1565

# PROBABILITY OF FREEZING TEMPERATURES IN THE SPRING AND FALL IN THE ATLANTIC REGION

PUBLICATION 1565 1975



Agriculture Canada

Copies of this publication may be obtained from
INFORMATION DIVISION
CANADA DEPARTMENT OF AGRICULTURE
OTTAWA
K1A 0C7



This publication replaces Publication 1111, *Probabilities of Freezing Temperatures at Fredericton, N.B., Charlottetown, P.E.I., Kentville, N.S and Nappan, N.S*

Printed 1975
Reprinted 1977

Code 5M-38642-5:77
Cat. A53-1565
ISBN. 0-662-00592-9

Buchanan Printers, Winnipeg, Manitoba
Contract number: OKT6-3663

# PROBABILITY OF FREEZING TEMPERATURES IN THE SPRING AND FALL IN THE ATLANTIC REGION

S. N. EDEY
Agrometeorology Research and Service
Chemistry and Biology Research Institute
Ottawa, Ontario

## Foreword

In 1961, R. A. Hornstein, then Meteorologist-in-Charge of the Halifax Public Weather Office, authored the Canada Department of Agriculture publication *Probabilities of Freezing Temperatures at Fredericton, N.B.; Charlottetown, P.E.I.; Kentville, N.S.; and Nappan, N.S.* This publication was sufficiently popular that an up-dated version has been prepared.

The analytical procedure used in preparing the probability tables was developed by the Agrometeorology Research and Service Unit. Observations over 30 years were smoothed to suppress nonsignificant anomalies. Thirty years is the minimum length of time for evaluating the normality of the climate in a particular region. The standard normal period now being used is 1941–1970, as recommended by the World Meteorological Organization.

Although the original text by Mr. Hornstein has been changed, his aim to produce a user-oriented publication remains of prime importance; additional tables, definitions, and appendixes have been included to assist the reader.

## Introduction

All areas across Canada exhibit characteristic climatic variations that greatly influence crop production. Although drought is the most serious climatic hazard to agriculture in many regions, near or below freezing temperatures are the most commonly encountered danger in Eastern Canada. Consequently, data on the last occurrence of freezing weather in the spring, the first such occurrence in the fall, and thereby the length of the freeze-free growing season are useful both economically and aesthetically to the gardener, orchardist, and farmer in the Atlantic Region.

Carefully kept weather records over many years can indicate the likelihood of freezing temperatures occurring on specific dates in the spring or fall. From analysis of such weather records, growing limits in the Atlantic Region can be predicted. These limits suggest which crops can best be grown with a certain measure of success. Although requirements for growth, length of time to reach maturity, cold tolerance, and other related physiological aspects of many plants have been determined, the climatic characteristics of the Atlantic Region are not as well known.

This publication documents some of the variations in air temperature observed over the 30 years between 1941 and 1970 at five agroclimatological stations in the Atlantic Region. Because all crops are subject to possible low-temperature injury at some time during the year, comments are limited to those periods in the late spring and early fall when untimely freezes can prove critical to the plants.

## Frost or freeze: definition and result

During the last decade, the term freeze injury rather than frost damage has become common both in conversation and in many publications. Frost, in itself, has not been definitely proven harmful to a plant. It is the accompanying freezing temperatures that injure or kill the plant by causing ice crystals to form either within individual plant cells or between the individual cells, thus withdrawing cellular water. Therefore, below-freezing temperatures are more indicative of plant injury than is the presence of frost.

Most people are more familiar with the physical aspects of white frost, black frost, and hoarfrost than they are with classifications that describe the relative severity of freezes. A system of classifying freezes is necessary, however, because some plants are more easily killed than others by freezing temperatures.

**Light freeze** — A light freeze occurs when the temperature of the air near the ground drops briefly to 0°C (32°F). It adversely affects only the most tender plants and vines such as melons, cucumbers, tomatoes, and tobacco. This condition usually occurs when the minimum temperature in the Stevenson screen, a standard instrument shelter, reaches 0 to 1°C (32 to 34°F). However, under clear skies with little or no wind, screen temperatures of 4 to 6°C (40 to 42°F) can result in freeze injury to low-growing plants.

**Moderate freeze** — A moderate freeze occurs when the screen temperature is 0 to −4°C (32 to 25°F), which causes damage to hardier plants such as potatoes, onions, sugar beets, and celery. A screen temperature of −2°C (28°F) or lower is significant to both tree fruits and small fruits. If exposed to below-freezing temperatures in prebloom, bloom, and early postbloom stages, most plants produce low yields and deformed fruit. Under repeated freezing, mature fruit sustain cellular breakdown, which results in poor storage capability.

**Severe freeze** — A severe freeze occurs when the temperature is −4°C (25°F) or less. Such temperatures kill most annuals, even the hardy varieties, and cause perennial plants to become dormant in the fall.

Although low temperature is a prerequisite to freeze injury, other factors contribute to the extent of damage. Susceptibility to low temperatures is high during the early growth and flowering stages of plant development. The seedling stage of annuals is particularly vulnerable. The extent of injury is also affected by the rate and duration of freeze. A rapid change of temperature appears to cause greater damage than does a slow gradual change.

## Factors initiating a freeze

Prevailing weather conditions directly influence the development of a freeze; consequently, freezes can be classified meteorologically according to three main types: advective, radiative, or a combination of the two. Although all three are damaging, the radiative freeze has, perhaps, the greatest economic significance to agriculture.

The advective freeze develops when an air mass at temperatures near or below freezing is accompanied by a wind, which produces fairly uniform temperatures over large geographic areas.

Under clear skies and stable conditions, this same air mass produces the radiative–advective freeze, which causes an extreme drop in temperature.

A radiative freeze requires a fairly cool air mass, virtually clear skies, and little or no wind. These factors contribute to substantial heat loss from the soil surface, which produces low air temperatures near the ground. As the soil surface cools, the adjacent layers of air lose heat through conduction to the cooler soil surface. Because air is a poor conductor of heat, the air at higher levels does not cool as much as does the air at the soil surface. The resulting condition, known as a temperature inversion, often accounts for significant differences between screen temperatures and temperatures at the surface of the ground. These differences may be as large as 7 to 8 Celsius degrees (12 to 14 Fahrenheit degrees). A screen temperature of 4 to 6°C (40 to 42°F) could conceivably result in severe damage to the bloom of a strawberry crop, whereas grapevines growing a foot or so higher would escape injury.

Many factors should be considered when the freeze hazard for a particular location is determined. Maps, probability tables, and other statistics using minimum temperature data are based on observations taken from a Stevenson screen. This instrument shelter is positioned 1.4 m (4.5 ft) above the ground, and significant temperature differences can occur between ground level and instrument level. The topographical features of the area are also important, particularly on a clear, calm night. Cool air is heavier than warm air. For example, a given volume of air weighs 1.7% more at −3°C than it does at 1°C. Like water, cool air flows downhill and settles in hollows, valleys, and other depressions to create so-called frost pockets. Ridges, banks, hedgerows, and windbreaks act like dams, trapping cool air to form areas of high freeze incidence. Long, unobstructed slopes are therefore ideal for gardens, orchards, and other speciality crops because here the arrival of killing freezes is often delayed. The effective growing season is thus considerably lengthened on sloping locations. Sites in or near large towns and cities have a longer freeze-free season than do the surrounding rural areas. An urban heat island is created because construction materials such as concrete and asphalt can retain heat emitted from the sun and from factories and large buildings. Other geographic features such as abrupt changes in elevation, proximity of large bodies of water, presence and type of vegetative surfaces, and condition and texture of soil surfaces all influence the estimation of freeze dates for a specific area.

## Damaging effect of freezing temperatures

All plant growth of agricultural importance ceases when the temperature approaches the freezing point of water. Only the physiological hardening-off processes that occur as plants prepare for dormancy during the winter can continue. The aftereffect of freezing or near-freezing temperatures is variable; it depends on the minimum temperature reached, rate and duration of the temperature drop, frequency of occurrence of freezing, conditions of thawing, stage of development of the plant, and inherent ability of the species or variety to tolerate low temperatures.

Freeze injury occurs when a plant loses more heat than it absorbs, and ice crystals form in the plant tissue. Loss of heat may occur either by conduction or by radiation. Loss by conduction occurs when cold air moves through an area and lowers both plant and air temperature simultaneously. Loss by radiation takes place when the plant returns more heat to the atmosphere than it receives. When the night is calm and clear, radiative heat loss is maximum and leaf temperatures can be significantly lower than the surrounding air temperature.

Severity of freeze injury varies more with a radiative freeze than with a conductive freeze. Radiative freeze injury ranges from plant death to differing degrees of growth suppression that affect the final crop yield. Outward signs include curling, flecking, and bronzing of leaves; cracking, splitting, and dieback of stems; and blossom kill, fruit drop, fruit marking, and other abnormalities of blossoms or fruit.

**Cereals and forage crops** — Extensive production of cereal crops is generally confined to areas with a freeze-free season of 100 days or more. A shorter season requires prompt seeding and the use of early-maturing varieties. Further limitation is determined by the length of the growing season, minimum winter temperature, and depth of snow cover.

Sensitivity of cereal plants to low temperature is quite variable. Temperatures lower than −9°C (16°F) are lethal at all stages of development, except during dormancy. A light freeze during the bloom stage can kill the pollen and prevent fertilization; during the ripening stage, a light freeze can result in abnormal grain development. During postemergence, however, young plants are fairly tolerant of low temperatures, which allows most cereals to be sown several weeks before the last killing freeze of the season.

Corn and sorghum are more vulnerable than other cereals, and well-developed plants are killed by temperatures slightly below freezing. Young plants between 1 and 3 weeks can, however, recover from temperatures as low as −4°C (25°F). At this stage, the growing point of corn is still below the soil level and remains protected until the plants are between 15 and 30 cm (6 and 12 in.) tall. If a freeze occurs after this stage, damage can be severe. In the fall, freeze injury to corn kernels with less than 35% moisture is slight; however, to withstand temperatures of −7°C (20°F) or less, kernels should have a moisture content of less than 25%.

The growing parts of soybeans, field beans, alfalfa, and other legume seedlings are above the ground and subject to damage from untimely low temperatures. Soybeans are slightly more tolerant than field beans, cowpeas, and corn because soybean plants can withstand light freezes when they are young or nearly mature. However, a temperature of −4 to −3°C (24 to 26°F) or less can result in widespread injury to newly emerged beans. Alfalfa seedlings require a temperature of −7°C (20°F) or less to sustain similar damage. Forage grasses are fairly tolerant of untimely low temperatures.

**Trees and small fruits** — Temperature is the main factor governing the location of fruit-growing areas in Canada. Hardy fruit crops are produced on deciduous trees or bushes. Although cold weather is required to break the dormancy of deciduous plants, these crops are still sensitive to low temperatures, particularly before, during, and immediately after blooming. In the tight-bud stage, fruit blossoms are hardy and can tolerate temperatures as low as −7 to −6°C (20 to 22°F). However, they become increasingly more susceptible to damage as the blossoms open, and the longer the cold period, the greater the extent of injury. Swollen buds or those showing flower petals can be damaged at temperatures between −4 and −2°C (25 and 28°F). Blossoms fully open or those showing fruit development can be injured at temperatures between −2 and −1°C (28 and 30°F).

Early-blooming varieties of fruit trees are more prone to freeze injury than late varieties. Because peaches and cherries bloom earlier than apples or pears, their flower buds are more susceptible to damage from the cold. The buds of tart varieties of cherries are hardier than those of sweet varieties. Apricots are less hardy than peaches because they bloom earlier. Pear growing is hazardous where the ambient air temperature drops lower than −9°C (15°F). However, the hardiness of pears is also reduced because the tree blooms earlier than hardier crops such as apples.

Varieties of European grape are not particularly hardy in Canada because plant stems are injured when the temperature approaches −18°C (0°F). They are otherwise much like peaches in susceptibility to low temperatures. Young grape shoots and flower clusters are easily damaged at temperatures below −0.6°C (31°F). Sustained temperatures below −2°C (28°F) can severely injure all new wood and growing points.

The strawberry is a semihardy evergreen that is widely grown despite its low tolerance for cold temperatures. Because the plant grows close to the ground, it is exposed to the lower temperatures found near the soil surface during a radiative freeze. Open strawberry blossoms can only withstand temperatures slightly below freezing. The crown of the plant can be injured or killed at temperatures lower than −12°C (10°F). Strawberry plants require the protection of snow and other covers to survive the cold extremes of the Canadian climate.

Raspberries and blackberries are both relatively late bloomers and are therefore considered hardy.

**Flowers and vegetables** — Many vegetables and ornamental crops in Canada are not native but are nevertheless being profitably grown in regions very different from their original habitat. Because the temperature regime is often restrictive and freezing temperatures present a genuine hazard, many of these plants are termed hardy, half-hardy, or tender. Although freeze resistance is the main factor in determining the hardiness of a particular species or plant, the length of the preflowering period is also considered.

Hardy plants can withstand several degrees of freezing temperatures during either the seedling stage in the spring or the mature stage in the fall, whereas those classified as tender perish at temperatures at or approaching the freezing point. Often, if the plants are not killed outright, growth is severely checked, and they never fully recover and assume normal development.

Table 1 lists vegetables and annual flowers according to frost hardiness and suggests the best planting time relative to the average freeze date of the region. When transplants are used to offset a short growing season, the physiological condition of the transplant must be considered. Transplants that have been hardened off before planting sustain less injury at low temperatures than do those without proper hardening.

The freezing point of fruits and vegetables is the temperature at which ice crystals begin to form within the cell structure. Some fruits and vegetables can be frozen and thawed under certain conditions without apparent injury. The freezing point is, however, considered the danger point at which injury becomes possible if the produce is exposed to that temperature for sufficient time. The average freezing point, listed for some fruits and vegetables in Table 2, is a valuable indication of the storage life of the produce.

