Frost and minimum temperature probabilities

FROST is one of the climatic hazards with which primary producers must contend.

Its potential as a damaging agency has been well demonstrated over the years.

Many crops and pasture plants have varying degrees of susceptibility to frost. As a consequence, it is usual practice to adjust the time of sowing to minimize the risk of frost occurring at a critical growth stage.

It takes years of experience at any one location to become familiar with the pattern of frost occurrences and their variation from year to year. However, by looking at temperature data for the past 70 to 80 years, it is possible to obtain a good picture of frost occurrence patterns.

This article presents tables of probabilities associated with frost occurrence. This provides a basis for the planning for frost avoidance. Probabilities associated with minimum temperatures throughout the year are also tabulated. Minimum temperature is often important in relation to establishment, subsequent growth and flowering of crops.

The probabilities discussed have been derived from long-term temperature data which have been collated within the Department of Primary Industries. The locations for which these data are available to date are Charleville, Dalby, Emerald, Goondiwindi and Roma.

Computer programmes have been written to analyse these data and produce the tables presented in this article.

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Relation of minimum temperature to frost

The minimum daily temperature measured in a standard screen at 1·25 m above the ground has been used as the indicator of frost. A minimum temperature of 2°C in the screen will generally correspond to a light frost, whereas 0°C in the screen implies a heavy frost. However, caution must be taken here as the stability of the atmosphere is also important in determining whether or not a frost will occur. Hence, the specification based solely on minimum temperature can only be regarded as a rule of thumb.

The effect of local topography must also be considered. It is a well-known fact that frosts are more severe in the bottom of a valley or depression ('frost pockets') than on a slope. If a site is in a slight depression in relation to the meteorological recording station then it is likely that a 2°C minimum screen temperature will correspond with a heavy frost at the site. Conversely, a site on a slight rise in relation to the recording site may only receive a light frost when the minimum screen temperature is 0°C.

Local knowledge in conjunction with a few temperature measurements taken over a period of time at a particular site enable the correspondence between the site and the official recording site to be established. The most accurate use of the information presented in this article could then be made.

Explanation of tables

Three distinct types of tables have been produced for each station:

(i) First and last frost occurrence (tables in Appendix 1).

The body of each table gives the date of the first (or last) occurrence of a particular minimum screen temperature for a given risk. For convenience, the year has been divided at July 15 (approximately the coldest time of year). A first occurrence is that day prior to July 15 when the minimum temperature first goes below the specified temperature. A last occurrence is that day after July 15 when the minimum temperature last goes below the specified temperature.

The dates of the earliest and latest recorded first (last) occurrences of a particular temperature are also given. The probability at the base of the table is the chance of receiving the particular minimum temperature at all before (after) July 15.

For example, consider the table for Dalby (table 2). There is a 71% chance of receiving a minimum temperature of $-2°C$ or less before July 15 (that is, in 29% of years the minimum temperature did not go below $-2°C$ before July 15) and there is a 30% chance that such a temperature will occur before June 16. The earliest first occurrence on record for this minimum temperature is May 8 and the latest first occurrence recorded is July 14.

(ii) Minimum temperature probabilities (tables in Appendix 2).

The tables give the weekly mean minimum for a particular risk for each week of the year. The lowest and highest weekly mean minimum temperatures recorded to date are also given.

For example, at Charleville (table 6) there is a 30% chance (or risk) that in the week beginning October 8 the weekly mean minimum temperature will be $12·4°C$ or lower. The lowest and highest weekly mean minimum temperatures observed to date for that week are $7·1°C$ and $19·7°$ respectively.

(iii) Frost occurrence and duration percentage probabilities (tables in Appendix 3).

The tables give the probabilities for the relevant weeks in the year which have at least 1 day, 2 consecutive days or 3 consecutive days with minimum temperatures less than or equal to that specified. Thus, they detail the

chances related to the severity of frost throughout the season.

For example, at Emerald (table 13) there is a 13% chance of getting 2 consecutive days with minimum temperatures at or below $0°C$ in the week beginning July 2.

Use of tables

These tables present information that enables the risk, with respect to frost and minimum temperature, associated with a particular management decision to be accurately specified.

For example, with a winter crop such as wheat there is always the chance of getting a damaging frost at flowering if planting is early. Consider a property near Emerald where it is known that a minimum temperature of $0°C$ is critical. Looking at table 3 it is seen that there is a 30% risk of the last minimum temperature of $0°C$ or less for the year occurring after August 6. Table 13 shows the probabilities week by week and for $0°C$ they fall away from the beginning of August. Hence the grower may decide (depending on his attitude to risk) that planning for flowering in early August is reasonable and so will adjust his most desirable planting time for particular varieties accordingly.

Another example is with cotton where minimum soil temperature is an important consideration in crop establishment and frost before boll maturity is an important factor in the probability of a flower developing to a mature boll. The tables in Appendix 2 can be related to minimum soil temperatures so that the probability of this requirement being met by a particular date can be found. The tables in Appendix 1 and Appendix 3 enable the determination of the frost risk associated with time of flowering.

There are numerous situations where minimum temperature is a critical factor. Although the relationship between minimum temperature and frost occurrence is not exact, the specification of risks associated with minimum temperatures should prove useful as an aid to farmers in making management decisions. It should also help researchers develop and evaluate management strategies.

Appendix 1

Tables of the probability of the date of first and last frost occurrence for the year for specified minimum temperatures.

