The Weather and Its Influence on Plant Diseases

The main features of the weather during 1944 in coastal B.C. were the absence of snow during a mild winter, a cool and relatively dry spring, a relatively dry summer, and a dry sunny fall.

Due to the rather dry cold spring, tulip fire was held in check. Probably due to the same cause late blight of potatoes appeared later than usual, and it did not become a serious factor in most localities owing to the dry summer weather. In late spring and early summer, downy mildew developed epidemically on garden beets grown for seed in a few fields in the Fraser Valley, the temperatures at the time being apparently at the optimum for conidial development. The disease was checked during the summer.

The fall weather was very satisfactory on the coast, and no adverse effects were noticed in the seed crops as a result of disease prevalence. In central B.C., however, the rains interfered with the harvesting of clover seed crops (W. Jones).

In Alta. the winter was unusually mild and there was little or no winter killing of winter wheat and legumes. Crown rot of alfalfa also caused much less damage than usual. Seeding started early under dry conditions, but precipitation was heavy throughout the summer in the central and north-central sections. Extensive flood damage occurred in the area north-west of Edmonton. The crops were generally heavy and late-maturing, and there was considerable lodging. Under these conditions, certain foliage diseases were unusually prevalent and severe. Rust infection, however, did not appear until mid-August and made little progress under the prevailing cool conditions. Stem rust was notably more common on oats than on wheat or barley. Common root rot developed extensively in cereals but did not cause severe damage in most areas. The weather was apparently too dry during late August and September for the spread of late blight of potatoes and no tuber rot was found. Bacterial wilt of alfalfa was favoured by abundant moisture for the third consecutive year and continued to spread in the area east of Edmonton and other parts of central Alta. In southern Alta. and the Peace River district drought conditions prevailed throughout the season. Crop yields were low and foliage and stem infection was relatively slight. (M.W. Cormack).

Soil conditions in Sask. at seeding time were fair, with enough moisture for germination, except in the southwestern and western districts. Germination was good except in the dry areas of the southwest. Rainfall varied from light showers to heavy rains in the latter part of May. Some flood damage occurred southwest of Regina. Growth was good during June except in the area along the Alta. boundary which remained dry all season. Temperatures were favourable with no extreme heat; this, along with generally favourable moisture conditions, provided fast growth. Fair recovery was made from browning root rot infection, which was widespread in the heavy clay areas. The moist conditions during early summer favoured development of leaf spots, particularly halo blight of oats. The spread of these and development of rust was checked by continued dry weather during July. More smut appeared than in 1943. This was a direct result of the cool moist conditions at seeding time. Showers were frequent in the north-eastern area during the summer. As a result, stem and leaf spots flourished.

Among these were speckled leaf blotch of wheat (Septoria nodorum) and black stem of alfalfa (Ascochyta imperfecta) (H.W. Mead).

April and early May were much drier than normal throughout Man. and seeding operations were completed earlier than usual. Average weekly temperatures during April and May, except for the first week in April, which was 4° below normal, and the first week in May, which was 6° below normal, were from 4° to 9° above normal. Although rainfall was deficient during the early part of the season there was sufficient soil moisture from the previous year to carry the crop during that period and, owing to the favourable temperature conditions, crops in general were in excellent condition and about a week earlier than normal at the end of May. During the last week in May, when crops were just beginning to suffer from lack of moisture, copious rainfall occurred and from then on until harvest precipitation was well in excess of normal, particularly during the month of June when, in many localities, precipitation for that month exceeded the normal by over 100%. For the whole season of April 1 to August 31, precipitation except in one or two districts where rainfall was normal, exceeded the normal by from 10 to 65% or more. Although crops were well advanced at the beginning of June the excessive soil moisture and the slightly subnormal temperatures that prevailed during most of the remainder of the season somewhat retarded development, and cereals ripened a few days later than usual. Cereal rusts, except leaf rust of wheat and crown rust of oats in some late crops, did not develop in sufficient intensity to cause much damage although weather conditions were favourable to their development from early June onwards. The failure of these rusts to become really heavy may, no doubt, be ascribed to the abnormally late arrival of spores and to the paucity of inoculum when it did arrive. The excessive moisture favoured the development of late blight of potatoes and it caused much damage in the field during the summer and in storage bins after harvest. Tomatoes were also affected with this disease but much less than potatoes. The pathogens that responded most favourably to the excessive moisture were those that cause leaf spots on wild and cultivated shrubs and trees, on ornamental plants, and on small fruits (B. Peturson).