TABLE 1. HARDINESS OF SOME VEGETABLES AND FLOWERING ANNUALS (INCLUDING SUGGESTED PLANTING TIMES)

HARDY — Plant as early as soil can be prepared

Vegetables

| | | | |
|---|---|---|---|
| asparagus | carrots | parsnips | Swiss chard |
| beets | kale | peas | turnips |
| broccoli | lettuce | radishes | |
| cabbage | onions | spinach | |

Annuals

| | | |
|---|---|---|
| cornflower | evening primrose | sweet alyssum |
| coreopsis | larkspur | sweet pea |
| dianthus | poppy | |
| | rudbeckia | |

HALF-HARDY — Plant 1 to 2 weeks after average date of last spring freeze

Vegetables

| | |
|---|---|
| cauliflower | potatoes |
| snap beans | sweet corn |

Annuals

| | | |
|---|---|---|
| California poppy | cleome | Drummond phlox |
| calendula | gaillardia | salvia |
| candytuft | mignonette | scabiosa |
| basket flower | nigella | stock |

TENDER — Plant 3 to 4 weeks after average date of last spring freeze

Vegetables

| | | |
|---|---|---|
| cucumbers | okra | tomatoes |
| eggplant | peppers | sweet potatoes |
| lima beans | pumpkins | watermelons |
| muskmelon | squash | |

Annuals

| | | |
|---|---|---|
| ageratum | morning glory | salpiglossis |
| browallia | nasturtium | sunflower |
| celosia | nicotiana | torenia |
| lobelia | (flowering | zinnia |
| marigold | tobacco) | |
| | petunia | |

TABLE 2. AVERAGE FREEZING POINTS OF SOME FRUITS AND VEGETABLES

| Fruit | Temperature °C | Temperature °F |
|---|---|---|
| Apples | | |
| Summer varieties | −2.0 | 28.4 |
| Fall and winter varieties | −1.9 | 28.5 |
| Blackberries | | |
| Black varieties | −1.6 | 29.1 |
| White varieties | −2.0 | 28.4 |
| Logan (loganberries) | −1.4 | 29.5 |
| Cherries | −2.3 | 27.8 |
| Cranberries | −2.9 | 26.7 |
| Currants | −1.0 | 30.2 |
| Gooseberries | −1.7 | 28.9 |
| Grapes, eastern | −2.2 | 28.1 |
| Grapefruit | −2.1 | 28.3 |
| Lemons | −2.2 | 28.1 |
| Oranges | −2.2 | 28.0 |
| Peaches, hard ripe | −1.4 | 29.4 |
| Pears, Bartlett | | |
| Hard ripe | −2.0 | 28.4 |
| Soft ripe | −2.4 | 27.8 |
| Plums | −1.9 | 28.5 |
| Raspberries | | |
| Red varieties | −0.9 | 30.4 |
| Black varieties | −1.8 | 28.7 |
| Strawberries | −1.2 | 29.9 |

| Vegetable | Temperature °C | Temperature °F |
|---|---|---|
| Beans, snap | −1.3 | 29.7 |
| Cabbage, early Jersey Wakefield | −0.5 | 31.1 |
| Carrots | −1.4 | 29.5 |
| Cauliflower | −1.1 | 30.0 |
| Corn, sweet | −1.7 | 28.9 |
| Eggplant | −0.9 | 30.4 |
| Kohlrabi | −1.1 | 30.0 |
| Lettuce | −0.4 | 31.2 |
| Onions, dry | −1.1 | 30.0 |
| Peas, green | −1.1 | 30.0 |
| Potatoes | −1.7 | 28.9 |
| Potatoes, sweet | −2.0 | 28.4 |
| Tomatoes, ripe | −0.9 | 30.3 |
| Turnips | −1.0 | 30.2 |

## Analysis and use of spring and fall freeze data

Daily temperature records for the 30 years between 1941 and 1970 were used to prepare the probability values presented in Tables 3–12. Because the data series has been smoothed to obtain an even distribution, the date of an actual event may not necessarily fit the computed distribution. Such inconsistencies are particularly noticeable beyond the 10 and 90% probability levels.

Tables 3, 5, 7, 9, and 11 give the dates of the last critical freeze in the spring for various levels of risk at five locations in the Atlantic Region. From these tables you can find the chances of various freezing temperatures occurring on specific spring dates. The average date on which a particular temperature reading last occurs in the spring is given at the 50% risk level. Also given on the top and bottom lines of the tables are the earliest and latest dates on which particular freezing temperatures last occurred in the spring over the 30 years 1941–70.

The following example shows how these tables are helpful in planning agricultural operations. A temperature of 0°C (32°F) is usually fatal to young tobacco plants. Table 5 shows that at Charlottetown the plants have a 20% risk (one chance in five) of being killed by exposure to 0°C (32°F) on May 23. The risk of the temperature reaching 0°C (32°F) increases to 50% (one chance in two) on May 14. May 14, then, is the average date of the last spring freeze at 0°C (32°F). To avoid any risk of a 0°C (32°F) freeze, you must plant your tobacco after June 10.

Tables 4, 6, 8, 10, and 12 give the critical freeze dates for the fall season and are used the same way the spring tables are. Using both the spring and fall tables, you can assess the degree of expected success or failure of a particular operation. You can, for example, estimate the freeze-free season in each of the five locations documented, that is, the period between the date of the last freeze of a particular temperature in the spring and the date of the first freeze in the fall. You can also determine the effective growing period available to a particular crop, which is the length of time from emergence to the time it matures or is killed by freezing weather in the fall.

Consider a particular crop at Kentville that requires a 140-day growing season to mature from emergence to harvest, with no spring freezes of 0°C (32°F) or less and no autumn freezes of −2°C (28°F) or less. From Tables 9 and 10 you can estimate the planting date that offers the least risk of damage to this crop from freezing temperatures. Emergence is assumed to be 5 days after planting.

| | | | | |
|---|---|---|---|---|
| If emergence date is | May 8 | May 17 | May 23 | June 2 |
| Chance of 0°C (32°F) spring freeze is | 90% | 70% | 50% | 20% |
| Chance of no 0°C spring freeze is | 10% | 30% | 50% | 80% |
| Corresponding fall maturity date is | Sept 25 | Oct 4 | Oct 10 | Oct 20 |
| Chance of −2°C (28°F) fall freeze before maturity is | 0% | 18% | 33% | 60% |
| Chance of no −2°C fall freeze before maturity is | 100% | 82% | 67% | 40% |
| Combined chance of no damaging freeze in spring and fall is | 10% | 25% | 34% | 32% |

May 23 is the optimum date of emergence for the crop in this example because the 34% combined chance of no freeze damage in spring and fall for that date is the best one calculated. The combined chance of no damaging freeze in spring and fall is obtained by multiplying the spring risk (on May 23, 50%) by the corresponding risk in the fall (on October 10, 67%) and dividing the product by 100. In this example the calculation is $(50 \times 67)/100 = 34\%$.

Harvesting the crops is influenced by freezing temperatures in the fall. For example, you should harvest tobacco before it is subjected to air temperatures of 0°C (32°F). At Charlottetown (Table 6) the earliest date on which this temperature occurred was September 29, and the date on which this temperature is likely to occur in 1 year out of 5 (20% risk) is October 10. By October 17 the chances are 1 out of 2 (50% risk), and by October 31 the air temperature is almost certain to fall to 0°C (32°F). Similarly, repeated temperatures of −4°C (25°F) are detrimental to the keeping quality of late-variety apples. At Kentville (Table 10), the earliest date on which this temperature was recorded was October 10. The chances are 1 in 5 (20% risk) by October 19 and 1 in 2 (50% risk) by October 31 of a −4°C (25°F) temperature occurring. A temperature of −4°C (25°F) is almost certain to occur by November 24.

The tables show a marked difference in the climates of the five stations. These differences are primarily caused by the moderating effect of the ocean. Oceanic influence is particularly noticeable at Charlottetown. This local variation shows how important it is to know the temperature background of your own farm and region. At Charlottetown (Table 5) you may expect a temperature of 0°C (32°F) in 1 year out of 2 on May 14, at Fredericton (Table 7) on May 18, at Kentville (Table 9) on May 23, at Nappan (Table 11) on May 27, and at St. John's (Table 3) on June 9. In the fall, chances are that 1 year out of 2 you will have an air temperature of 0°C (32°F) at Nappan by September 18 (Table 12), at Fredericton (Table 8) by September 26, at St. John's (Table 5) by September 29, at Kentville (Table 10) by September 30, and at Charlottetown (Table 6) by October 17. Charlottetown has an advantage of more than 2 weeks over Kentville and Fredericton, and of almost a full month over Nappan.

Figures 1–10 are nomographs showing the probability of light (0°C, 32°F), moderate (−2°C, 28°F), and severe (−4°C, 25°F) freezes occurring in the spring and fall at the five stations. The probability that a freeze will occur on or after a specific date in the spring or on or before a specific date in the fall is obtained by drawing a horizontal line from the date in which you are interested to the slanted freeze line. The point at which the horizontal line and the freeze line intersect is the corresponding probability level. The numerical value is obtained by drawing a vertical line from this point to the base scale.

In illustration, the graph for Nappan in the spring (Fig. 9) shows a less than 10% chance of a severe freeze, a 51% chance of a moderate freeze, and an 86% chance of a light freeze on May 10. In the fall (Fig. 10), the graph shows a less than 10% chance of a severe freeze, a 21% chance of a moderate freeze, and a 79% likelihood of a light freeze on September 26.

The data given apply mostly to crops that are susceptible to damage from freezing; however, these data can be applied equally well to any type of activity that is sensitive to or requires protection from temperatures at or below freezing.

TABLE 3. SPRING DATE OF LAST CRITICAL FREEZE FOR A GIVEN RISK — ST. JOHN'S, NFLD.

| | Date of last critical freeze | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature °C (°F) | | | | | | | | | | |
| Percent risk | −6 (21) | −5 (23) | −4 (25) | −3 (27) | −2 (28) | −1 (30) | 0 (32) | 1 (34) | 2 (36) | 3 (37) | 4 (39) |
| *Earliest | Mar 21 | Mar 21 | Mar 23 | Mar 23 | Apr 28 | May 8 | May 19 | May 23 | Jun 5 | Jun 15 | Jun 15 |
| 90 | Mar 30 | Apr 2 | Apr 7 | Apr 17 | Apr 29 | May 10 | May 23 | May 31 | Jun 9 | Jun 14 | Jun 20 |
| 85 | Apr 2 | Apr 5 | Apr 11 | Apr 20 | May 3 | May 13 | May 26 | Jun 3 | Jun 11 | Jun 17 | Jun 22 |
| 80 | Apr 5 | Apr 8 | Apr 14 | Apr 23 | May 5 | May 16 | May 29 | Jun 5 | Jun 13 | Jun 18 | Jun 24 |
| 75 | Apr 7 | Apr 10 | Apr 16 | Apr 25 | May 8 | May 19 | May 31 | Jun 7 | Jun 14 | Jun 20 | Jun 25 |
| 70 | Apr 9 | Apr 13 | Apr 18 | Apr 27 | May 10 | May 21 | Jun 2 | Jun 9 | Jun 15 | Jun 21 | Jun 27 |
| 65 | Apr 11 | Apr 14 | Apr 20 | Apr 29 | May 11 | May 23 | Jun 4 | Jun 11 | Jun 17 | Jun 23 | Jun 28 |
| 60 | Apr 12 | Apr 16 | Apr 22 | May 1 | May 13 | May 25 | Jun 6 | Jun 12 | Jun 18 | Jun 24 | Jun 29 |
| 55 | Apr 14 | Apr 18 | Apr 24 | May 3 | May 15 | May 26 | Jun 7 | Jun 14 | Jun 19 | Jun 25 | Jun 30 |
| 50 | Apr 16 | Apr 20 | Apr 26 | May 4 | May 17 | May 28 | Jun 9 | Jun 15 | Jun 20 | Jun 26 | Jul 1 |
| 45 | Apr 17 | Apr 22 | Apr 28 | May 6 | May 18 | May 30 | Jun 11 | Jun 17 | Jun 21 | Jun 27 | Jul 2 |
| 40 | Apr 19 | Apr 24 | Apr 30 | May 8 | May 20 | Jun 1 | Jun 12 | Jun 18 | Jun 22 | Jun 28 | Jul 3 |
| 35 | Apr 21 | Apr 26 | May 2 | May 10 | May 22 | Jun 3 | Jun 14 | Jun 20 | Jun 24 | Jun 30 | Jul 5 |
| 30 | Apr 22 | Apr 27 | May 4 | May 11 | May 24 | Jun 5 | Jun 16 | Jun 21 | Jun 25 | Jul 1 | Jul 6 |
| 25 | Apr 24 | Apr 29 | May 6 | May 13 | May 26 | Jun 7 | Jun 18 | Jun 23 | Jun 26 | Jul 2 | Jul 7 |
| 20 | Apr 26 | May 2 | May 9 | May 16 | May 28 | Jun 10 | Jun 20 | Jun 25 | Jun 28 | Jul 4 | Jul 8 |
| 15 | Apr 29 | May 5 | May 12 | May 18 | May 31 | Jun 12 | Jun 23 | Jun 28 | Jun 29 | Jul 6 | Jul 10 |
| 10 | May 2 | May 8 | May 15 | May 22 | Jun 3 | Jun 16 | Jun 26 | Jun 30 | Jul 2 | Jul 8 | Jul 12 |
| *Latest | May 24 | May 24 | Jun 2 | Jun 10 | Jun 15 | Jul 5 | Jul 14 | Jul 14 | Jul 14 | Jul 14 | Jul 15 |

*Earliest and latest dates on which freezing temperatures have been recorded between 1941 and 1970.