TABLE 1 CHARLEVILLE

		Date of First Frost for Year (i.e. before July 15)							Date of Last Frost for Year (i.e. after July 15)					
Temperature °C		3	2	1	0	−1	−2	Temperature °C		−2	−1	0	1	2	3
Earliest		Apr 16	Apr 22	Apr 24	May 8	May 9	May 9	Earliest		July 17	July 18	July 17	July 21	July 31	Aug 14
% Risk	10	Apr 26	May 3	May 10	May 19	May 29	June 6	% Risk	90	..	..	July 21	Aug 2	Aug 13	Aug 25
	30	May 7	May 14	May 22	June 1	June 13	June 21		70	..	July 25	Aug 4	Aug 14	Aug 26	Sept 5
	50	May 15	May 22	May 30	June 10	June 24	July 8		50	July 20	Aug 5	Aug 13	Aug 23	Sept 3	Sept 13
	70	May 23	May 30	June 7	June 21	July 9	..		30	Aug 4	Aug 14	Aug 21	Sept 1	Sept 12	Sept 21
	90	June 4	June 11	June 19	July 12	..	..		10	Aug 18	Aug 26	Sept 2	Sept 13	Sept 25	Oct 3
Latest		June 29	June 29	July 7	July 12	July 12	July 14	Latest		Sept 8	Sept 8	Sept 23	Oct 3	Oct 3	Oct 12
Probability (%)		100	99	99	90	76	60	Probability (%)		59	83	94	99	100	100

TABLE 2 DALBY

	Date of First Frost for Year (i.e. before July 15)							Date of Last Frost for Year (i.e. after July 15)					
Temperature °C	3	2	1	0	−1	−2	Temperature °C	−2	−1	0	1	2	3
Earliest	Apr 14	Apr 14	Apr 17	May 5	May 8	May 8	Earliest	July 18	July 18	July 18	July 17	Aug 12	Aug 17
% Risk 10	Apr 20	Apr 25	May 2	May 12	May 24	June 1	% Risk 90	..	..	July 28	Aug 14	Aug 24	Sept 2
30	May 2	May 8	May 16	May 25	June 5	June 16	70	July 19	July 31	Aug 12	Aug 25	Sept 4	Sept 13
50	May 10	May 17	May 25	June 4	June 15	June 27	50	Aug 1	Aug 10	Aug 21	Sept 2	Sept 12	Sept 20
70	May 18	May 26	June 4	June 14	June 27	July 13	30	Aug 11	Aug 19	Aug 30	Sept 10	Sept 19	Sept 28
90	May 29	June 8	June 18	July 2	..	..	10	Aug 23	Aug 31	Sept 11	Sept 21	Sept 30	Oct 8
Latest	June 21	June 25	July 11	July 14	July 14	July 14	Latest	Oct 6	Oct 6	Oct 18	Oct 18	Oct 30	Oct 30
Probability (%)	100	100	100	96	84	71	Probability (%)	72	85	96	100	100	100

TABLE 3 EMERALD

	Date of First Frost for Year (i.e. before July 15)							Date of Last Frost for Year (i.e. after July 15)					
Temperature °C	3	2	1	0	−1	−2	Temperature °C	−2	−1	0	1	2	3
Earliest	Apr 22	Apr 23	Apr 23	Apr 29	May 25	June 12	Earliest	July 17	July 17	July 17	July 18	July 18	July 19
% Risk 10	May 7	May 17	May 27	June 5	June 17	*	% Risk 90	*	..	..	..	July 22	Aug 3
30	May 21	May 31	June 12	June 22	July 13	*	70	*	..	..	July 25	Aug 7	Aug 17
50	May 31	June 10	June 22	July 8	..	*	50	*	..	July 26	Aug 6	Aug 17	Aug 26
70	June 10	June 21	July 8	..	..	*	30	*	July 25	Aug 6	Aug 16	Aug 26	Sept 4
90	June 24	July 11	..	..	..	*	10	*	Aug 12	Aug 18	Aug 28	Sept 7	Sept 17
Latest	July 9	July 11	July 12	July 14	July 14	July 14	Latest	Sept 8	Sept 8	Sept 9	Sept 18	Nov 4	Nov 4
Probability (%)	99	90	77	61	35	16	Probability (%)	30	42	63	80	94	100

* Insufficient occurrences for complete probability analysis

TABLE 4 GOONDIWINDI

		Date of First Frost for Year (i.e. before July 15)							Date of Last Frost for Year (i.e. after July 15)					
Temperature °C		3	2	1	0	−1	−2	Temperature °C		−2	−1	0	1	2	3
Earliest		Apr 5	Apr 17	May 8	May 8	May 9	May 17	Earliest		July 17	July 17	July 17	July 17	July 29	Aug 14
% Risk	10	Apr 29	May 6	May 14	May 25	June 3	June 14	% Risk	90	..	..	..	July 28	Aug 10	Aug 23
	30	May 10	May 18	May 28	June 9	June 18	June 28		70	..	..	July 30	Aug 12	Aug 23	Sept 4
	50	May 18	May 26	June 8	June 20	July 1	..		50	..	July 22	Aug 10	Aug 22	Sept 2	Sept 12
	70	May 26	June 3	June 18	July 4	..	..		30	July 19	Aug 7	Aug 20	Sept 1	Sept 11	Sept 20
	90	June 9	June 19	July 11	..	..	..		10	Aug 12	Aug 22	Sept 3	Sept 16	Sept 25	Oct 2
Latest		July 5	July 3	July 14	July 11	July 12	July 12	Latest		Sept 7	Sept 7	Sept 27	Oct 16	Oct 16	Oct 16
Probability (%)		99	97	92	81	66	48	Probability (%)		39	61	84	99	100	100

TABLE 5 ROMA

		Date of First Frost for Year (i.e. before July 15)							Date of Last Frost for Year (i.e. after July 15)					
Temperature °C		3	2	1	0	−1	−2	Temperature °C		−2	−1	0	1	2	3
Earliest		Mar 29	Apr 14	Apr 18	May 2	May 2	May 8	Earliest		July 18	July 20	July 20	July 20	July 20	July 28
% Risk	10	Apr 18	Apr 24	May 3	May 14	May 22	May 30	% Risk	90	..	July 20	July 29	Aug 10	Aug 22	Aug 31
	30	Apr 30	May 8	May 17	May 28	June 5	June 13		70	July 18	Aug 2	Aug 12	Aug 24	Sept 4	Sept 11
	50	May 8	May 17	May 27	June 7	June 15	June 25		50	Aug 1	Aug 12	Aug 20	Sept 2	Sept 12	Sept 19
	70	May 16	May 26	June 6	June 18	June 27	July 12		30	Aug 12	Aug 21	Aug 29	Sept 11	Sept 21	Sept 27
	90	May 27	June 9	June 23	July 8	..	..		10	Aug 26	Sept 1	Sept 10	Sept 25	Oct 4	Oct 9
Latest		June 19	June 28	July 11	July 15	July 14	July 14	Latest		Sept 13	Sept 14	Sept 26	Oct 2	Oct 25	Nov 2
Probability (%)		100	99	97	94	86	72	Probability (%)		71	90	97	100	100	100

Appendix 2

Tables of weekly mean minimum temperature for a given risk.

