care for his crops and growth was good.

From the end of July through August and September, rainfall, humidity and temperature were most favourable for late blight (Phytophthora infestans). The disease soon reached epidemic proportions in the unsprayed and poorly sprayed potato fields as well as in tomatoes and an appreciable loss resulted. Late season infections of apple scab were also favoured by weather conditions in September and October, and resulted in a lower grade of pack in many of the winter varieties.

Total precipitation recorded at Kentville, N.S., for April to October inclusive was 23.54 inches comparedwith a 25 year average of 22.17 inches.

The growing season of 1941 in Prince Edward Island was featured by continuous wet, cool weather, which was favourable for the development of some highly destructive plant diseases. During a brief period of fine weather in late April, seeding operations were attempted on a few farms. However, the generally backward spring resulted in late seeding of all crops, including potatoes.

Apple scab spore discharge was recorded on May 15, two regular spray applications having been made by that date. Because of unusually difficult spraying conditions, however, it was impossible to make subsequent applications according to schedule. Thus, under the worst possible spraying conditions, together with ideal conditions for scab development, this disease was extremely troublesome, and caused very appreciable reductions in the marketable crop. Similarly, brown rot of stone fruits caused a total failure of plums in many localities.

The last spring frost (28°F.) was experienced May 2 and injured the tender growing shoots of many trees, leading later to leaf injury. The frost-free period covered 177 days, first killing frost being felt on October 26 (31°F.), the effect being noticed in many potato fields, and with considerable benefit to crops suffering from late blight.

The heavier-than-average seasonal rainfall, being highly favorable for the development of potato late blight, led to what was considered to be the worst outbreak of blight on record in this area.

Comparison of rainfall (1941) and 41 year average; also 1941 sunshine hours and 31 year average.

	Rainfall		Sunshine	
	1941	41 year average	1941	31 year average
April			171.3 hr.	159.0 hr.
May	5.81 in.	2.86 in.	185.7 "	213.2 "
June	4.31 "	2.77 "	208.3 "	225.7 "
July	5.35 "	2.97 "	236.3 "	244.5 "
August	4.84 "	3.26 "	183.7 "	234.7 "
Sept.	3.41 "	3.84 "	192.2 "	175.3 "

Common scab of potatoes, being a dry season disease, gave very little trouble. Powdery scab, however, showed a marked increase in the 1941 crop. Early season damping-off and seed-piece rot were widespread and very troublesome, brought on unquestionably by wet weather and extremely poor growing conditions.

Verticillium wilt of potato showed a marked decrease in 1941, and where it did occur, the yields were not noticeably affected. The growing season being generally unfavourable for potato growth, owing to wet, cool weather and reduced sunshine hours, wilting was less prominent in Verticillium affected plants, hence they did not succumb to the disease.

Because of the many periods when soil moisture was high and soil temperatures moderate (60-65°F.), club root infection was greater than in previous years, regardless of whether or not turnip seed was planted early or late. In areas of heavy soil inoculum, almost all plants succumbed to club root in their early stages of growth, while in fields where the contamination was less, infected roots were rendered unfit for use by club root.