TABLE 4. AUTUMN DATE OF FIRST CRITICAL FREEZE FOR A GIVEN RISK — ST. JOHN'S, NFLD.

| | Date of first critical freeze | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature °C (°F) | | | | | | | | | | |
| Percent risk | 4 (39) | 3 (37) | 2 (36) | 1 (34) | 0 (32) | −1 (30) | −2 (28) | −3 (27) | −4 (25) | −5 (23) | −6 (21) |
| *Earliest | Jul 18 | Jul 18 | Jul 18 | Jul 22 | Jul 23 | Sep 15 | Oct 1 | Oct 11 | Oct 22 | Oct 31 | Nov 4 |
| 10 | Jul 21 | Jul 29 | Aug 10 | Aug 26 | Sep 7 | Sep 23 | Oct 6 | Oct 16 | Oct 27 | Nov 8 | Nov 12 |
| 15 | Jul 28 | Aug 4 | Aug 15 | Aug 30 | Sep 11 | Sep 26 | Oct 9 | Oct 19 | Oct 30 | Nov 10 | Nov 15 |
| 20 | Aug 2 | Aug 10 | Aug 20 | Sep 3 | Sep 14 | Sep 29 | Oct 12 | Oct 22 | Nov 2 | Nov 13 | Nov 18 |
| 25 | Aug 7 | Aug 14 | Aug 24 | Sep 6 | Sep 17 | Oct 2 | Oct 14 | Oct 24 | Nov 4 | Nov 15 | Nov 20 |
| 30 | Aug 11 | Aug 18 | Aug 27 | Sep 9 | Sep 20 | Oct 4 | Oct 16 | Oct 27 | Nov 6 | Nov 16 | Nov 22 |
| 35 | Aug 14 | Aug 21 | Aug 30 | Sep 11 | Sep 22 | Oct 6 | Oct 18 | Oct 28 | Nov 8 | Nov 18 | Nov 23 |
| 40 | Aug 18 | Aug 25 | Sep 3 | Sep 14 | Sep 24 | Oct 8 | Oct 20 | Oct 30 | Nov 10 | Nov 19 | Nov 25 |
| 45 | Aug 21 | Aug 28 | Sep 5 | Sep 16 | Sep 26 | Oct 10 | Oct 21 | Nov 1 | Nov 11 | Nov 21 | Nov 27 |
| 50 | Aug 24 | Sep 1 | Sep 8 | Sep 18 | Sep 29 | Oct 12 | Oct 23 | Nov 3 | Nov 13 | Nov 22 | Nov 28 |
| 55 | Aug 28 | Sep 4 | Sep 11 | Sep 21 | Oct 1 | Oct 14 | Oct 25 | Nov 4 | Nov 15 | Nov 24 | Nov 30 |
| 60 | Aug 31 | Sep 7 | Sep 14 | Sep 23 | Oct 3 | Oct 15 | Oct 26 | Nov 6 | Nov 16 | Nov 25 | Dec 1 |
| 65 | Sep 4 | Sep 11 | Sep 18 | Sep 25 | Oct 5 | Oct 17 | Oct 28 | Nov 8 | Nov 18 | Nov 27 | Dec 3 |
| 70 | Sep 7 | Sep 14 | Sep 21 | Sep 28 | Oct 7 | Oct 19 | Oct 30 | Nov 10 | Nov 20 | Nov 28 | Dec 5 |
| 75 | Sep 11 | Sep 18 | Sep 24 | Sep 30 | Oct 10 | Oct 22 | Nov 1 | Nov 12 | Nov 22 | Nov 30 | Dec 7 |
| 80 | Sep 16 | Sep 23 | Sep 28 | Oct 4 | Oct 13 | Oct 24 | Nov 3 | Nov 14 | Nov 24 | Dec 2 | Dec 9 |
| 85 | Sep 21 | Sep 28 | Oct 3 | Oct 7 | Oct 16 | Oct 27 | Nov 6 | Nov 17 | Nov 27 | Dec 4 | Dec 11 |
| 90 | Sep 27 | Oct 4 | Oct 8 | Oct 11 | Oct 20 | Oct 31 | Nov 9 | Nov 20 | Nov 30 | Dec 7 | Dec 15 |
| *Latest | Sep 30 | Oct 6 | Oct 17 | Oct 18 | Oct 29 | Nov 2 | Nov 10 | Dec 17 | Dec 17 | Dec 20 | Dec 20 |

*Earliest and latest dates on which freezing temperatures have been recorded between 1941 and 1970.

TABLE 5. SPRING DATE OF LAST CRITICAL FREEZE FOR A GIVEN RISK — CHARLOTTETOWN, P.E.I.

| | Date of last critical freeze | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature °C (°F) | | | | | | | | | | |
| Percent risk | −6 (21) | −5 (23) | −4 (25) | −3 (27) | −2 (28) | −1 (30) | 0 (32) | 1 (34) | 2 (36) | 3 (37) | 4 (39) |
| * Earliest | Mar 21 | Mar 21 | Mar 21 | Mar 28 | Apr 16 | Apr 17 | May 1 | May 3 | May 16 | May 17 | May 22 |
| 90 | Mar 21 | Mar 24 | Mar 31 | Apr 9 | Apr 17 | Apr 25 | May 1 | May 8 | May 14 | May 22 | May 29 |
| 85 | Mar 24 | Mar 27 | Apr 2 | Apr 12 | Apr 20 | Apr 27 | May 2 | May 11 | May 17 | May 24 | Jun 1 |
| 80 | Mar 27 | Mar 30 | Apr 5 | Apr 14 | Apr 22 | Apr 29 | May 4 | May 13 | May 19 | May 27 | Jun 2 |
| 75 | Mar 29 | Apr 1 | Apr 7 | Apr 16 | Apr 24 | May 1 | May 6 | May 15 | May 21 | May 28 | Jun 4 |
| 70 | Mar 31 | Apr 3 | Apr 8 | Apr 17 | Apr 26 | May 3 | May 8 | May 17 | May 23 | May 30 | Jun 6 |
| 65 | Apr 1 | Apr 4 | Apr 10 | Apr 19 | Apr 27 | May 4 | May 9 | May 18 | May 24 | May 31 | Jun 7 |
| 60 | Apr 3 | Apr 6 | Apr 11 | Apr 20 | Apr 28 | May 6 | May 11 | May 20 | May 26 | Jun 2 | Jun 8 |
| 55 | Apr 5 | Apr 7 | Apr 13 | Apr 21 | Apr 30 | May 7 | May 12 | May 21 | May 27 | Jun 3 | Jun 9 |
| 50 | Apr 6 | Apr 9 | Apr 14 | Apr 23 | May 1 | May 8 | May 14 | May 23 | May 29 | Jun 4 | Jun 11 |
| 45 | Apr 8 | Apr 11 | Apr 16 | Apr 24 | May 3 | May 10 | May 15 | May 24 | May 31 | Jun 6 | Jun 12 |
| 40 | Apr 10 | Apr 12 | Apr 17 | Apr 25 | May 4 | May 11 | May 17 | May 26 | Jun 1 | Jun 7 | Jun 13 |
| 35 | Apr 11 | Apr 14 | Apr 19 | Apr 27 | May 5 | May 12 | May 18 | May 27 | Jun 3 | Jun 8 | Jun 15 |
| 30 | Apr 13 | Apr 15 | Apr 20 | Apr 28 | May 7 | May 14 | May 20 | May 29 | Jun 4 | Jun 10 | Jun 16 |
| 25 | Apr 15 | Apr 17 | Apr 22 | Apr 30 | May 8 | May 15 | May 21 | May 30 | Jun 6 | Jun 11 | Jun 17 |
| 20 | Apr 17 | Apr 19 | Apr 24 | May 2 | May 10 | May 17 | May 23 | Jun 1 | Jun 8 | Jun 13 | Jun 19 |
| 15 | Apr 20 | Apr 22 | Apr 26 | May 4 | May 13 | May 19 | May 26 | Jun 4 | Jun 10 | Jun 15 | Jun 21 |
| 10 | Apr 23 | Apr 25 | Apr 29 | May 6 | May 15 | May 22 | May 29 | Jun 6 | Jun 13 | Jun 18 | Jun 23 |
| * Latest | Apr 29 | Apr 29 | May 2 | May 6 | May 27 | May 27 | Jun 10 | Jun 13 | Jun 15 | Jun 29 | Jul 2 |

* Earliest and latest dates on which freezing temperatures have been recorded between 1941 and 1970.

TABLE 6. AUTUMN DATE OF FIRST CRITICAL FREEZE FOR A GIVEN RISK — CHARLOTTETOWN, P.E.I.

| | Date of first critical freeze | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature °C (°F) | | | | | | | | | | |
| Percent risk | 4 (39) | 3 (37) | 2 (36) | 1 (34) | 0 (32) | −1 (30) | −2 (28) | −3 (27) | −4 (25) | −5 (23) | −6 (21) |
| * Earliest | Aug 24 | Sep 3 | Sep 8 | Sep 20 | Sep 29 | Oct 1 | Oct 8 | Oct 20 | Nov 1 | Nov 3 | Nov 6 |
| 10 | Sep 4 | Sep 10 | Sep 18 | Sep 27 | Oct 6 | Oct 15 | Oct 21 | Oct 28 | Nov 5 | Nov 7 | Nov 10 |
| 15 | Sep 6 | Sep 13 | Sep 21 | Sep 29 | Oct 8 | Oct 17 | Oct 23 | Oct 31 | Nov 8 | Nov 10 | Nov 13 |
| 20 | Sep 8 | Sep 15 | Sep 23 | Oct 1 | Oct 10 | Oct 18 | Oct 25 | Nov 1 | Nov 9 | Nov 13 | Nov 15 |
| 25 | Sep 10 | Sep 17 | Sep 25 | Oct 3 | Oct 11 | Oct 20 | Oct 27 | Nov 3 | Nov 11 | Nov 15 | Nov 17 |
| 30 | Sep 12 | Sep 19 | Sep 27 | Oct 5 | Oct 13 | Oct 21 | Oct 29 | Nov 5 | Nov 13 | Nov 17 | Nov 19 |
| 35 | Sep 13 | Sep 21 | Sep 28 | Oct 6 | Oct 14 | Oct 22 | Oct 30 | Nov 6 | Nov 14 | Nov 18 | Nov 21 |
| 40 | Sep 15 | Sep 23 | Sep 30 | Oct 7 | Oct 15 | Oct 24 | Nov 1 | Nov 7 | Nov 15 | Nov 20 | Nov 23 |
| 45 | Sep 16 | Sep 24 | Oct 1 | Oct 8 | Oct 16 | Oct 25 | Nov 2 | Nov 8 | Nov 16 | Nov 22 | Nov 24 |
| 50 | Sep 17 | Sep 26 | Oct 3 | Oct 10 | Oct 17 | Oct 26 | Nov 3 | Nov 10 | Nov 18 | Nov 23 | Nov 26 |
| 55 | Sep 19 | Sep 27 | Oct 4 | Oct 11 | Oct 18 | Oct 27 | Nov 5 | Nov 11 | Nov 19 | Nov 25 | Nov 28 |
| 60 | Sep 20 | Sep 29 | Oct 6 | Oct 12 | Oct 19 | Oct 28 | Nov 6 | Nov 12 | Nov 20 | Nov 27 | Nov 29 |
| 65 | Sep 21 | Sep 30 | Oct 7 | Oct 14 | Oct 20 | Oct 29 | Nov 7 | Nov 14 | Nov 21 | Nov 28 | Dec 1 |
| 70 | Sep 23 | Oct 2 | Oct 9 | Oct 15 | Oct 21 | Oct 30 | Nov 9 | Nov 15 | Nov 23 | Nov 30 | Dec 3 |
| 75 | Sep 24 | Oct 4 | Oct 10 | Oct 16 | Oct 23 | Nov 1 | Nov 10 | Nov 16 | Nov 24 | Dec 2 | Dec 4 |
| 80 | Sep 26 | Oct 6 | Oct 12 | Oct 18 | Oct 24 | Nov 2 | Nov 12 | Nov 18 | Nov 26 | Dec 4 | Dec 7 |
| 85 | Sep 28 | Oct 8 | Oct 14 | Oct 20 | Oct 26 | Nov 4 | Nov 14 | Nov 20 | Nov 28 | Dec 7 | Dec 9 |
| 90 | Sep 30 | Oct 11 | Oct 17 | Oct 22 | Oct 28 | Nov 6 | Nov 17 | Nov 22 | Nov 30 | Dec 10 | Dec 12 |
| * Latest | Sep 30 | Oct 21 | Oct 22 | Oct 25 | Oct 31 | Nov 8 | Dec 6 | Dec 12 | Dec 13 | Dec 19 | Dec 20 |

* Earliest and latest dates on which freezing temperatures have been recorded between 1941 and 1970.

TABLE 7. SPRING DATE OF LAST CRITICAL FREEZE FOR A GIVEN RISK — FREDERICTON, N.B.

| | Date of last critical freeze | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature °C (°F) | | | | | | | | | | |
| Percent risk | −6 (21) | −5 (23) | −4 (25) | −3 (27) | −2 (28) | −1 (30) | 0 (32) | 1 (34) | 2 (36) | 3 (37) | 4 (39) |
| * Earliest | Mar 20 | Mar 20 | Mar 22 | Mar 29 | Apr 17 | Apr 23 | Apr 25 | May 3 | May 7 | May 20 | May 25 |
| 90 | Mar 27 | Mar 31 | Apr 4 | Apr 13 | Apr 23 | May 1 | May 6 | May 11 | May 22 | May 30 | Jun 4 |
| 85 | Mar 30 | Apr 3 | Apr 7 | Apr 16 | Apr 25 | May 3 | May 9 | May 14 | May 25 | Jun 1 | Jun 7 |
| 80 | Apr 2 | Apr 5 | Apr 9 | Apr 18 | Apr 27 | May 5 | May 10 | May 16 | May 27 | Jun 3 | Jun 8 |
| 75 | Apr 4 | Apr 7 | Apr 11 | Apr 20 | Apr 29 | May 6 | May 12 | May 18 | May 28 | Jun 4 | Jun 10 |
| 70 | Apr 6 | Apr 9 | Apr 13 | Apr 21 | Apr 30 | May 8 | May 13 | May 20 | May 30 | Jun 5 | Jun 11 |
| 65 | Apr 7 | Apr 10 | Apr 14 | Apr 23 | May 1 | May 9 | May 14 | May 22 | May 31 | Jun 6 | Jun 13 |
| 60 | Apr 9 | Apr 12 | Apr 16 | Apr 24 | May 2 | May 10 | May 16 | May 24 | Jun 1 | Jun 8 | Jun 14 |
| 55 | Apr 10 | Apr 14 | Apr 17 | Apr 25 | May 3 | May 11 | May 17 | May 25 | Jun 2 | Jun 8 | Jun 15 |
| 50 | Apr 12 | Apr 15 | Apr 19 | Apr 27 | May 4 | May 12 | May 18 | May 27 | Jun 4 | Jun 10 | Jun 16 |
| 45 | Apr 13 | Apr 17 | Apr 20 | Apr 28 | May 5 | May 13 | May 19 | May 28 | Jun 5 | Jun 11 | Jun 18 |
| 40 | Apr 15 | Apr 18 | Apr 22 | Apr 29 | May 6 | May 14 | May 20 | May 30 | Jun 6 | Jun 12 | Jun 19 |
| 35 | Apr 16 | Apr 20 | Apr 23 | May 1 | May 7 | May 15 | May 21 | May 31 | Jun 7 | Jun 13 | Jun 20 |
| 30 | Apr 18 | Apr 21 | Apr 25 | May 2 | May 9 | May 16 | May 23 | Jun 2 | Jun 9 | Jun 14 | Jun 21 |
| 25 | Apr 20 | Apr 23 | Apr 27 | May 4 | May 10 | May 17 | May 24 | Jun 4 | Jun 10 | Jun 15 | Jun 23 |
| 20 | Apr 22 | Apr 25 | Apr 29 | May 5 | May 11 | May 19 | May 25 | Jun 6 | Jun 12 | Jun 16 | Jun 24 |
| 15 | Apr 24 | Apr 28 | May 1 | May 7 | May 13 | May 20 | May 27 | Jun 8 | Jun 14 | Jun 18 | Jun 26 |
| 10 | Apr 27 | Apr 30 | May 4 | May 10 | May 15 | May 22 | May 29 | Jun 11 | Jun 16 | Jun 20 | Jun 28 |
| * Latest | May 8 | May 8 | May 15 | May 15 | May 25 | May 26 | Jun 14 | Jun 14 | Jul 7 | Jul 7 | Jul 7 |

* Earliest and latest dates on which freezing temperatures have been recorded between 1941 and 1970.