TABLE 6 CHARLEVILLE

WEEKLY MEAN MINIMUM TEMPERATURE (°C) FOR A GIVEN RISK

Week Beginning			Lowest Observed	Percentage Risk					Highest Observed
				10	30	50	70	90	
January 1	..	..	15·6	18·3	20·0	21·2	22·4	24·1	26·8
January 8	..	..	16·4	18·6	20·2	21·4	22·5	24·2	25·9
January 15	..	..	16·6	18·7	20·3	21·4	22·5	24·2	27·2
January 22	..	..	16·5	18·7	20·4	21·5	22·6	24·2	27·2
January 29	..	..	17·3	18·9	20·4	21·5	22·5	24·1	27·5
February 5	..	..	16·7	18·7	20·3	21·3	22·4	23·9	26·6
February 12	..	..	16·6	18·4	20·0	21·0	22·1	23·7	25·8
February 19	..	..	15·7	18·0	19·5	20·6	21·6	23·2	25·1
February 26	..	..	15·6	17·5	19·0	20·1	21·1	22·6	23·8
March 5	..	..	13·5	16·6	18·2	19·3	20·4	22·1	25·0
March 12	..	..	13·2	15·8	17·4	18·6	19·7	21·3	23·6
March 19	..	..	13·3	14·9	16·6	17·7	18·8	20·5	22·3
March 26	..	..	11·5	13·8	15·5	16·7	17·8 ·	19·5	21·8
April 2	..	..	10·3	12·6	14·3	15·5	16·7	18·4	19·9
April 9	..	..	7·3	11·0	12·9	14·2	15·5	17·4	19·4
April 16	..	..	5·7	9·3	11·3	12·7	14·1	16·1	18·6
April 23	..	..	4·3	7·7	9·9	11·3	12·8	15·0	17·5
April 30	..	..	4·2	6·6	8·8	10·3	11·7	13·9	16·6
May 7 ..	..	..	2·2	5·3	7·5	9·1	10·6	12·8	15·6
May 14 ..	..	..	0·6	4·2	6·5	8·1	9·6	11·9	14·1
May 21 ..	..	..	0·3	3·3	5·6	7·2	8·8	11·1	15·1
May 28 ..	..	..	0·8	2·7	5·0	6·5	8·1	10·4	14·2
June 4 ..	..	..	0·3	2·2	4·5	6·1	7·7	10·0	13·6
June 11 ..	..	..	0·4	1·6	4·0	5·7	7·4	9·8	13·2
June 18 ..	..	..	−1·8	0·9	3·4	5·1	6·8	9·3	12·7
June 25 ..	..	..	−2·4	0·5	2·9	4·5	6·2	8·6	12·9

TABLE 6 CHARLEVILLE—*continued*

WEEKLY MEAN MINIMUM TEMPERATURE (°C) FOR A GIVEN RISK

Week Beginning				Lowest Observed	Percentage Risk					Highest Observed
					10	30	50	70	90	
July 2	..	..	..	−1·4	0·4	2·7	4·3	5·9	8·2	11·6
July 9	..	..	..	−2·0	0·1	2·5	4·1	5·7	8·1	11·4
July 16	..	..	..	−1·9	0·1	2·4	3·9	5·4	7·6	12·2
July 23	..	..	..	−1·3	0·5	2·6	4·0	5·4	7·5	9·1
July 30	..	..	..	−1·7	1·0	3·0	4·4	5·8	7·8	10·7
August 6	..	..	..	−1·4	1·6	3·6	5·0	6·4	8·4	14·8
August 13	..	..	..	0·6	2·2	4·2	5·6	7·0	9·1	12·8
August 20	..	..	..	−0·2	3·0	5·1	6·5	7·9	9·9	12·0
August 27	..	..	..	2·0	4·0	6·0	7·4	8·8	10·8	13·3
September 3	..	..	..	3·0	5·0	7·0	8·4	9·8	11·8	14·3
September 10	..	..	..	3·5	6·0	8·0	9·3	10·7	12·7	14·8
September 17	..	..	..	4·8	6·8	8·8	10·1	11·5	13·5	15·7
September 24	..	..	..	3·5	7·8	9·8	11·2	12·6	14·6	15·4
October 1	..	..	..	5·8	9·2	11·2	12·6	13·9	15·9	19·2
October 8	..	..	..	7·1	10·6	12·4	13·7	14·9	16·7	19·7
October 15	..	..	..	8·8	11·7	13·4	14·5	15·6	17·3	18·5
October 22	..	..	..	10·0	12·6	14·3	15·4	16·5	18·2	21·2
October 29	..	..	..	9·1	13·4	15·2	16·3	17·5	19·3	23·0
November 5	..	..	..	12·2	14·0	15·8	17·1	18·3	20·1	24·3
November 12	..	..	..	11·4	14·8	16·6	17·9	19·1	21·0	24·0
November 19	..	..	..	13·7	15·4	17·2	18·4	19·6	21·4	23·9
November 26	..	..	..	14·5	16·0	17·8	19·0	20·2	22·0	24·1
December 3	..	..	..	11·0	16·3	18·1	19·3	20·6	22·4	24·2
December 10	..	..	..	12·9	17·0	18·7	19·9	21·1	22·8	25·7
December 17	..	..	..	15·7	17·5	19·2	20·4	21·6	23·3	25·1
December 24	..	..	..	14·1	17·8	19·6	20·8	22·1	23·8	26·9