In the Niagara Peninsula, Ont., sustained wet weather during cherry and plum blossom resulted in serious loss from the blossom blight and stem rot phase of brown rot. Of particular importance was the period May 22-25 when repeated fogs, drizzling rains, and cloudy weather kept the trees continually wet. In those districts where the trees were still in bloom at this time losses were very heavy with as high as 90% of the fruit clusters destroyed. Some growers reported complete loss of the crop of Schmidt's Bigarreau sweet cherries. In areas where the bloom was already over losses were moderate. Losses were reduced where growers were able to meet the emergency by dusting with sulphur but little effect followed the application of sprays. Fortunately fair weather from then until cherry harvest prevented further spread and little fruit rot developed.

Blossom blight proved of minor importance to peaches, mainly because full bloom had passed before the critical weather conditions prevailed.

The weather in May favoured heavy apple scab infection. Primary ascospore discharge occurred during the rain of April 24, and major discharges during a 36 hour wet spell of May 5-6. Further infection periods occurred with the rains of May 9, 12, and 16. Primary scab lesions were found fruiting abundantly during the very wet spell May 22-25 which undoubtedly was responsible

for initiating much secondary infection discernible on May 30. Scab became very prevalent in June, but the hot, dry weather of mid-summer helped to check its development and spread.

Defoliation due to the cherry yellows virus was considerably less in 1944 than in 1943. This was attributed to the higher temperatures prevailing in May and June.

Wet weather during and following spraying operations was a factor in the development of general and quite serious spray injury, including partial defoliation of Shiro Japanese plums from Bordeaux and arsenical sprays.

Serious outbreaks of fire blight occurred on pears in those areas where the disease was prevalent in 1943. Exudate from overwintered cankers was found during the wet weather of May 22-25 when trees were largely in bloom. Infection of blossom spurs was apparent on June 12. Showery weather favoured abundant bacterial exudate, which was spattered far and wide during a heavy rain and wind storm of June 23. Ten days later the disease was widespread, involving much of the heavier wood through spur and twig infection. Wet weather of July 24-26 produced further bacterial exudate, particularly from diseased fruit, but little further infection occurred.

Leaf spot of cherries was of little importance until late in the season, when fall rain served to initiate a moderate infection especially on the susceptible sweet cherry varieties after spraying had been discontinued.

A hail storm in localized areas on September 21 caused moderate damage to fruit crops especially grapes (G.C. Chamberlain).

In the Ottawa district, Ont., the winter was fairly mild and snowfall was below average. The depth of snow was never more than about 9 in. The growing season was warm and dry. Precipitation was normal in April, temperature was somewhat low and sunshine was above average. Precipitation was seriously below the average for May to Sept. inclusive, temperature was normal in June and high in the other months, and sunshine was below average in June, normal in July and above average in May and August. Precipitation was abundant in Sept. and temperature and sunshine were normal.

There were three notable spells of dry weather. From May 15 to 30 inclusive precipitation totalled 0.03 in., and on many days the temperature reached about 80°F. June 27 to July 8 was rainless, with 4 days on which the temperature reached 90°F. or higher. From July 29 to Aug. 16 there was no measurable rain, although traces were recorded on July 30 and Aug. 16, and maxima of 90 to 100°F. were recorded on 12 days. The shower on Aug. 16 when the shade temperature was about 92°F. probably caused considerable damage; one striking case is described in the test under Vitis.

Early in the season several downy mildews appeared in some abundance, evidently as a result of copious inoculum remaining from 1943, but all of these disappeared by the end of June. Among the rusts, development of Coleosporium spp. was strikingly less than in the wet summer of 1943. Some puociniaceous species developed abundantly, in some cases because slugs and Darluca were checked by the drought, and in some because of the sprinkling of gardens.