TABLE 8. AUTUMN DATE OF FIRST CRITICAL FREEZE FOR A GIVEN RISK — FREDERICTON, N.B.

| | Date of first critical freeze | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature °C (°F) | | | | | | | | | | |
| Percent risk | 4 (39) | 3 (37) | 2 (36) | 1 (34) | 0 (32) | −1 (30) | −2 (28) | −3 (27) | −4 (25) | −5 (23) | −6 (21) |
| *Earliest | Jul 31 | Aug 13 | Sep 1 | Sep 1 | Sep 11 | Sep 14 | Sep 14 | Sep 14 | Oct 7 | Oct 7 | Oct 7 |
| 10 | Aug 16 | Aug 30 | Sep 6 | Sep 8 | Sep 12 | Sep 20 | Sep 28 | Oct 2 | Oct 10 | Oct 17 | Oct 22 |
| 15 | Aug 19 | Sep 1 | Sep 8 | Sep 10 | Sep 15 | Sep 23 | Sep 30 | Oct 5 | Oct 13 | Oct 20 | Oct 25 |
| 20 | Aug 22 | Sep 3 | Sep 9 | Sep 12 | Sep 17 | Sep 25 | Oct 2 | Oct 7 | Oct 15 | Oct 22 | Oct 27 |
| 25 | Aug 24 | Sep 4 | Sep 10 | Sep 13 | Sep 19 | Sep 27 | Oct 4 | Oct 9 | Oct 17 | Oct 24 | Oct 29 |
| 30 | Aug 26 | Sep 5 | Sep 11 | Sep 15 | Sep 21 | Sep 29 | Oct 6 | Oct 10 | Oct 18 | Oct 25 | Oct 31 |
| 35 | Aug 28 | Sep 6 | Sep 12 | Sep 16 | Sep 22 | Sep 30 | Oct 7 | Oct 12 | Oct 20 | Oct 27 | Nov 1 |
| 40 | Aug 30 | Sep 8 | Sep 13 | Sep 17 | Sep 23 | Oct 2 | Oct 8 | Oct 13 | Oct 21 | Oct 28 | Nov 3 |
| 45 | Aug 31 | Sep 9 | Sep 14 | Sep 18 | Sep 25 | Oct 3 | Oct 10 | Oct 15 | Oct 22 | Oct 30 | Nov 4 |
| 50 | Sep 2 | Sep 10 | Sep 15 | Sep 19 | Sep 26 | Oct 4 | Oct 11 | Oct 16 | Oct 24 | Oct 31 | Nov 6 |
| 55 | Sep 4 | Sep 11 | Sep 16 | Sep 21 | Sep 28 | Oct 6 | Oct 12 | Oct 18 | Oct 25 | Nov 2 | Nov 7 |
| 60 | Sep 5 | Sep 12 | Sep 16 | Sep 22 | Sep 29 | Oct 7 | Oct 14 | Oct 19 | Oct 27 | Nov 3 | Nov 8 |
| 65 | Sep 7 | Sep 13 | Sep 17 | Sep 23 | Sep 30 | Oct 9 | Oct 15 | Oct 21 | Oct 28 | Nov 5 | Nov 10 |
| 70 | Sep 9 | Sep 14 | Sep 18 | Sep 24 | Oct 2 | Oct 10 | Oct 16 | Oct 22 | Oct 30 | Nov 6 | Nov 11 |
| 75 | Sep 11 | Sep 16 | Sep 19 | Sep 25 | Oct 3 | Oct 12 | Oct 18 | Oct 24 | Oct 31 | Nov 8 | Nov 13 |
| 80 | Sep 13 | Sep 17 | Sep 20 | Sep 27 | Oct 5 | Oct 14 | Oct 20 | Oct 26 | Nov 2 | Nov 10 | Nov 15 |
| 85 | Sep 16 | Sep 19 | Sep 21 | Sep 29 | Oct 7 | Oct 16 | Oct 22 | Oct 28 | Nov 4 | Nov 12 | Nov 17 |
| 90 | Sep 19 | Sep 21 | Sep 23 | Oct 1 | Oct 10 | Oct 19 | Oct 24 | Oct 31 | Nov 7 | Nov 14 | Nov 20 |
| *Latest | Sep 19 | Sep 25 | Sep 27 | Oct 7 | Oct 18 | Oct 24 | Nov 1 | Nov 10 | Nov 11 | Nov 21 | Nov 22 |

*Earliest and latest dates on which freezing temperatures have been recorded between 1941 and 1970.

TABLE 9. SPRING DATE OF LAST CRITICAL FREEZE FOR A GIVEN RISK — KENTVILLE, N.S.

| | Date of last critical freeze | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature °C (°F) | | | | | | | | | | |
| Percent risk | −6 (21) | −5 (23) | −4 (25) | −3 (27) | −2 (28) | −1 (30) | 0 (32) | 1 (34) | 2 (36) | 3 (37) | 4 (39) |
| * Earliest | Mar 21 | Mar 21 | Apr 4 | Apr 18 | Apr 22 | Apr 29 | May 2 | May 2 | May 19 | May 19 | Jun 1 |
| 90 | Mar 25 | Mar 30 | Apr 8 | Apr 20 | Apr 24 | Apr 29 | May 8 | May 16 | May 20 | May 29 | Jun 8 |
| 85 | Mar 28 | Apr 2 | Apr 11 | Apr 23 | Apr 26 | May 3 | May 11 | May 18 | May 23 | Jun 1 | Jun 10 |
| 80 | Mar 30 | Apr 5 | Apr 14 | Apr 25 | Apr 29 | May 5 | May 13 | May 20 | May 25 | Jun 3 | Jun 12 |
| 75 | Apr 2 | Apr 7 | Apr 16 | Apr 27 | May 1 | May 7 | May 15 | May 22 | May 27 | Jun 4 | Jun 13 |
| 70 | Apr 4 | Apr 9 | Apr 18 | Apr 28 | May 2 | May 9 | May 17 | May 24 | May 29 | Jun 6 | Jun 14 |
| 65 | Apr 5 | Apr 10 | Apr 19 | Apr 30 | May 4 | May 11 | May 18 | May 25 | May 31 | Jun 7 | Jun 15 |
| 60 | Apr 7 | Apr 12 | Apr 21 | May 1 | May 5 | May 13 | May 20 | May 27 | Jun 1 | Jun 8 | Jun 17 |
| 55 | Apr 9 | Apr 14 | Apr 22 | May 2 | May 7 | May 14 | May 22 | May 28 | Jun 3 | Jun 9 | Jun 18 |
| 50 | Apr 10 | Apr 15 | Apr 24 | May 4 | May 8 | May 16 | May 23 | May 29 | Jun 4 | Jun 11 | Jun 19 |
| 45 | Apr 12 | Apr 17 | Apr 26 | May 5 | May 10 | May 18 | May 25 | May 31 | Jun 6 | Jun 12 | Jun 20 |
| 40 | Apr 14 | Apr 19 | Apr 27 | May 6 | May 11 | May 19 | May 26 | Jun 1 | Jun 7 | Jun 13 | Jun 21 |
| 35 | Apr 15 | Apr 20 | Apr 29 | May 8 | May 12 | May 21 | May 28 | Jun 3 | Jun 9 | Jun 14 | Jun 22 |
| 30 | Apr 17 | Apr 22 | Apr 30 | May 9 | May 14 | May 23 | May 29 | Jun 4 | Jun 10 | Jun 16 | Jun 23 |
| 25 | Apr 19 | Apr 24 | May 2 | May 11 | May 16 | May 25 | May 31 | Jun 6 | Jun 12 | Jun 17 | Jun 25 |
| 20 | Apr 21 | Apr 26 | May 4 | May 12 | May 17 | May 27 | Jun 2 | Jun 7 | Jun 14 | Jun 19 | Jun 26 |
| 15 | Apr 24 | Apr 28 | May 7 | May 15 | May 20 | May 30 | Jun 4 | Jun 10 | Jun 16 | Jun 20 | Jun 28 |
| 10 | Apr 27 | May 1 | May 9 | May 17 | May 22 | Jun 2 | Jun 7 | Jun 12 | Jun 19 | Jun 23 | Jun 30 |
| * Latest | May 15 | May 15 | May 18 | May 26 | May 28 | Jun 8 | Jun 15 | Jun 19 | Jun 22 | Jun 28 | Jul 13 |

* Earliest and latest dates on which freezing temperatures have been recorded between 1941 and 1970.

TABLE 10. AUTUMN DATE OF FIRST CRITICAL FREEZE FOR A GIVEN RISK — KENTVILLE, N.S.

| | Date of first critical freeze | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature °C (°F) | | | | | | | | | | |
| Percent risk | 4 (39) | 3 (37) | 2 (36) | 1 (34) | 0 (32) | −1 (30) | −2 (28) | −3 (27) | −4 (25) | −5 (23) | −6 (21) |
| * Earliest | Jul 16 | Aug 22 | Aug 27 | Sep 6 | Sep 9 | Sep 10 | Sep 28 | Oct 6 | Oct 10 | Oct 11 | Oct 21 |
| 10 | Aug 6 | Aug 28 | Sep 2 | Sep 5 | Sep 10 | Sep 20 | Sep 29 | Oct 6 | Oct 13 | Oct 19 | Oct 23 |
| 15 | Aug 10 | Aug 30 | Sep 4 | Sep 8 | Sep 14 | Sep 23 | Oct 2 | Oct 10 | Oct 16 | Oct 23 | Oct 27 |
| 20 | Aug 14 | Sep 1 | Sep 6 | Sep 10 | Sep 17 | Sep 27 | Oct 5 | Oct 12 | Oct 19 | Oct 26 | Oct 30 |
| 25 | Aug 17 | Sep 2 | Sep 8 | Sep 12 | Sep 20 | Sep 29 | Oct 7 | Oct 15 | Oct 22 | Oct 28 | Nov 1 |
| 30 | Aug 20 | Sep 4 | Sep 9 | Sep 14 | Sep 22 | Oct 2 | Oct 9 | Oct 17 | Oct 24 | Oct 30 | Nov 3 |
| 35 | Aug 22 | Sep 5 | Sep 10 | Sep 16 | Sep 24 | Oct 4 | Oct 11 | Oct 18 | Oct 26 | Nov 1 | Nov 5 |
| 40 | Aug 25 | Sep 6 | Sep 12 | Sep 18 | Sep 26 | Oct 6 | Oct 13 | Oct 20 | Oct 28 | Nov 3 | Nov 7 |
| 45 | Aug 27 | Sep 7 | Sep 13 | Sep 19 | Sep 28 | Oct 8 | Oct 14 | Oct 22 | Oct 30 | Nov 5 | Nov 9 |
| 50 | Aug 29 | Sep 9 | Sep 14 | Sep 21 | Sep 30 | Oct 10 | Oct 16 | Oct 24 | Oct 31 | Nov 7 | Nov 11 |
| 55 | Sep 1 | Sep 10 | Sep 15 | Sep 23 | Oct 2 | Oct 12 | Oct 18 | Oct 25 | Nov 2 | Nov 9 | Nov 13 |
| 60 | Sep 3 | Sep 11 | Sep 16 | Sep 24 | Oct 4 | Oct 14 | Oct 20 | Oct 27 | Nov 4 | Nov 11 | Nov 15 |
| 65 | Sep 5 | Sep 12 | Sep 18 | Sep 26 | Oct 7 | Oct 16 | Oct 21 | Oct 29 | Nov 6 | Nov 13 | Nov 17 |
| 70 | Sep 8 | Sep 13 | Sep 19 | Sep 28 | Oct 9 | Oct 18 | Oct 23 | Oct 31 | Nov 8 | Nov 15 | Nov 19 |
| 75 | Sep 10 | Sep 15 | Sep 20 | Sep 30 | Oct 11 | Oct 20 | Oct 25 | Nov 2 | Nov 10 | Nov 17 | Nov 21 |
| 80 | Sep 13 | Sep 16 | Sep 22 | Oct 2 | Oct 14 | Oct 23 | Oct 28 | Nov 4 | Nov 13 | Nov 20 | Nov 24 |
| 85 | Sep 17 | Sep 18 | Sep 24 | Oct 4 | Oct 17 | Oct 26 | Oct 30 | Nov 7 | Nov 16 | Nov 23 | Nov 26 |
| 90 | Sep 21 | Sep 20 | Sep 26 | Oct 7 | Oct 21 | Oct 30 | Nov 3 | Nov 10 | Nov 19 | Nov 26 | Nov 30 |
| * Latest | Sep 22 | Sep 23 | Oct 12 | Oct 15 | Nov 3 | Nov 11 | Nov 18 | Nov 20 | Nov 24 | Dec 1 | Dec 2 |

* Earliest and latest dates on which freezing temperatures have been recorded between 1941 and 1970.

TABLE 11. SPRING DATE OF LAST CRITICAL FREEZE FOR A GIVEN RISK — NAPPAN, N.S.

| | Date of last critical freeze | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature °C (°F) | | | | | | | | | | |
| Percent risk | −6 (21) | −5 (23) | −4 (25) | −3 (27) | −2 (28) | −1 (30) | 0 (32) | 1 (34) | 2 (36) | 3 (37) | 4 (39) |
| * Earliest | Mar 20 | Mar 20 | Mar 20 | Apr 18 | Apr 20 | May 3 | May 7 | May 19 | May 21 | Jun 1 | Jun 1 |
| 90 | Mar 28 | Apr 3 | Apr 13 | Apr 23 | Apr 27 | May 7 | May 13 | May 20 | May 29 | Jun 6 | Jun 11 |
| 85 | Mar 31 | Apr 6 | Apr 15 | Apr 25 | Apr 29 | May 9 | May 15 | May 23 | May 31 | Jun 9 | Jun 14 |
| 80 | Apr 3 | Apr 9 | Apr 17 | Apr 27 | May 2 | May 11 | May 18 | May 25 | Jun 3 | Jun 11 | Jun 16 |
| 75 | Apr 5 | Apr 11 | Apr 19 | Apr 29 | May 3 | May 13 | May 20 | May 27 | Jun 5 | Jun 12 | Jun 17 |
| 70 | Apr 7 | Apr 13 | Apr 20 | Apr 30 | May 5 | May 14 | May 21 | May 28 | Jun 7 | Jun 14 | Jun 19 |
| 65 | Apr 9 | Apr 14 | Apr 22 | May 1 | May 6 | May 16 | May 23 | May 30 | Jun 8 | Jun 15 | Jun 20 |
| 60 | Apr 10 | Apr 16 | Apr 23 | May 3 | May 8 | May 17 | May 24 | May 31 | Jun 10 | Jun 16 | Jun 22 |
| 55 | Apr 12 | Apr 18 | Apr 24 | May 4 | May 9 | May 19 | May 26 | Jun 2 | Jun 12 | Jun 18 | Jun 23 |
| 50 | Apr 14 | Apr 19 | Apr 25 | May 5 | May 11 | May 20 | May 27 | Jun 3 | Jun 13 | Jun 19 | Jun 24 |
| 45 | Apr 15 | Apr 21 | Apr 26 | May 7 | May 12 | May 21 | May 29 | Jun 5 | Jun 15 | Jun 20 | Jun 26 |
| 40 | Apr 17 | Apr 22 | Apr 28 | May 8 | May 13 | May 22 | May 30 | Jun 6 | Jun 16 | Jun 21 | Jun 27 |
| 35 | Apr 19 | Apr 24 | Apr 29 | May 9 | May 15 | May 24 | May 31 | Jun 8 | Jun 18 | Jun 23 | Jun 29 |
| 30 | Apr 20 | Apr 26 | Apr 30 | May 10 | May 16 | May 25 | Jun 2 | Jun 9 | Jun 19 | Jun 24 | Jun 30 |
| 25 | Apr 22 | Apr 28 | May 2 | May 12 | May 18 | May 27 | Jun 4 | Jun 11 | Jun 21 | Jun 25 | Jul 1 |
| 20 | Apr 24 | Apr 30 | May 3 | May 14 | May 19 | May 29 | Jun 5 | Jun 13 | Jun 23 | Jun 27 | Jul 3 |
| 15 | Apr 27 | May 2 | May 5 | May 16 | May 22 | May 31 | Jun 8 | Jun 15 | Jun 26 | Jun 29 | Jul 5 |
| 10 | Apr 30 | May 5 | May 7 | May 18 | May 24 | Jun 2 | Jun 10 | Jun 18 | Jun 29 | Jul 1 | Jul 8 |
| * Latest | May 3 | May 15 | May 15 | May 27 | Jun 11 | Jun 11 | Jun 15 | Jun 26 | Jul 7 | Jul 7 | Jul 14 |

* Earliest and latest dates on which freezing temperatures have been recorded between 1941 and 1970.