TABLE 7 DALBY

WEEKLY MEAN MINIMUM TEMPERATURE (°C) FOR A GIVEN RISK

Week Beginning				Lowest Observed	Percentage Risk					Highest Observed
					10	30	50	70	90	
January 1	..	..	..	14·9	16·1	17·3	18·2	19·1	20·4	23·2
January 8	..	..	..	14·0	16·0	17·4	18·3	19·2	20·5	22·4
January 15	..	..	..	13·2	16·1	17·4	18·3	19·2	20·5	22·9
January 22	..	..	..	13·6	16·1	17·4	18·3	19·2	20·5	21·5
January 29	..	..	..	14·8	16·1	17·3	18·2	19·1	20·3	22·5
February 5	..	..	..	14·2	15·9	17·2	18·1	19·0	20·3	22·0
February 12	..	..	..	14·0	15·8	17·1	18·0	18·9	20·2	21·4
February 19	..	..	..	14·2	15·6	15·9	17·8	18·7	20·0	21·9
February 26	..	..	..	13·4	15·2	16·5	17·4	18·2	19·5	20·5
March 5	..	..	..	12·5	14·6	16·0	16·9	17·8	19·2	21·2
March 12	..	..	..	12·7	14·2	15·5	16·3	17·2	18·5	20·5
March 19	..	..	..	11·5	13·4	14·8	15·7	16·6	18·0	19·9
March 26	..	..	..	10·2	12·2	13·7	14·8	15·8	17·3	19·4
April 2	..	..	..	7·8	11·1	12·7	13·8	14·9	16·5	18·3
April 9	..	..	..	6·9	9·7	11·5	12·7	13·8	15·6	17·7
April 16	..	..	..	5·3	8·5	10·3	11·5	12·7	14·5	16·5
April 23	..	..	..	4·4	7·3	9·2	10·4	11·6	13·5	15·8
April 30	..	..	..	4·2	6·3	8·2	9·5	10·8	12·7	16·9
May 7 ..	..	..	..	1·8	5·1	7·1	8·5	9·8	11·9	15·6
May 14 ..	..	..	..	2·0	4·1	6·2	7·6	9·0	11·1	13·2
May 21 ..	..	..	..	0·6	3·3	5·4	6·9	8·4	10·5	15·5
May 28 ..	..	..	..	0·7	2·7	4·8	6·3	7·8	9·9	13·1
June 4 ..	..	..	..	−0·7	2·3	4·4	5·9	7·4	9·6	13·9
June 11 ..	..	..	..	0·3	1·7	4·0	5·6	7·1	9·4	12·1
June 18 ..	..	..	..	−2·3	0·9	3·2	4·9	6·5	8·9	11·5
June 25 ..	..	..	..	−3·8	0·2	2·6	4·3	5·9	8·3	12·7

TABLE 7 DALBY—*continued*

WEEKLY MEAN MINIMUM TEMPERATURE (°C) FOR A GIVEN RISK

Week Beginning				Lowest Observed	Percentage Risk					Highest Observed
					10	30	50	70	90	
July 2	..	..	..	−2·8	0·0	2·4	4·0	5·7	8·1	11·1
July 9	..	..	..	−2·4	−0·1	2·3	3·9	5·5	7·9	12·6
July 16	..	..	..	−2·5	−0·1	2·2	3·8	5·4	7·7	11·0
July 23	..	..	..	−1·8	0·3	2·5	3·9	5·4	7·6	10·9
July 30	..	..	..	−2·8	0·9	2·9	4·3	5·6	7·6	9·8
August 6	..	..	..	−1·7	1·5	3·4	4·7	6·0	7·8	10·1
August 13	..	..	..	−0·1	2·0	3·8	5·1	6·4	8·2	11·1
August 20	..	..	..	−0·4	2·7	4·5	5·7	6·9	8·7	11·6
August 27	..	..	..	−0·1	3·6	5·3	6·5	7·6	9·3	11·5
September 3	..	..	..	−0·9	4·4	6·1	7·3	8·5	10·2	12·2
September 10	..	..	..	2·6	5·3	7·1	8·3	9·4	11·2	12·5
September 17	..	..	..	2·0	6·1	7·8	9·0	10·2	12·0	14·6
September 24	..	..	..	0·2	7·0	8·8	10·0	11·2	12·9	14·3
October 1	..	..	..	−1·0	8·1	9·9	11·1	12·3	14·1	16·1
October 8	..	..	..	4·8	9·3	11·0	12·1	13·2	14·9	17·9
October 15	..	..	..	5·4	10·1	11·7	12·8	13·9	15·4	16·6
October 22	..	..	..	6·5	10·9	12·4	13·5	14·5	16·0	17·0
October 29	..	..	..	9·8	11·7	13·2	14·2	15·2	16·7	18·6
November 5	..	..	..	10·6	12·3	13·8	14·8	15·9	17·4	20·8
November 12	..	..	..	9·8	13·0	14·5	15·5	16·5	17·9	19·8
November 19	..	..	..	11·2	13·7	15·1	16·0	16·9	18·3	21·2
November 26	..	..	..	11·5	14·3	15·6	16·4	17·3	18·6	20·3
December 3	..	..	..	11·4	14·7	16·0	16·9	17·8	19·1	20·2
December 10	..	..	..	12·8	15·2	16·5	17·3	18·2	19·5	22·1
December 17	..	..	..	14·1	15·5	16·8	17·7	18·5	19·8	21·7
December 24	..	..	..	14·2	15·7	17·0	17·9	18·8	20·1	22·3