The common practice of sprinkling private gardens gently several times a week in hot weather, not only aggravated drought injury by checking root development, but certainly increased the damage caused by several foliage parasites, including Puccinia Malvacearum, Cercospora Carotae and C. Violae. It should also be noted, however, that C. Carotae seems to be stimulated by high temperature; in one garden under observation heavily infected plants threw out new leaves in late August and these remained almost free from attack.

Drought injury often made it difficult to assess the damage caused by diseases, but it was noted in a wide variety of plants that parasitized leaves tended to be killed before healthy ones (D.B.O. Savile).

In eastern Que. the spring was exceptionally dry, precipitation for May and June being 1.48 in. and 2.52 in. respectively. There was no rain at Ste. Anne de la Pocatière from May 18 to June 3, the usual period for primary infection by Venturia inaequalis; apple trees were in bloom by May 23, whereas the first, weak discharge of ascospores took place on June 3. Consequently control of scab was easily obtained with a regular spray schedule; even small unsprayed orchards were relatively clean.

The dry weather allowed early seeding, but also caused very irregular stands, particularly of fiber flax. Cereal rusts developed rather late and were not prevalent.

In July the precipitation was 5.53 in., but the showers were usually followed by strong drying winds and rather low temperatures, especially during the latter part of the month.

The wet, early fall brought a severe epidemic of late blight on both potatoes and tomatoes. Unsprayed fields were blighted early in Sept., and in the first 10 days of the month there was rain almost daily. Temperatures at night averaged about 50-54°F. Considerable tuber rotting occurred in the fields and even more in cellars, owing to rather high night temperatures during Sept. and early Oct.

With the exception of late blight, diseases were in general easily controlled by ordinary measures.

In western Que. early blight of potatoes was unusually prevalent and destroyed many fields before late blight developed.

Fiber flax in the Montreal district suffered from poor retting. The hot, dry weather in Aug. destroyed several acres of this crop (R.O. Lachance).

In N.B. snow coverage and rainfall were light during the winter. Only 4 in. of snow fell in Dec. and but 3 inches during Jan., the total precipitation being 1.07 and 0.57 in. respectively. The fields were bare at the end of Jan. and remained so until Feb. 9. At the end of Feb., 15 inches of snow covered the fields, the greatest depth recorded for the winter. This snow and various light falls in early March were largely removed by six rainstorms during the month. In Feb. and March the total precipitation was slightly above the 30-year average.

The scanty snow covering, and the freezing and thawing of bare or partially bare fields nearly every night during late March and throughout April, resulted in severe winter injury of many plants. At least 80% of the red clover and much alsike clover were winter killed. Grasses were not noticeably winter killed but meadows and pastures reflected the severe winter in the slow rate at which they became established. Apple orchards suffered little except for some delay in the opening of buds on the terminal twigs. The bloom was moderately light and of the shortest duration recorded. In some localities raspberry canes were killed back for some feet, but in other localities no injury was experienced. Strawberries suffered severely, some plantations being completely wiped out. The only strawberry plants available for transplanting were frost injured stocks. Many of these plants succumbed after transplanting, while the bulk of the survivors appeared weak and chlorotic after establishment. Perennials suffered severely as did foundation plantings of evergreens about residences. Cedar hedges throughout the province suffered the worst winter killing in years.

May was characterized by considerable sunshine and high winds. The frost was sufficiently out of the ground by May 5 to permit ploughing. Seeding operations began around May 19. The first ascospore discharge of the apple scab fungus occurred May 27, when the trees were in full bloom. June was wet and cool and ideal for weed growth. Aecial discharge from barberries and buckthorns was at its maximum June 22. The first twenty days of July were mostly fair and ideal for early haying. For six consecutive days, beginning July 11, maximum temperatures between 92 and 96°F. were recorded. As a result of these high temperatures, fallen apples and tomatoes scalded on the ground and bean and pea pods, still attached to the plants, scalded on sun-exposed surfaces. The first three weeks of Aug. were hot and dry, being excellent for haying and harvesting of early sown grain, but the last week was unsettled. The hot weather, however, caused the grain to ripen prematurely, resulting in light weights per measured bushel.