TABLE 12. AUTUMN DATE OF FIRST CRITICAL FREEZE FOR A GIVEN RISK — NAPPAN, N.S.

| | Date of first critical freeze | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature °C (°F) | | | | | | | | | | |
| Percent risk | 4 (39) | 3 (37) | 2 (36) | 1 (34) | 0 (32) | −1 (30) | −2 (28) | −3 (27) | −4 (25) | −5 (23) | −6 (21) |
| * Earliest | Jul 16 | Jul 16 | Jul 16 | Aug 21 | Sep 3 | Sep 9 | Sep 14 | Sep 28 | Oct 1 | Oct 10 | Oct 10 |
| 10 | Jul 25 | Aug 2 | Aug 19 | Aug 29 | Sep 6 | Sep 7 | Sep 17 | Sep 28 | Oct 8 | Oct 17 | Oct 19 |
| 15 | Jul 29 | Aug 7 | Aug 22 | Sep 1 | Sep 8 | Sep 11 | Sep 21 | Oct 1 | Oct 11 | Oct 20 | Oct 22 |
| 20 | Aug 2 | Aug 11 | Aug 24 | Sep 3 | Sep 10 | Sep 14 | Sep 24 | Oct 4 | Oct 14 | Oct 22 | Oct 25 |
| 25 | Aug 5 | Aug 14 | Aug 27 | Sep 5 | Sep 11 | Sep 16 | Sep 27 | Oct 7 | Oct 16 | Oct 24 | Oct 27 |
| 30 | Aug 8 | Aug 16 | Aug 28 | Sep 6 | Sep 13 | Sep 18 | Sep 29 | Oct 9 | Oct 18 | Oct 26 | Oct 29 |
| 35 | Aug 10 | Aug 19 | Aug 30 | Sep 7 | Sep 14 | Sep 20 | Oct 1 | Oct 10 | Oct 20 | Oct 28 | Oct 31 |
| 40 | Aug 13 | Aug 21 | Sep 1 | Sep 9 | Sep 15 | Sep 22 | Oct 3 | Oct 12 | Oct 22 | Oct 30 | Nov 2 |
| 45 | Aug 15 | Aug 24 | Sep 2 | Sep 10 | Sep 17 | Sep 24 | Oct 5 | Oct 14 | Oct 24 | Oct 31 | Nov 3 |
| 50 | Aug 17 | Aug 26 | Sep 4 | Sep 12 | Sep 18 | Sep 26 | Oct 7 | Oct 16 | Oct 25 | Nov 2 | Nov 5 |
| 55 | Aug 20 | Aug 28 | Sep 6 | Sep 13 | Sep 19 | Sep 28 | Oct 9 | Oct 17 | Oct 27 | Nov 3 | Nov 7 |
| 60 | Aug 22 | Aug 31 | Sep 7 | Sep 14 | Sep 20 | Sep 29 | Oct 11 | Oct 19 | Oct 29 | Nov 5 | Nov 8 |
| 65 | Aug 24 | Sep 2 | Sep 9 | Sep 16 | Sep 21 | Oct 2 | Oct 13 | Oct 21 | Oct 31 | Nov 7 | Nov 10 |
| 70 | Aug 27 | Sep 5 | Sep 10 | Sep 17 | Sep 23 | Oct 3 | Oct 15 | Oct 23 | Nov 2 | Nov 8 | Nov 12 |
| 75 | Aug 30 | Sep 7 | Sep 12 | Sep 18 | Sep 24 | Oct 6 | Oct 17 | Oct 25 | Nov 4 | Nov 10 | Nov 14 |
| 80 | Sep 2 | Sep 11 | Sep 14 | Sep 20 | Sep 26 | Oct 8 | Oct 20 | Oct 27 | Nov 6 | Nov 12 | Nov 16 |
| 85 | Sep 5 | Sep 14 | Sep 17 | Sep 22 | Sep 28 | Oct 11 | Oct 23 | Oct 30 | Nov 9 | Nov 15 | Nov 18 |
| 90 | Sep 10 | Sep 19 | Sep 20 | Sep 25 | Sep 30 | Oct 14 | Oct 27 | Nov 2 | Nov 12 | Nov 18 | Nov 22 |
| * Latest | Sep 11 | Sep 19 | Sep 25 | Sep 25 | Oct 12 | Oct 26 | Nov 3 | Nov 11 | Nov 20 | Dec 1 | Dec 1 |

* Earliest and latest dates on which freezing temperatures have been recorded between 1941 and 1970.

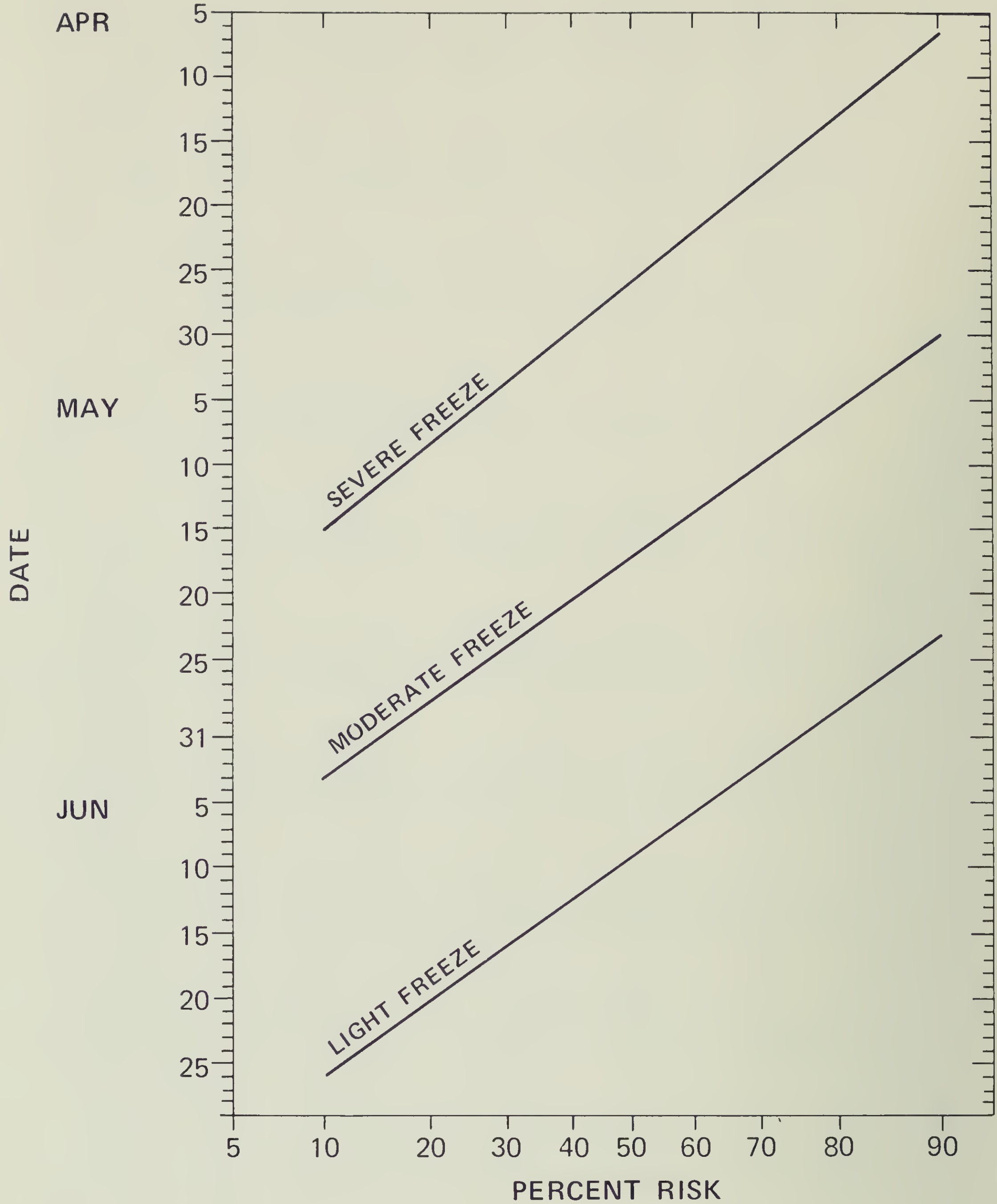


*Fig. 1. Probability of the severity of a spring freeze on a specific date — St. John's, Nfld.*

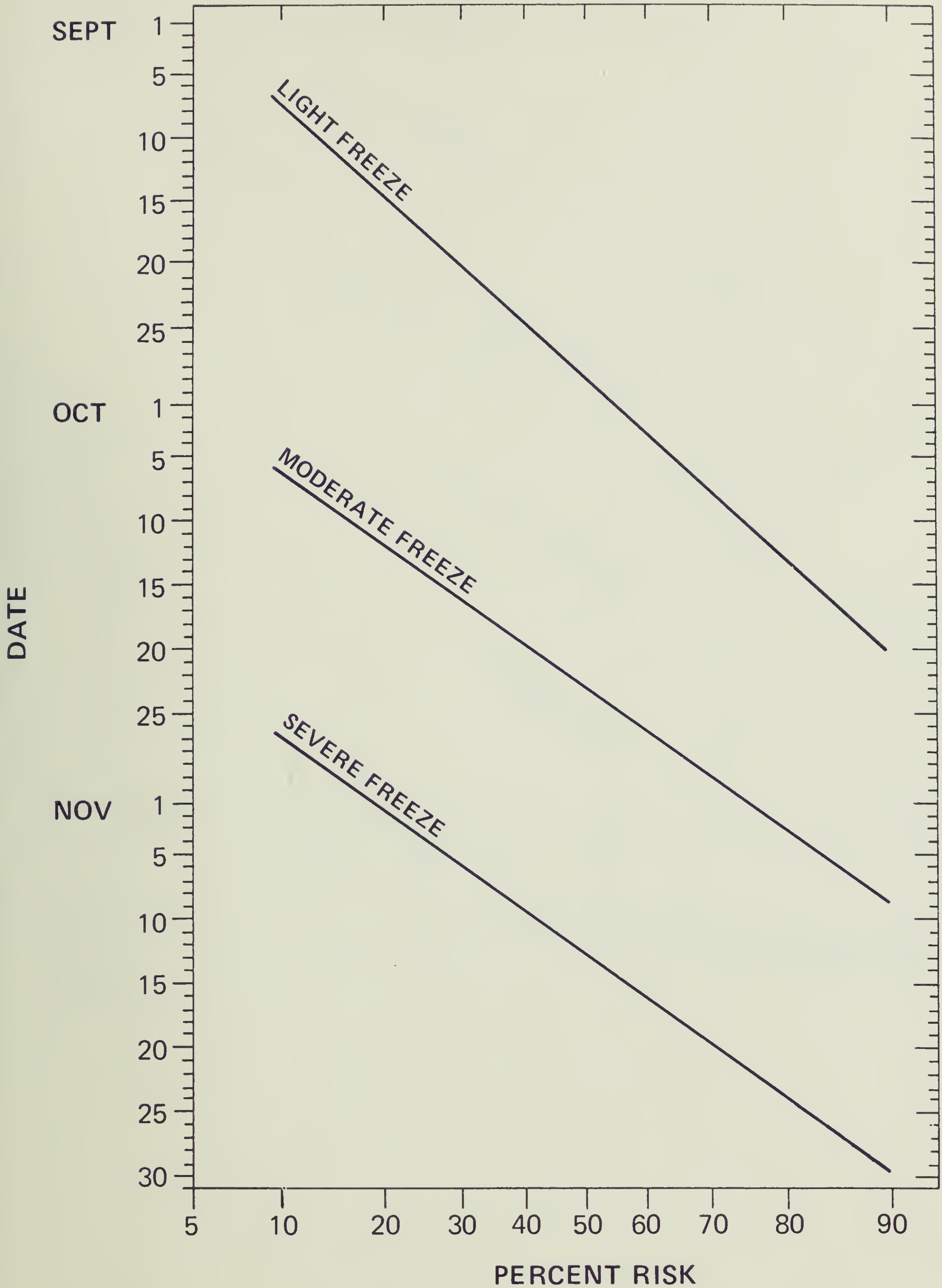


*Fig. 2. Probability of the severity of a fall freeze on a specific date — St. John's, Nfld.*