TABLE 8 EMERALD

WEEKLY MEAN MINIMUM TEMPERATURE (°C) FOR A GIVEN RISK

Week Beginning	Lowest Observed	Percentage Risk					Highest Observed
		10	30	50	70	90	
January 1	14·1	19·2	20·3	21·1	21·9	23·1	25·7
January 8	11·0	19·2	20·4	21·2	22·1	23·3	24·9
January 15	11·9	19·2	20·4	21·2	22·1	23·3	25·5
January 22	11·0	18·9	20·2	21·1	22·0	23·3	25·4
January 29	10·8	18·8	20·1	21·0	22·0	23·3	25·5
February 5	10·8	18·5	19·9	20·9	21·8	23·2	24·5
February 12	13·3	18·4	19·8	20·8	21·8	23·2	23·8
February 19	11·3	18·3	19·7	20·7	21·7	23·1	24·4
February 26	11·4	17·8	19·3	20·3	21·3	22·8	24·2
March 5	8·8	17·1	18·7	19·8	20·9	22·5	24·3
March 12	8·4	16·5	18·1	19·2	20·4	22·0	23·1
March 19	9·6	15·8	17·4	18·6	19·7	21·4	22·5
March 26	11·4	14·9	16·6	17·8	19·0	20·7	21·8
April 2	9·8	14·2	15·9	17·0	18·1	19·8	20·8
April 9	7·7	12·9	14·7	15·9	17·2	19·0	21·1
April 16	6·8	11·6	13·5	14·8	16·1	17·9	20·8
April 23	5·4	10·4	12·4	13·7	15·0	17·0	19·0
April 30	2·0	9·2	11·3	12·7	14·2	16·3	17·8
May 7	4·5	8·0	10·2	11·7	13·2	15·4	16·9
May 14	2·3	6·9	9·2	10·8	12·3	14·6	18·1
May 21	3·1	6·1	8·4	10·0	11·6	13·9	16·3
May 28	3·5	5·5	7·8	9·4	10·9	13·3	15·2
June 4	2·0	4·9	7·3	8·9	10·5	12·8	16·8
June 11	1·2	4·4	6·8	8·4	10·0	12·4	16·1
June 18	1·6	3·7	6·2	7·9	9·6	12·0	13·5
June 25	−1·5	3·0	5·6	7·4	9·2	11·7	15·8

TABLE 8 EMERALD—*continued*

WEEKLY MEAN MINIMUM TEMPERATURE (°C) FOR A GIVEN RISK

Week Beginning				Lowest Observed	Percentage Risk					Highest Observed
					10	30	50	70	90	
July 2	..	..	..	−0·4	2·9	5·4	7·2	8·9	11·5	13·4
July 9	..	..	..	−1·1	2·5	5·2	7·0	8·8	11·4	14·1
July 16	..	..	..	0·1	2·4	4·9	6·5	8·2	10·7	9·5
July 23	..	..	..	−0·9	2·3	4·7	6·3	8·0	10·3	13·9
July 30	..	..	..	−0·1	2·8	5·1	6·7	8·3	10·6	13·0
August 6	..	..	..	1·3	3·5	5·7	7·3	8·8	11·1	16·1
August 13	..	..	..	0·8	4·3	6·4	7·9	9·4	11·6	14·5
August 20	..	..	..	2·6	5·2	7·3	8·7	10·0	12·2	14·6
August 27	..	..	..	2·1	6·1	8·2	9·6	11·0	13·0	15·6
September 3	..	..	..	5·6	7·2	9·2	10·5	11·8	13·7	15·1
September 10	..	..	..	6·5	8·4	10·2	11·5	12·7	14·6	15·7
September 17	..	..	..	6·0	9·3	11·1	12·3	13·6	15·4	18·9
September 24	..	..	..	8·7	10·3	12·1	13·3	14·6	16·4	19·6
October 1	..	..	..	9·2	11·5	13·2	14·4	15·6	17·4	18·9
October 8	..	..	..	8·8	12·7	14·3	15·5	16·6	18·3	19·7
October 15	..	..	..	11·4	13·6	15·1	16·2	17·3	18·9	20·0
October 22	..	..	..	12·0	14·4	15·9	16·9	18·0	19·5	20·2
October 29	..	..	..	10·3	15·1	16·6	17·6	18·6	20·1	21·9
November 5	..	..	..	12·9	15·8	17·2	18·2	19·1	20·6	22·5
November 12	..	..	..	13·1	16·6	17·9	18·8	19·7	21·0	22·5
November 19	..	..	..	15·7	17·3	18·4	19·3	20·1	21·3	22·3
November 26	..	..	..	15·7	17·7	18·9	19·7	20·5	21·6	22·1
December 3	..	..	..	14·6	18·0	19·2	20·1	21·0	22·2	24·1
December 10	..	..	..	15·2	18·5	19·7	20·5	21·3	22·5	23·4
December 17	..	..	..	12·8	18·7	19·9	20·7	21·5	22·7	24·1
December 24	..	..	..	13·1	18·9	20·0	20·9	21·7	22·8	24·3