Almost 6 in. of rain fell in Sept. and poorly drained fields were definitely wet at the end of the month. Almost 7 in. of rain fell in Oct., leaving the fields water-soaked, and making harvesting of grain, roots and potatoes difficult.

Late blight of potatoes was first noticed July 16 in limited areas along the Bay of Fundy. Environmental conditions did not favour its

spread then or in Aug. or early Sept., during which period it was chiefly confined to the stems of affected plants. Late Sept., though wet, was too cool to favour a rapid development of blight. Potatoes harvested during the first two weeks of Sept. were comparatively free of blight infection. Weather conditions in early Oct. favoured the abundant production of blight spores on the lower leaves of potato plants, and the moist condition of the soil enhanced the survival of spores on its surface until Oct. 16 when a killing frost occurred.

Ploughing operations ceased Dec. 2 and the St. John River froze over Dec. 3 (J.L. Howatt).

Precipitation at Kentville, N.S., during March and April was 76% of the 30-year mean for those months. The rainfall during May, 1944, was the lowest on record, being 0.22 in. compared with a mean of 2.64 in. This meant that there was a pronounced soil moisture deficit during the early summer. The months of June and July had total rainfalls slightly below the mean, so that there was no build up of the early deficit. From July 31 to Aug. 17 inclusive there was no rainfall, but there was a mean temperature well above 65° for that period. On six successive days the maximum temperature was above 92° and on one occasion reached the new high of 100° for Kentville. The minimum temperature for the same six days was 56°. During the last fourteen days of August there was a total rainfall of 3.02 in. and during the balance of the season rainfall was adequate.

No severe plant disease outbreaks occurred during 1944. Apple scab was of minor importance and late blight of potatoes did not appear until late in the season. Apple russeting was severe on Cox's Orange Pippins irrespective of spray treatment. Much of this russeting must have been caused by climatic conditions. Boron deficiency symptoms on apples showed up conspicuously in susceptible orchards where no boron had been applied.

Due to the dry soil conditions in May and June, particularly in the lighter soils, there were poor stands of carrots and many fields were seeded the second time (J.F. Hockey).

In P.E.I. the heavy covering of snow gave ample winter protection to clover. In the absence of general thaws during Jan. and Feb. and of severe spring frosts this crop wintered well and developed exceptionally strong growth. Tree fruits, on the other hand, suffered pith injury to year old wood as a result of the low temperature of Feb. 9. Perennial and biennial ornamental flowers came through well, although there was some killing of hollyhocks. Considerable low temperature injury was sustained by potatoes in the late fall of 1943 and again during the cold snap in Feb., this was followed by destructive storage rots.

Small fruits wintered well, giving early promise of at least average yields, although the crop of strawberries suffered from low temperature injury to the early bloom. Excessive rainfall in June favoured the development of apple scab and brown rot in stone fruits. These diseases were checked by the

comparatively dry month of July only to develop again during Sept. Brown rot was particularly serious on plums in the Fall.

Late blight of potatoes appeared during late July but this outbreak was arrested by dry weather in early Aug., only to become serious later in that month with lower temperatures and prolonged periods of rain. The ensuing epiphytotic was general but reached its most serious proportions in western Prince Co. During the hot period of Aug. it was necessary to curtail the spraying program in order to avoid the severe spray burn which follows wet applications during unusually hot weather. Following severe injury from the Aug. 7 application the spray schedule was interrupted accordingly until Aug. 24 when rainy weather was encountered. The subsequent applications made Sept. 1 and Sept. 8 completed our spray program for the season. Little spraying was done anywhere in the province after Sept. 8 owing to rainy weather. Vine growth being still strong, top-killing was resorted to and, where it was practised, highly satisfactory blight control was noted. Open weather in late Sept. and early Oct. allowed potatoes to be left in the ground for at least ten days after the tops had been destroyed, an essential supplementary blight prevention measure (R.R. Hurst, L.C. Callbeck).