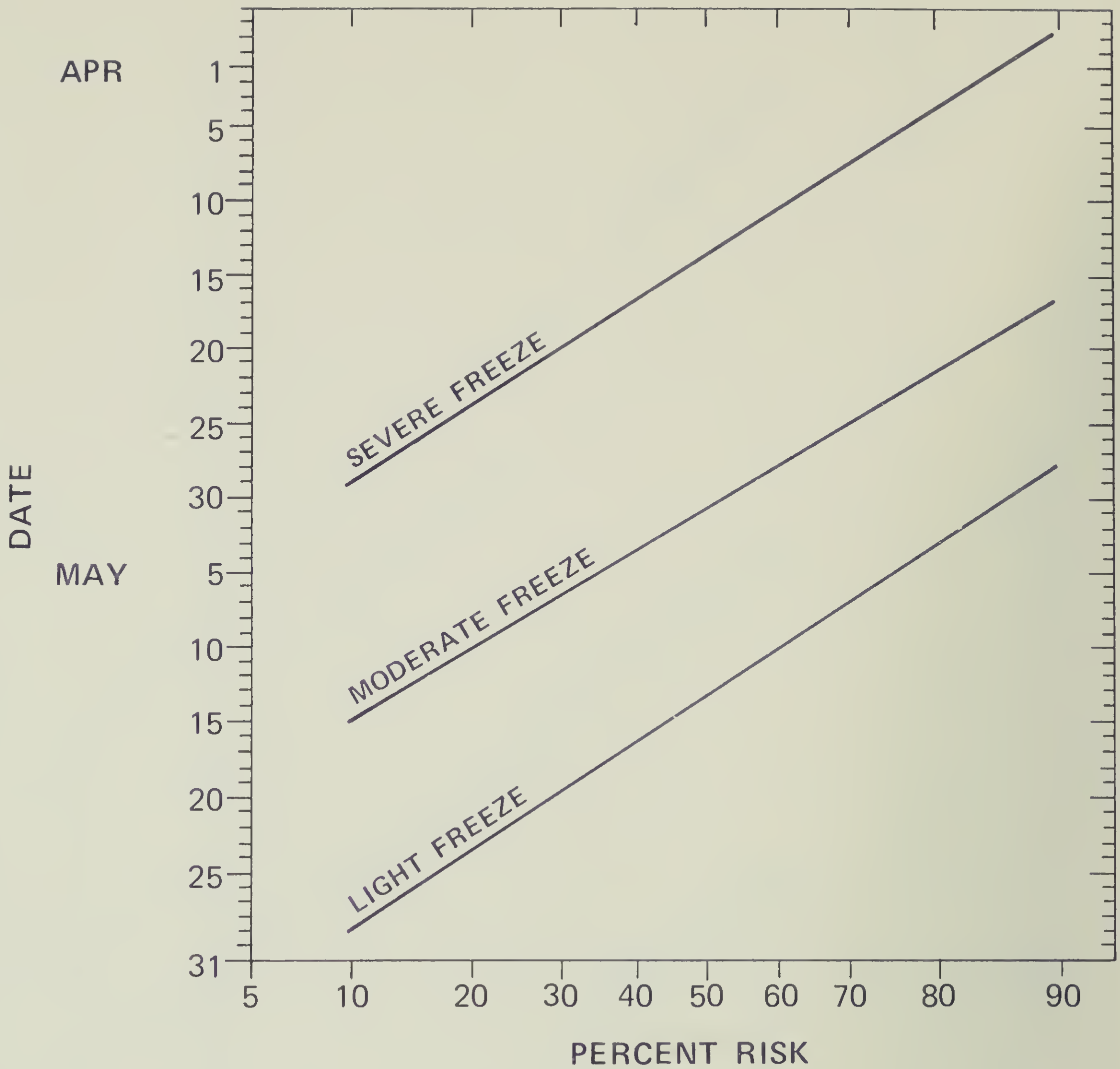


*Fig. 3. Probability of the severity of a spring freeze on a specific date — Charlottetown, P.E.I.*

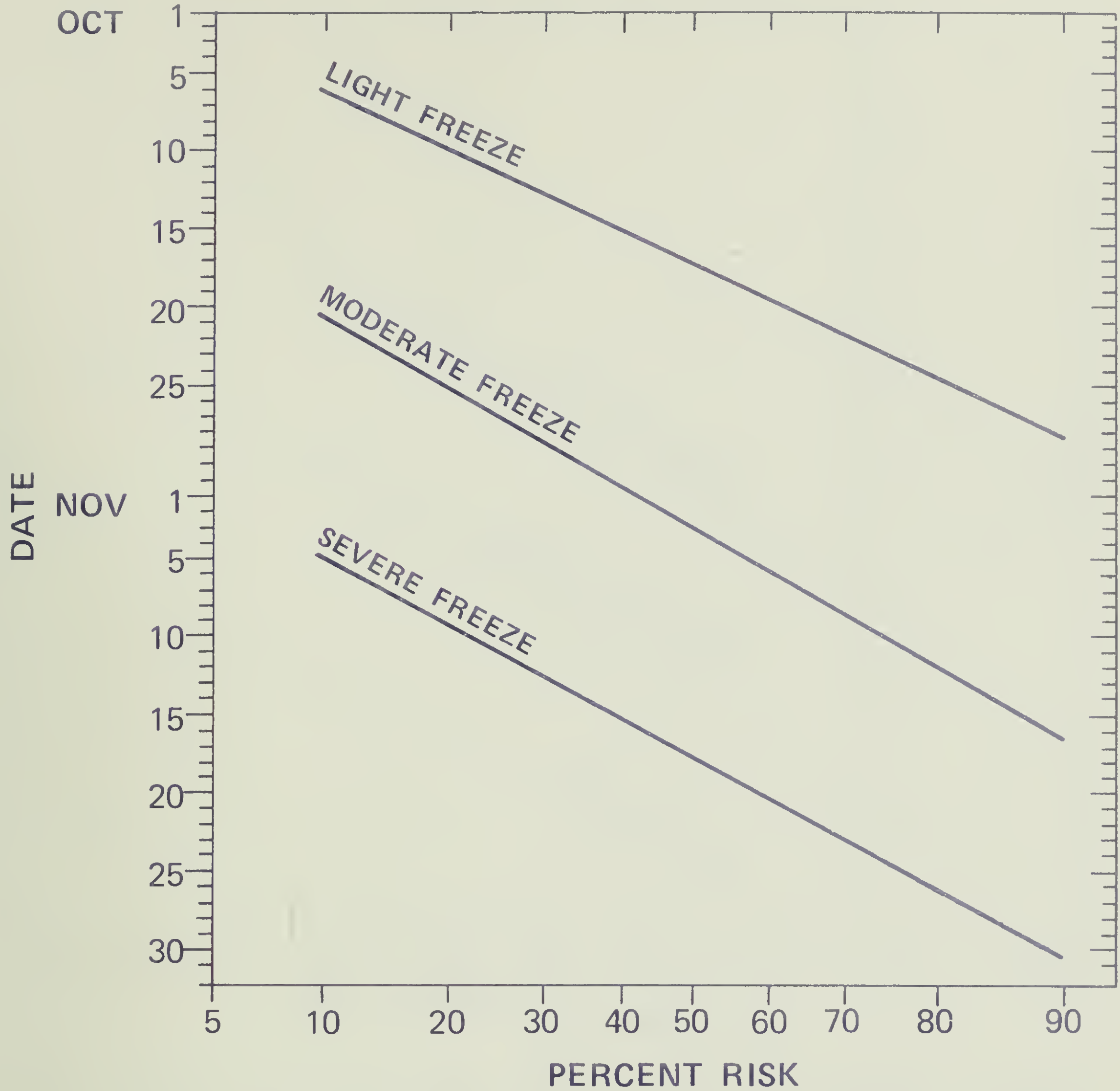


*Fig. 4. Probability of the severity of a fall freeze on a specific date — Charlottetown, P.E.I.*

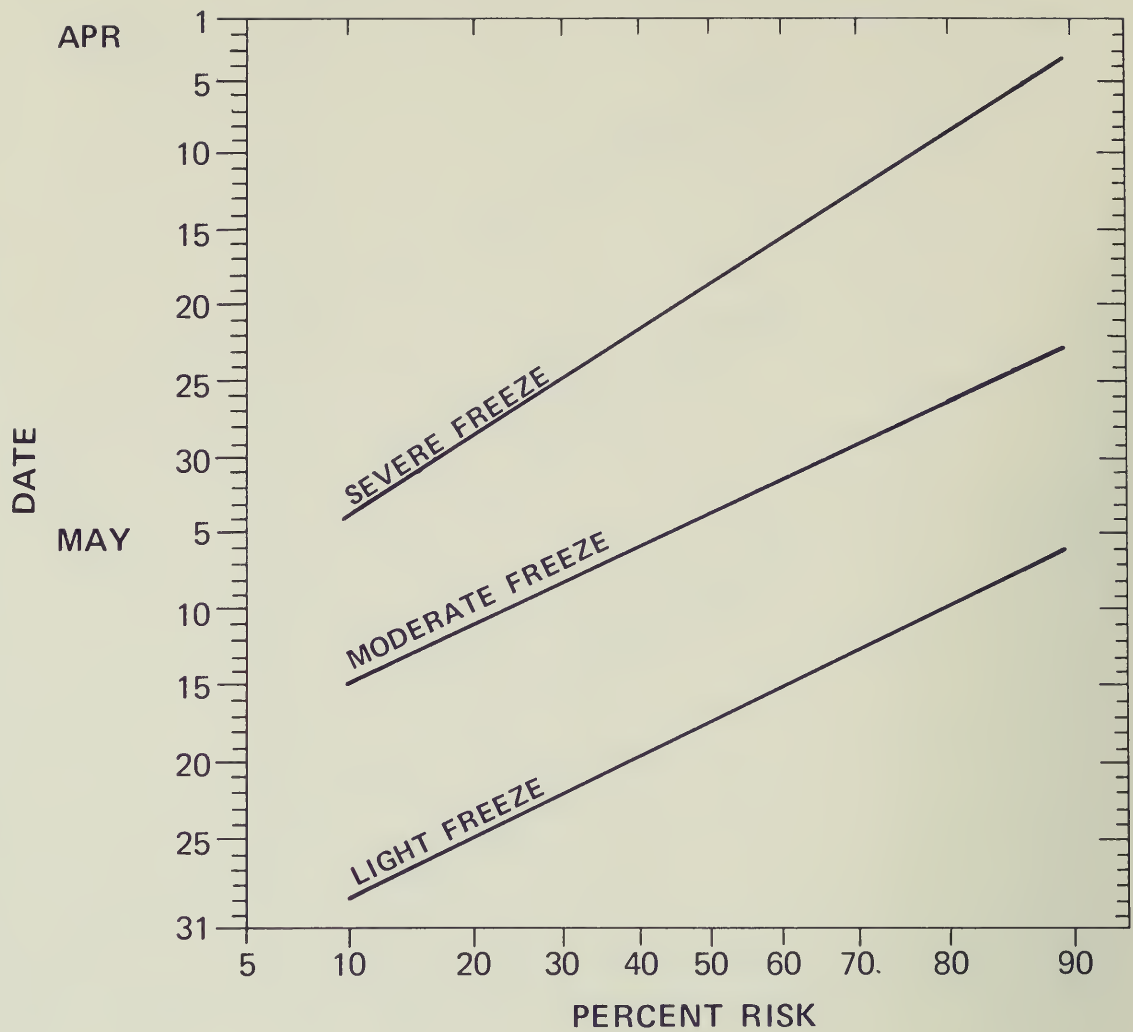


*Fig. 5. Probability of the severity of a spring freeze on a specific date — Fredericton, N.B.*

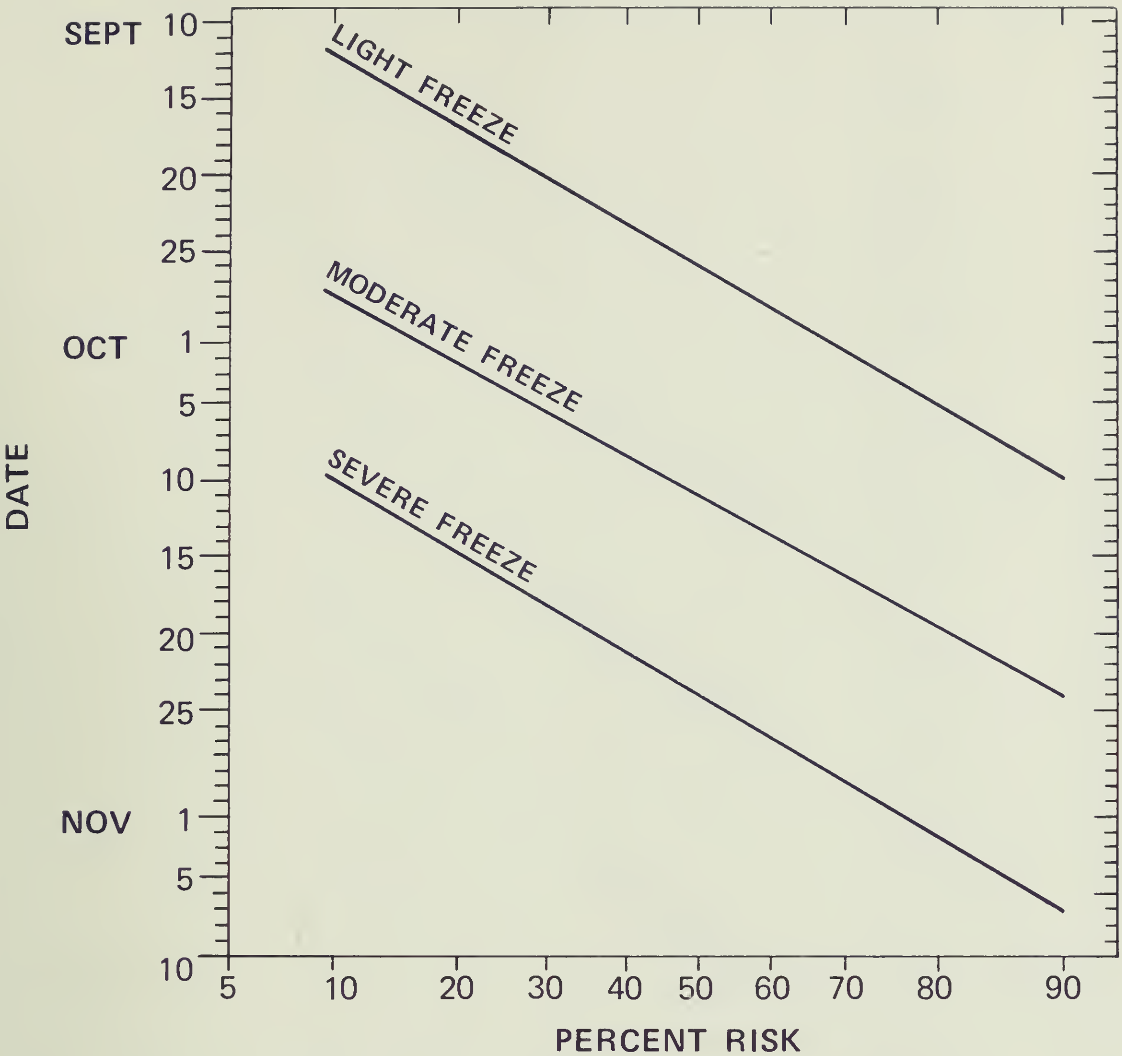


*Fig. 6. Probability of the severity of a fall freeze on a specific date — Fredericton, N.B.*