TABLE 9 GOONDIWINDI

Weekly Mean Minimum Temperature (°C) for a Given Risk

Week Beginning	Lowest Observed	Percentage Risk					Highest Observed
		10	30	50	70	90	
January 1	15·6	17·1	18·6	19·6	20·6	22·1	25·5
January 8	15·5	17·1	18·6	19·7	20·7	22·2	24·9
January 15	14·7	17·2	18·7	19·7	20·7	22·1	25·6
January 22	16·0	17·3	18·7	19·7	20·7	22·1	24·2
January 29	12·1	17·2	18·6	19·5	20·5	21·9	24·0
February 5	14·3	17·1	18·5	19·5	20·4	21·8	24·3
February 12	12·1	16·8	18·3	19·3	20·3	21·8	23·2
February 19	12·0	16·4	17·9	18·9	20·0	21·5	23·3
February 26	11·9	16·1	17·5	18·5	19·4	20·8	21·8
March 5	11·3	15·3	16·9	17·9	18·9	20·4	22·8
March 12	11·1	14·7	16·2	17·3	18·3	19·8	23·0
March 19	7·9	14·1	15·5	16·6	17·6	19·0	21·3
March 26	10·1	13·0	14·6	15·6	16·7	18·2	20·3
April 2	8·7	12·0	13·6	14·6	15·7	17·2	20·1
April 9	8·4	10·8	12·4	13·5	14·5	16·1	17·8
April 16	7·1	9·6	11·2	12·3	13·3	14·9	17·8
April 23	5·4	8·2	9·9	11·1	12·3	14·0	15·8
April 30	4·9	7·2	9·0	10·2	11·4	13·2	15·0
May 7	4·2	5·9	7·9	9·2	10·5	12·4	14·5
May 14	3·0	4·9	6·9	8·3	9·7	11·7	14·5
May 21	1·4	4·0	6·1	7·6	9·0	11·1	15·3
May 28	−1·5	3·4	5·5	6·9	8·3	10·3	11·9
June 4	−1·7	3·0	5·0	6·5	7·9	10·0	13·8
June 11	−0·5	2·6	4·7	6·2	7·6	9·7	12·4
June 18	−0·6	1·9	4·1	5·6	7·1	9·3	11·8
June 25	−4·5	1·4	3·6	5·1	6·6	8·7	11·8

TABLE 9 GOONDIWINDI—*continued*

WEEKLY MEAN MINIMUM TEMPERATURE (°C) FOR A GIVEN RISK

Week Beginning				Lowest Observed	Percentage Risk					Highest Observed
					10	30	50	70	90	
July 2	..	..	..	−2·7	1·3	3·4	4·9	6·3	8·5	11·8
July 9	..	..	..	−2·1	1·2	3·2	4·6	6·0	8·1	12·3
July 16	..	..	..	−0·9	1·2	3·1	4·4	5·7	7·7	13·8
July 23	..	..	..	−1·1	1·5	3·4	4·7	5·9	7·8	10·6
July 30	..	..	..	−1·2	2·0	3·8	5·0	6·2	8·0	9·8
August 6	..	..	..	1·2	2·7	4·3	5·5	6·7	8·4	9·7
August 13	..	..	..	1·3	3·0	4·7	5·9	7·1	8·8	10·7
August 20	..	..	..	1·2	3·7	5·4	6·6	7·7	9·4	11·2
August 27	..	..	..	2·8	4·5	6·1	7·2	8·3	9·9	12·9
September 3	..	..	..	4·3	5·3	6·9	8·0	9·1	10·8	13·7
September 10	..	..	..	2·7	6·1	7·8	9·0	10·2	11·8	13·7
September 17	..	..	..	3·8	6·8	8·5	9·7	10·9	12·7	14·3
September 24	..	..	..	4·1	7·7	9·5	10·7	11·9	13·7	15·1
October 1	..	..	..	6·4	8·9	10·6	11·9	13·1	14·8	18·2
October 8	..	..	..	7·3	10·1	11·7	12·8	13·9	15·6	18·0
October 15	..	..	..	9·6	11·0	12·5	13·5	14·6	16·1	18·0
October 22	..	..	..	10·6	11·7	13·2	14·3	15·3	16·9	18·4
October 29	..	..	..	8·8	12·4	14·0	15·1	16·2	17·8	19·8
November 5	..	..	..	10·6	13·1	14·7	15·8	16·9	18·6	21·8
November 12	..	..	..	10·0	13·9	15·5	16·6	17·6	19·2	21·1
November 19	..	..	..	12·7	14·5	16·0	17·1	18·1	19·7	23·1
November 26	..	..	..	13·1	15·1	16·6	17·6	18·6	20·1	22·2
December 3	..	..	..	13·4	15·5	17·0	18·0	19·1	20·5	21·5
December 10	..	..	..	12·4	16·1	17·6	18·6	19·6	21·0	23·1
December 17	..	..	..	15·1	16·5	18·0	19·1	20·0	21·5	23·1
December 24	..	..	..	15·5	16·8	18·3	19·3	20·4	21·9	25·5

TABLE 10 ROMA

Weekly Mean Minimum Temperature (°C) for a Given Risk

Week Beginning			Lowest Observed	Percentage Risk					Highest Observed
				10	30	50	70	90	
January 1	..	..	15·0	17·4	19·0	20·1	21·1	22·7	25·6
January 8	..	..	15·8	17·5	19·1	20·1	21·2	22·7	25·2
January 15	..	..	15·3	17·6	19·1	20·1	21·2	22·7	24·6
January 22	..	..	15·4	17·6	19·1	20·1	21·1	22·6	23·9
January 29	..	..	14·4	17·5	19·0	20·0	21·0	22·5	24·4
February 5	..	..	14·2	17·3	18·8	19·9	20·9	22·4	24·6
February 12	..	..	15·7	17·2	18·7	19·7	20·7	22·3	23·3
February 19	..	..	13·3	16·6	18·2	19·3	20·5	22·1	24·5
February 26	..	..	12·2	16·2	17·8	18·8	19·9	21·5	22·2
March 5	..	..	11·7	15·3	17·0	18·2	19·3	21·0	22·9
March 12	..	..	10·8	14·7	16·3	17·5	18·7	20·3	23·3
March 19	..	..	12·1	14·0	15·6	16·8	17·9	19·6	21·2
March 26	..	..	9·9	12·9	14·6	15·8	17·0	18·8	22·3
April 2	..	..	6·9	11·8	13·6	14·8	16·0	17·8	23·9
April 9	..	..	6·6	10·2	12·1	13·5	14·8	16·8	22·2
April 16	..	..	4·9	8·5	10·6	12·1	13·5	15·7	19·7
April 23	..	..	4·6	6·9	9·2	10·8	12·4	14·7	17·3
April 30	..	..	3·2	5·8	8·2	9·8	11·5	13·9	18·3
May 7 ..	..	..	2·3	5·0	7·3	8·8	10·4	12·7	17·9
May 14 ..	..	..	0·7	4·3	6·5	8·0	9·4	11·7	13·9
May 21 ..	..	..	0·9	3·2	5·4	6·9	8·5	10·7	13·5
May 28 ..	..	..	−0·7	1·9	4·2	5·8	7·4	9·8	12·8
June 4 ..	..	..	−1·2	1·4	3·8	5·5	7·1	9·5	14·0
June 11 ..	..	..	−0·5	1·1	3·5	5·2	6·9	9·4	13·2
June 18 ..	..	..	−1·1	0·4	3·0	4·7	6·5	9·0	12·6
June 25 ..	..	..	−4·8	−0·1	2·5	4·2	6·0	8·6	12·4