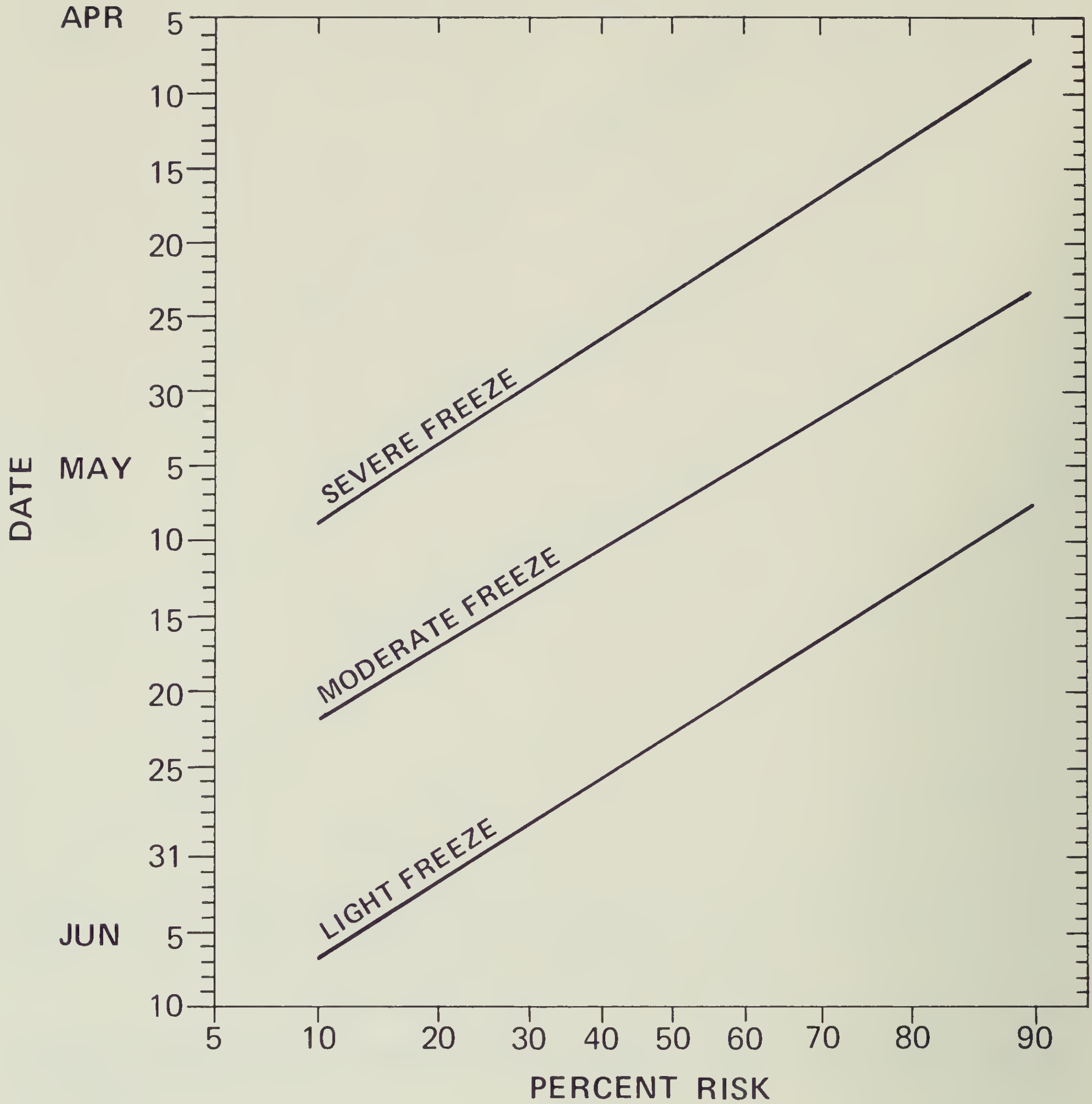


*Fig. 7. Probability of the severity of a spring freeze on a specific date — Kentville, N.S.*

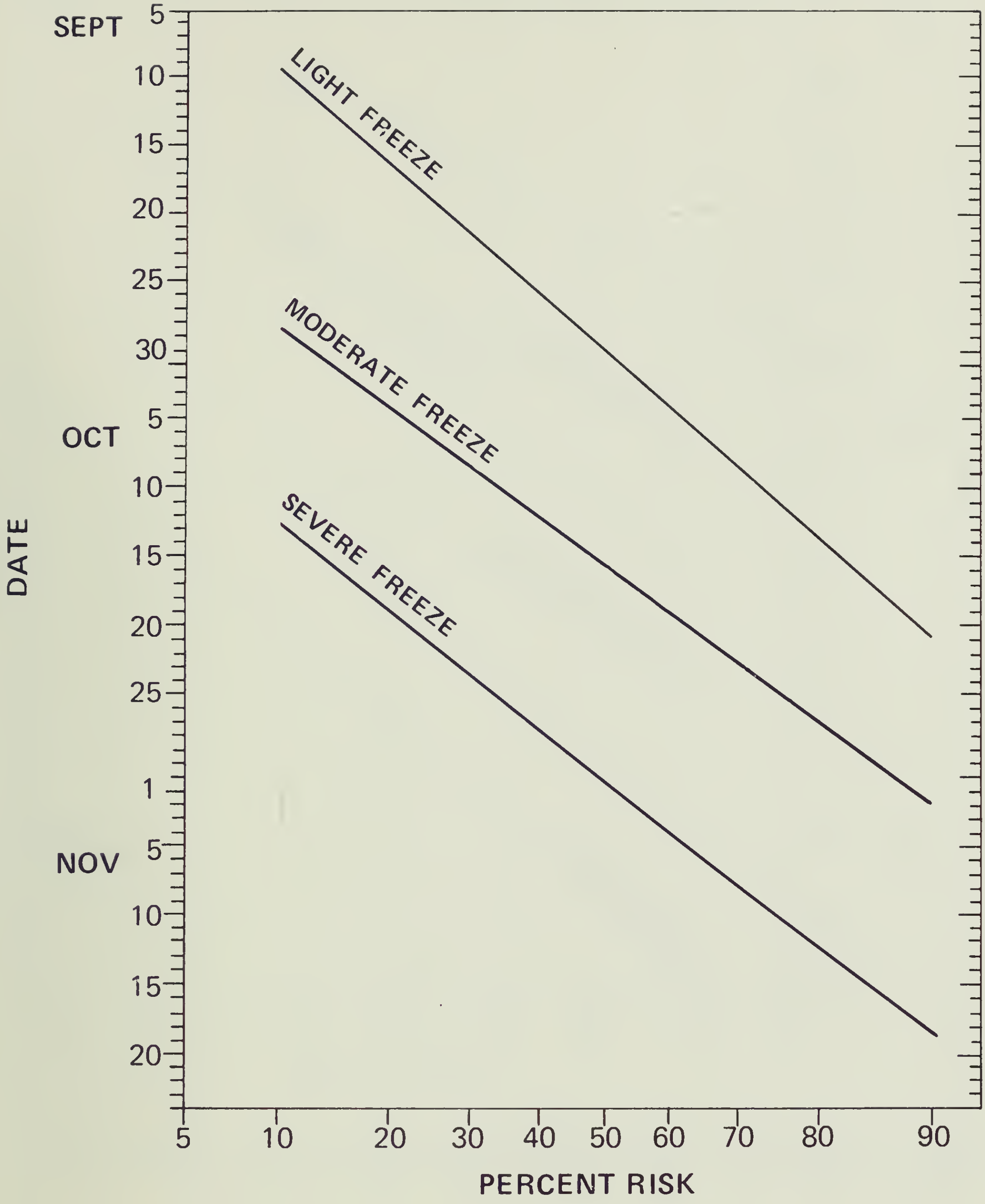


*Fig. 8. Probability of the severity of a fall freeze on a specific date — Kentville, N.S.*

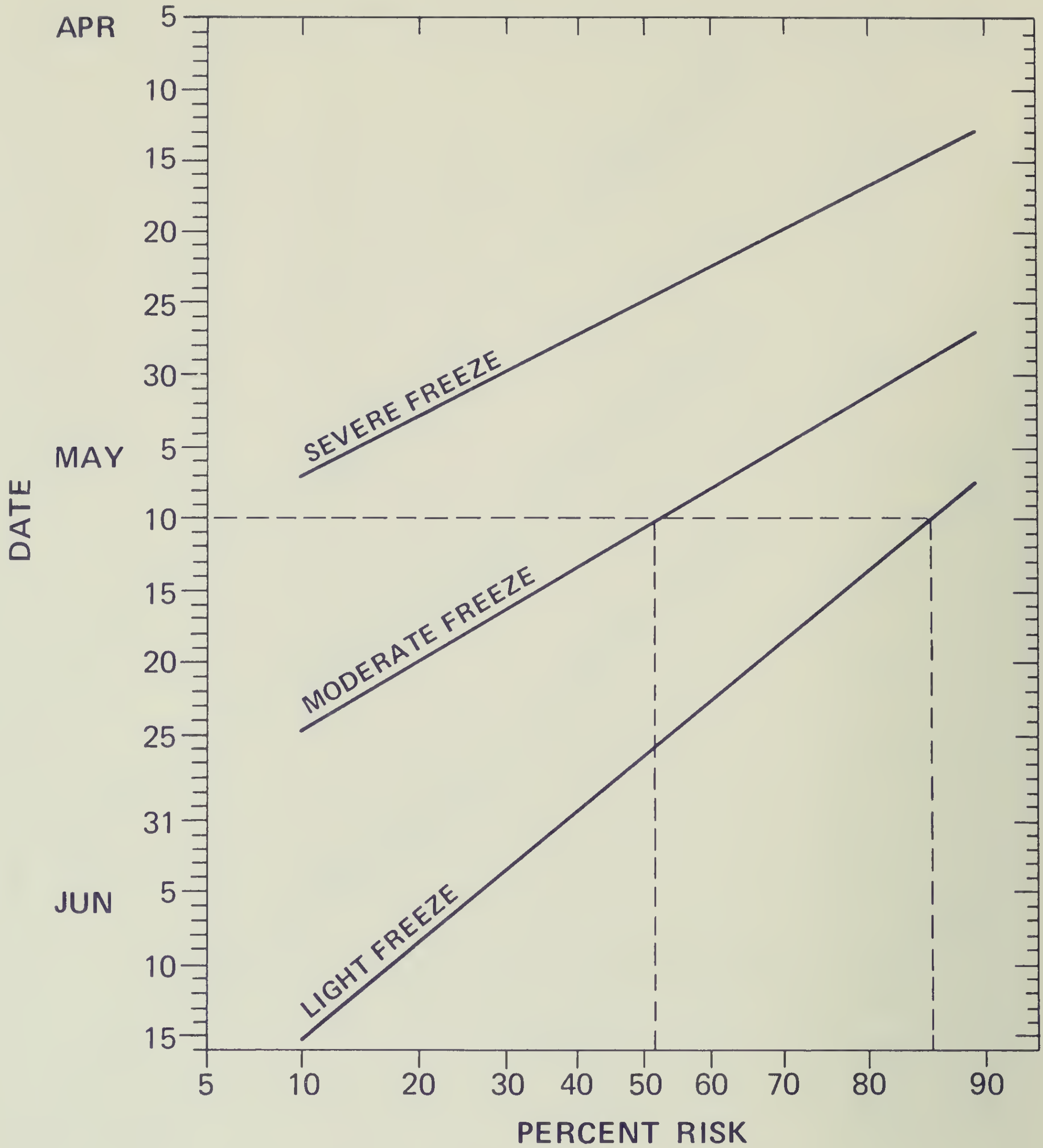


*Fig. 9. Probability of the severity of a spring freeze on a specific date — Nappan, N.S.*

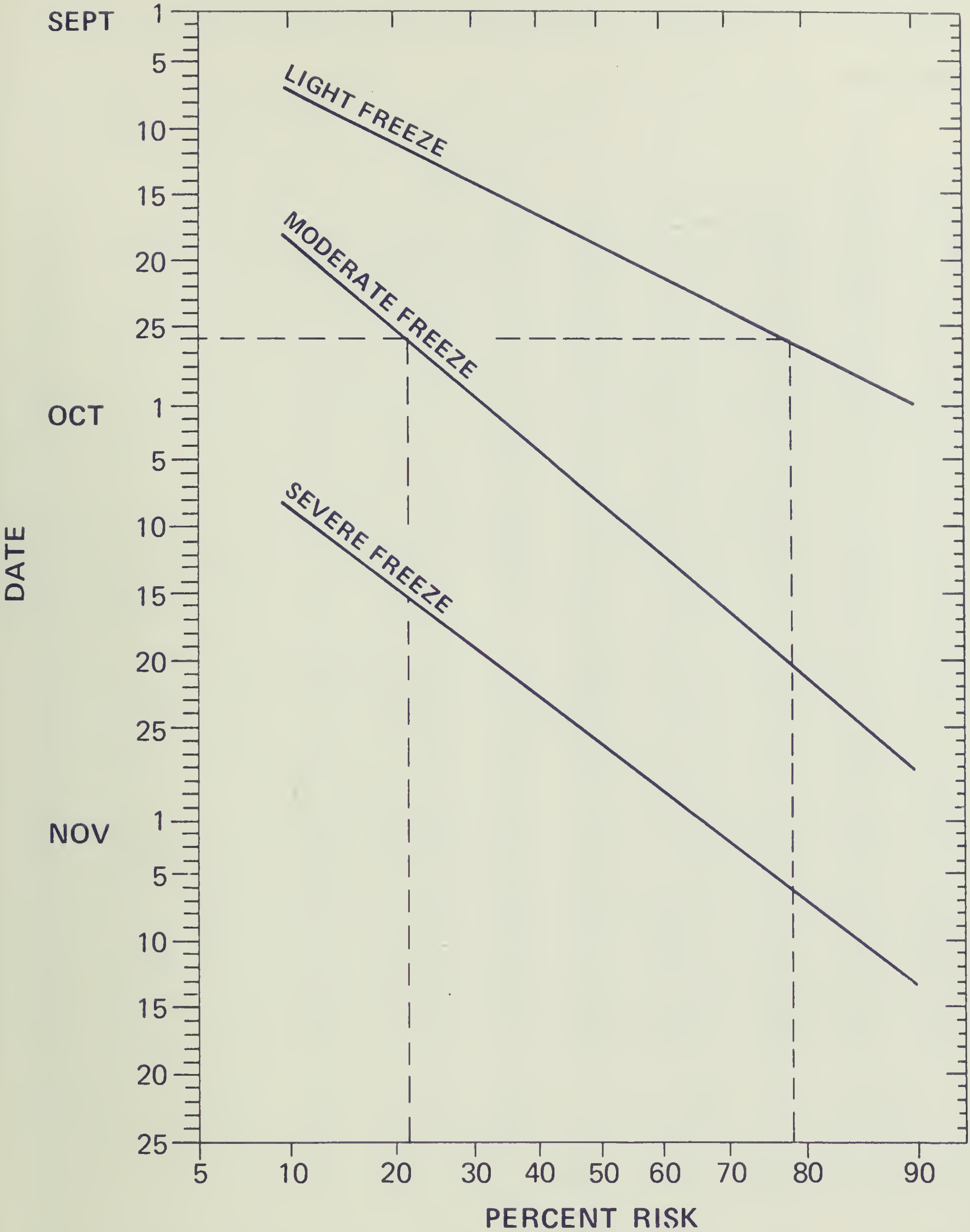


*Fig. 10. Probability of the severity of a fall freeze on a specific date — Nappan, N.S.*

APPENDIX 1. CONVERSION OF FAHRENHEIT TO CELSIUS DEGREES

| Fahrenheit | 0.0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | CELSIUS | | | | | |
| 20 | −6.67 | −6.61 | −6.56 | −6.50 | −6.44 | −6.39 | −6.33 | −6.28 | −6.22 | −6.17 |
| 21 | −6.11 | −6.06 | −6.00 | −5.94 | −5.89 | −5.83 | −5.78 | −5.72 | −5.67 | −5.61 |
| 22 | −5.56 | −5.50 | −5.44 | −5.39 | −5.33 | −5.28 | −5.22 | −5.17 | −5.11 | −5.06 |
| 23 | −5.00 | −4.94 | −4.89 | −4.83 | −4.78 | −4.72 | −4.67 | −4.61 | −4.56 | −4.50 |
| 24 | −4.44 | −4.39 | −4.33 | −4.28 | −4.22 | −4.17 | −4.11 | −4.06 | −4.00 | −3.94 |
| 25 | −3.89 | −3.83 | −3.78 | −3.72 | −3.67 | −3.61 | −3.56 | −3.50 | −3.44 | −3.39 |
| 26 | −3.33 | −3.28 | −3.22 | −3.17 | −3.11 | −3.06 | −3.00 | −2.94 | −2.89 | −2.83 |
| 27 | −2.78 | −2.72 | −2.67 | −2.61 | −2.56 | −2.50 | −2.44 | −2.39 | −2.33 | −2.28 |
| 28 | −2.22 | −2.17 | −2.11 | −2.06 | −2.00 | −1.94 | −1.89 | −1.83 | −1.78 | −1.72 |
| 29 | −1.67 | −1.61 | −1.56 | −1.50 | −1.44 | −1.39 | −1.33 | −1.28 | −1.22 | −1.17 |
| 30 | −1.11 | −1.06 | −1.00 | −0.94 | −0.89 | −0.83 | −0.78 | −0.72 | −0.67 | −0.61 |
| 31 | −0.56 | −0.50 | −0.44 | −0.39 | −0.33 | −0.28 | −0.22 | −0.17 | −0.11 | −0.06 |
| 32 | 0.00 | 0.06 | 0.11 | 0.17 | 0.22 | 0.28 | 0.33 | 0.39 | 0.44 | 0.50 |
| 33 | 0.56 | 0.61 | 0.67 | 0.72 | 0.78 | 0.83 | 0.89 | 0.94 | 1.00 | 1.06 |
| 34 | 1.11 | 1.17 | 1.22 | 1.28 | 1.33 | 1.39 | 1.44 | 1.50 | 1.56 | 1.61 |
| 35 | 1.67 | 1.72 | 1.78 | 1.83 | 1.89 | 1.94 | 2.00 | 2.06 | 2.11 | 2.17 |
| 36 | 2.22 | 2.28 | 2.33 | 2.39 | 2.44 | 2.50 | 2.56 | 2.61 | 2.67 | 2.72 |
| 37 | 2.78 | 2.83 | 2.89 | 2.94 | 3.00 | 3.06 | 3.11 | 3.17 | 3.22 | 3.28 |
| 38 | 3.33 | 3.39 | 3.44 | 3.50 | 3.56 | 3.61 | 3.67 | 3.72 | 3.78 | 3.83 |
| 39 | 3.89 | 3.94 | 4.00 | 4.06 | 4.11 | 4.17 | 4.22 | 4.28 | 4.33 | 4.39 |
| 40 | 4.44 | 4.50 | 4.56 | 4.61 | 4.67 | 4.72 | 4.78 | 4.83 | 4.89 | 4.94 |
| 41 | 5.00 | 5.06 | 5.11 | 5.17 | 5.22 | 5.28 | 5.33 | 5.39 | 5.44 | 5.50 |
| 42 | 5.56 | 5.61 | 5.67 | 5.72 | 5.78 | 5.83 | 5.89 | 5.94 | 6.00 | 6.06 |
| 43 | 6.11 | 6.17 | 6.22 | 6.28 | 6.33 | 6.39 | 6.44 | 6.50 | 6.56 | 6.61 |
| 44 | 6.67 | 6.72 | 6.78 | 6.83 | 6.89 | 6.94 | 7.00 | 7.06 | 7.11 | 7.17 |
| 45 | 7.22 | 7.28 | 7.33 | 7.39 | 7.44 | 7.50 | 7.56 | 7.61 | 7.67 | 7.72 |
| 46 | 7.78 | 7.83 | 7.89 | 7.94 | 8.00 | 8.06 | 8.11 | 8.17 | 8.22 | 8.28 |
| 47 | 8.33 | 8.39 | 8.44 | 8.50 | 8.56 | 8.61 | 8.67 | 8.72 | 8.78 | 8.83 |
| 48 | 8.89 | 8.94 | 9.00 | 9.06 | 9.11 | 9.17 | 9.22 | 9.28 | 9.33 | 9.39 |
| 49 | 9.44 | 9.50 | 9.56 | 9.61 | 9.67 | 9.72 | 9.78 | 9.83 | 9.89 | 9.94 |
| 50 | 10.00 | 10.06 | 10.11 | 10.17 | 10.22 | 10.28 | 10.33 | 10.39 | 10.44 | 10.50 |
| 51 | 10.56 | 10.61 | 10.67 | 10.72 | 10.78 | 10.83 | 10.89 | 10.94 | 11.00 | 11.06 |
| 52 | 11.11 | 11.17 | 11.22 | 11.28 | 11.33 | 11.39 | 11.44 | 11.50 | 11.56 | 11.61 |
| 53 | 11.67 | 11.72 | 11.78 | 11.83 | 11.89 | 11.94 | 12.00 | 12.06 | 12.11 | 12.17 |
| 54 | 12.22 | 12.28 | 12.33 | 12.39 | 12.44 | 12.50 | 12.56 | 12.61 | 12.67 | 12.72 |
| 55 | 12.78 | 12.83 | 12.89 | 12.94 | 13.00 | 13.06 | 13.11 | 13.17 | 13.22 | 13.28 |
| 56 | 13.33 | 13.39 | 13.44 | 13.50 | 13.56 | 13.61 | 13.67 | 13.72 | 13.78 | 13.83 |
| 57 | 13.89 | 13.94 | 14.00 | 14.06 | 14.11 | 14.17 | 14.22 | 14.28 | 14.33 | 14.39 |
| 58 | 14.44 | 14.50 | 14.56 | 14.61 | 14.67 | 14.72 | 14.78 | 14.83 | 14.89 | 14.94 |
| 59 | 15.00 | 15.06 | 15.11 | 15.17 | 15.22 | 15.28 | 15.33 | 15.39 | 15.44 | 15.50 |
| 60 | 15.56 | 15.61 | 15.67 | 15.72 | 15.78 | 15.83 | 15.89 | 15.94 | 16.00 | 16.06 |
| 61 | 16.11 | 16.17 | 16.22 | 16.28 | 16.33 | 16.39 | 16.44 | 16.50 | 16.56 | 16.61 |
| 62 | 16.67 | 16.72 | 16.78 | 16.83 | 16.89 | 16.94 | 17.00 | 17.06 | 17.11 | 17.17 |
| 63 | 17.22 | 17.28 | 17.33 | 17.39 | 17.44 | 17.50 | 17.56 | 17.61 | 17.67 | 17.72 |
| 64 | 17.78 | 17.83 | 17.89 | 17.94 | 18.00 | 18.06 | 18.11 | 18.17 | 18.22 | 18.28 |

APPENDIX 2. CONVERSION OF DATE TO DAY OF YEAR

| DATE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Day of year | | | | | | | |
| 1 | 1 | 32 | 60 | 91 | 121 | 152 | 182 | 213 | 244 | 274 | 305 | 335 |
| 2 | 2 | 33 | 61 | 92 | 122 | 153 | 183 | 214 | 245 | 275 | 306 | 336 |
| 3 | 3 | 34 | 62 | 93 | 123 | 154 | 184 | 215 | 246 | 276 | 307 | 337 |
| 4 | 4 | 35 | 63 | 94 | 124 | 155 | 185 | 216 | 247 | 277 | 308 | 338 |
| 5 | 5 | 36 | 64 | 95 | 125 | 156 | 186 | 217 | 248 | 278 | 309 | 339 |
| 6 | 6 | 37 | 65 | 96 | 126 | 157 | 187 | 218 | 249 | 279 | 310 | 340 |
| 7 | 7 | 38 | 66 | 97 | 127 | 158 | 188 | 219 | 250 | 280 | 311 | 341 |
| 8 | 8 | 39 | 67 | 98 | 128 | 159 | 189 | 220 | 251 | 281 | 312 | 342 |
| 9 | 9 | 40 | 68 | 99 | 129 | 160 | 190 | 221 | 252 | 282 | 313 | 343 |
| 10 | 10 | 41 | 69 | 100 | 130 | 161 | 191 | 222 | 253 | 283 | 314 | 344 |
| 11 | 11 | 42 | 70 | 101 | 131 | 162 | 192 | 223 | 254 | 284 | 315 | 345 |
| 12 | 12 | 43 | 71 | 102 | 132 | 163 | 193 | 224 | 255 | 285 | 316 | 346 |
| 13 | 13 | 44 | 72 | 103 | 133 | 164 | 194 | 225 | 256 | 286 | 317 | 347 |
| 14 | 14 | 45 | 73 | 104 | 134 | 165 | 195 | 226 | 257 | 287 | 318 | 348 |
| 15 | 15 | 46 | 74 | 105 | 135 | 166 | 196 | 227 | 258 | 288 | 319 | 349 |
| 16 | 16 | 47 | 75 | 106 | 136 | 167 | 197 | 228 | 259 | 289 | 320 | 350 |
| 17 | 17 | 48 | 76 | 107 | 137 | 168 | 198 | 229 | 260 | 290 | 321 | 351 |
| 18 | 18 | 49 | 77 | 108 | 138 | 169 | 199 | 230 | 261 | 291 | 322 | 352 |
| 19 | 19 | 50 | 78 | 109 | 139 | 170 | 200 | 231 | 262 | 292 | 323 | 353 |
| 20 | 20 | 51 | 79 | 110 | 140 | 171 | 201 | 232 | 263 | 293 | 324 | 354 |
| 21 | 21 | 52 | 80 | 111 | 141 | 172 | 202 | 233 | 264 | 294 | 325 | 355 |
| 22 | 22 | 53 | 81 | 112 | 142 | 173 | 203 | 234 | 265 | 295 | 326 | 356 |
| 23 | 23 | 54 | 82 | 113 | 143 | 174 | 204 | 235 | 266 | 296 | 327 | 357 |
| 24 | 24 | 55 | 83 | 114 | 144 | 175 | 205 | 236 | 267 | 297 | 328 | 358 |
| 25 | 25 | 56 | 84 | 115 | 145 | 176 | 206 | 237 | 268 | 298 | 329 | 359 |
| 26 | 26 | 57 | 85 | 116 | 146 | 177 | 207 | 238 | 269 | 299 | 330 | 360 |
| 27 | 27 | 58 | 86 | 117 | 147 | 178 | 208 | 239 | 270 | 300 | 331 | 361 |
| 28 | 28 | 59 | 87 | 118 | 148 | 179 | 209 | 240 | 271 | 301 | 332 | 362 |
| 29 | 29 | | 88 | 119 | 149 | 180 | 210 | 241 | 272 | 302 | 333 | 363 |
| 30 | 30 | | 89 | 120 | 150 | 181 | 211 | 242 | 273 | 303 | 334 | 364 |
| 31 | 31 | | 90 | | 151 | | 212 | 243 | | 304 | | 365 |

## CONVERSION FACTORS FOR METRIC SYSTEM

| Imperial units | Approximate conversion factor | Results in: | |
|---|---|---|---|
| **LINEAR** | | | |
| inch | x 25 | millimetre | (mm) |
| foot | x 30 | centimetre | (cm) |
| yard | x 0.9 | metre | (m) |
| mile | x 1.6 | kilometre | (km) |
| **AREA** | | | |
| square inch | x 6.5 | square centimetre | ($cm^2$) |
| square foot | x 0.09 | square metre | ($m^2$) |
| acre | x 0.40 | hectare | (ha) |
| **VOLUME** | | | |
| cubic inch | x 16 | cubic centimetre | ($cm^3$) |
| cubic foot | x 28 | cubic decimetre | ($dm^3$) |
| cubic yard | x 0.8 | cubic metre | ($m^3$) |
| fluid ounce | x 28 | millilitre | (ml) |
| pint | x 0.57 | litre | ($\ell$) |
| quart | x 1.1 | litre | ($\ell$) |
| gallon | x 4.5 | litre | ($\ell$) |
| **WEIGHT** | | | |
| ounce | x 28 | gram | (g) |
| pound | x 0.45 | kilogram | (kg) |
| short ton (2000 lb) | x 0.9 | tonne | (t) |
| **TEMPERATURE** | | | |
| degrees Fahrenheit | (°F-32) x 0.56 or (°F-32) x 5/9 | degrees Celsius | (°C) |
| **PRESSURE** | | | |
| pounds per square inch | x 6.9 | kilopascal | (kPa) |
| **POWER** | | | |
| horsepower | x 746 | watt | (W) |
| | x 0.75 | kilowatt | (kW) |
| **SPEED** | | | |
| feet per second | x 0.30 | metres per second | (m/s) |
| miles per hour | x 1.6 | kilometres per hour | (km/h) |
| **AGRICULTURE** | | | |
| gallons per acre | x 11.23 | litres per hectare | ($\ell$/ha) |
| quarts per acre | x 2.8 | litres per hectare | ($\ell$/ha) |
| pints per acre | x 1.4 | litres per hectare | ($\ell$/ha) |
| fluid ounces per acre | x 70 | millilitres per hectare | (ml/ha) |
| tons per acre | x 2.24 | tonnes per hectare | (t/ha) |
| pounds per acre | x 1.12 | kilograms per hectare | (kg/ha) |
| ounces per acre | x 70 | grams per hectare | (g/ha) |
| plants per acre | x 2.47 | plants per hectare | (plants/ha) |