TABLE 10 ROMA—*continued*

WEEKLY MEAN MINIMUM TEMPERATURE (°C) FOR A GIVEN RISK

Week Beginning				Lowest Observed	Percentage Risk					Highest Observed
					10	30	50	70	90	
July 2	..	..	..	−2·6	−0·1	2·4	4·1	5·7	8·2	11·1
July 9	..	..	..	−3·0	−0·2	2·2	3·8	5·4	7·8	9·6
July 16	..	..	..	−4·3	−0·3	2·0	3·6	5·2	7·5	14·0
July 23	..	..	..	−2·8	0·2	2·3	3·8	5·3	7·5	11·4
July 30	..	..	..	−1·4	0·6	2·8	4·3	5·7	7·9	10·4
August 6	..	..	..	−3·2	1·1	3·3	4·7	6·2	8·4	14·5
August 13	..	..	..	−1·7	1·6	3·8	5·3	6·8	9·0	11·2
August 20	..	..	..	0·3	2·5	4·6	6·1	7·5	9·7	11·5
August 27	..	..	..	−0·9	3·1	5·4	6·9	8·4	10·6	14·2
September 3	..	..	..	1·4	4·2	6·3	7·8	9·3	11·5	14·2
September 10	..	..	..	2·4	5·3	7·4	8·8	10·3	12·3	15·0
September 17	..	..	..	3·1	6·2	8·2	9·7	11·1	13·2	14·0
September 24	..	..	..	2·6	7·2	9·3	10·8	12·2	14·3	15·9
October 1	..	..	..	6·0	8·5	10·6	12·0	13·4	15·5	19·1
October 8	..	..	..	5·2	9·9	11·8	13·1	14·4	16·3	19·1
October 15	..	..	..	8·2	10·9	12·7	13·9	15·1	16·8	17·7
October 22	..	..	..	8·1	11·8	13·5	14·7	15·9	17·6	19·6
October 29	..	..	..	7·6	12·5	14·3	15·5	16·8	18·6	22·4
November 5	..	..	..	8·3	13·1	14·9	16·2	17·4	19·2	21·9
November 12	..	..	..	10·7	14·0	15·7	16·9	18·1	19·7	21·7
November 19	..	..	..	13·0	14·7	16·4	17·5	18·6	20·3	21·2
November 26	..	..	..	13·1	15·3	17·0	18·1	19·2	20·8	22·7
December 3	..	..	..	11·9	15·6	17·3	18·5	19·6	21·3	26·6
December 10	..	..	..	13·9	16·2	17·8	19·0	20·1	21·7	28·4
December 17	..	..	..	12·3	16·5	18·2	19·4	20·5	22·2	26·1
December 24	..	..	..	13·6	16·8	15·2	19·7	20·9	22·6	26·3

Appendix 3

Tables of the probability of at least 1 day, 2 consecutive days or 3 consecutive days in a given week at or below the given temperature.

TABLE 11. CHARLEVILLE—Frost Occurrence and Duration Probabilities (%)

Temperature °C	3			2			1			0			−1			−2		
Week Beginning	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days
March 26 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 16 ..	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 23	8	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
April 30 ..	10	4	1	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0
May 7	25	10	5	19	6	3	6	3	1	5	1	0	1	0	0	0	0	0
May 14	42	22	10	25	9	1	5	3	1	4	1	1	1	1	0	1	0	0
May 21	44	27	19	28	20	14	19	14	5	15	9	1	4	3	0	3	0	0
May 28	57	44	23	39	24	13	30	15	4	23	8	1	11	4	0	5	3	0
June 4	62	38	27	43	25	16	27	15	8	18	10	5	8	4	0	1	1	0
June 11	70	52	35	57	39	22	41	19	10	25	11	5	8	1	0	4	0	0
June 18	71	53	34	59	44	25	52	32	15	39	27	13	28	11	6	13	6	3
June 25	78	62	42	70	52	34	58	43	22	46	28	13	30	14	5	16	8	1
July 2	86	73	54	78	59	34	65	48	23	54	35	18	41	19	10	19	9	4
July 9	86	71	54	76	56	42	65	43	29	56	33	23	38	22	11	22	11	5
July 16	89	77	61	82	70	44	68	54	27	63	43	14	41	24	13	22	15	8
July 23	86	71	57	81	58	43	70	41	30	54	28	20	34	22	9	16	9	3
July 30	87	68	51	77	59	37	63	38	24	47	27	14	28	14	6	8	5	1

TABLE 11. CHARLEVILLE—Frost Occurrence and Duration Probabilities (%)—*continued*

Temperature °C	3			2			1			0			−1			−2		
Week Beginning	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days
August 6 ..	86	66	32	71	46	20	53	25	9	43	19	6	23	8	4	8	4	0
August 13 ..	80	58	37	65	38	25	38	23	13	25	15	8	18	6	1	6	3	1
August 20 ..	70	39	25	47	25	16	32	18	8	22	10	5	15	4	3	1	0	0
August 27 ..	65	41	19	42	20	8	18	6	0	10	3	0	4	3	0	0	0	0
September 3 ..	43	22	9	20	6	1	6	3	0	4	1	0	3	0	0	0	0	0
September 10 ..	22	8	3	13	3	1	3	0	0	1	0	0	0	0	0	0	0	0
September 17 ..	18	4	0	8	0	0	4	0	0	1	0	0	0	0	0	0	0	0
September 24 ..	13	1	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 1 ..	8	4	1	5	0	0	1	0	0	0	0	0	0	0	0	0	0	0
October 8 ..	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 15 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 22 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 29 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
November 5 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 12. DALBY—Frost Occurrence and Duration Probabilities (%)

Temperature °C	3			2			1			0			−1			−2		
Week Beginning	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days
March 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 9	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 16	5	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 23	14	6	2	7	4	1	2	0	0	0	0	0	0	0	0	0	0	0
April 30	20	4	1	11	1	0	5	0	0	1	0	0	0	0	0	0	0	0
May 7	30	17	5	23	11	1	13	4	0	7	4	0	2	1	0	1	1	0
May 14	46	24	10	35	14	6	20	6	1	14	0	0	1	0	0	1	0	0
May 21	44	29	23	27	23	19	25	14	6	18	11	1	6	1	0	1	0	0
May 28	67	40	21	45	30	14	32	18	7	24	13	4	13	6	1	6	4	0
June 4	67	44	24	54	35	13	42	20	8	31	15	7	25	8	0	10	1	0
June 11	64	45	29	55	37	21	43	25	11	37	21	10	20	13	7	12	4	1
June 18	69	57	40	62	46	26	55	35	19	44	25	11	33	17	1	25	6	1
June 25	82	61	42	75	54	32	62	40	21	54	35	20	44	21	11	30	11	2
July 2	90	71	54	86	64	42	76	51	29	70	40	23	55	19	11	36	8	4
July 9	82	62	50	74	54	42	67	50	31	61	39	21	43	23	12	29	11	6
July 16	87	76	60	81	68	48	70	57	27	65	42	19	50	29	11	33	14	6
July 23	83	64	52	77	57	39	63	49	24	58	38	18	48	26	11	33	14	7
July 30	88	65	49	74	57	39	64	46	27	60	35	18	39	15	6	19	4	2
August 6	86	64	27	74	45	19	65	30	6	58	21	5	31	7	2	12	1	1
August 13	86	61	35	69	51	24	56	37	14	44	26	10	26	12	1	8	1	0
August 20	69	48	27	60	39	15	43	20	8	30	11	7	18	5	1	6	0	0

Temperature °C	3			2			1			0			−1			−2		
Week Beginning	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days
August 27 ..	69	32	23	49	24	11	30	8	4	20	6	2	6	4	1	5	0	0
September 3 ..	56	24	7	40	10	5	26	5	2	13	2	1	4	1	0	1	1	0
September 10 ..	32	6	5	18	2	2	8	2	1	5	1	0	2	0	0	1	0	0
September 17 ..	33	14	2	19	5	1	6	1	0	4	1	0	0	0	0	0	0	0
September 24 ..	17	7	1	11	2	1	6	2	1	4	2	1	2	1	1	1	1	1
October 1 ..	13	5	1	7	2	1	4	1	1	2	1	1	1	1	1	1	1	1
October 8 ..	4	2	1	2	1	0	1	0	0	1	0	0	0	0	0	0	0	0
October 15 ..	2	1	0	1	1	0	1	1	0	1	1	0	0	0	0	0	0	0
October 22 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 29 ..	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
November 5 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 13. EMERALD—FROST OCCURRENCE AND DURATION PROBABILITIES (%)

Temperature °C	3			2			1			0			−1			−2		
Week Beginning	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days
March 26 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 2 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 9 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 16 ..	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 23 ..	3	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0
April 30 ..	5	1	1	3	1	0	1	0	0	1	0	0	0	0	0	0	0	0
May 7 ..	5	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
May 14 ..	9	5	1	5	3	1	1	1	0	0	0	0	0	0	0	0	0	0
May 21 ..	18	8	4	10	3	1	4	0	0	4	0	0	1	0	0	0	0	0
May 28 ..	23	8	0	10	3	0	5	1	0	4	0	0	1	0	0	0	0	0
June 4 ..	38	20	5	20	9	1	14	4	1	11	4	0	5	0	0	0	0	0
June 11 ..	35	23	13	29	14	6	13	5	4	6	4	3	3	3	0	3	0	0
June 18 ..	52	28	13	32	18	6	17	10	1	13	6	0	6	3	0	3	0	0
June 25 ..	54	30	20	38	20	13	27	15	6	20	8	5	9	5	5	4	1	1
July 2 ..	58	37	20	39	28	14	24	18	8	20	13	5	14	9	3	8	3	1
July 9 ..	61	41	23	47	27	18	35	14	10	27	9	4	14	3	1	3	0	0
July 16 ..	59	42	29	48	34	19	43	23	11	33	16	8	19	13	3	9	4	0
July 23 ..	66	47	32	57	34	19	42	19	8	33	11	6	16	6	3	4	1	0
July 30 ..	66	43	29	44	29	16	33	15	8	25	8	4	13	3	3	4	1	0
August 6 ..	54	29	15	41	19	10	24	8	1	13	5	0	8	1	0	1	0	0
August 13 ..	41	22	14	27	14	5	15	8	3	11	5	3	6	3	3	3	3	1
August 20 ..	30	11	3	22	5	0	6	0	0	5	0	0	3	0	0	0	0	0

Temperature °C	3			2			1			0			−1			−2		
Week Beginning	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days
August 27 ..	15	8	3	9	5	3	4	3	0	4	1	0	1	0	0	1	0	0
September 3 ..	9	3	0	3	1	0	1	1	0	1	1	0	1	0	0	0	0	0
September 10 ..	9	1	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
September 17 ..	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
September 24 ..	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 1 ..	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 8 ..	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 15 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 22 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 29 ..	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
November 5 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 14. GOONDIWINDI—FROST OCCURRENCE AND DURATION PROBABILITIES (%)

Temperature °C	3			2			1			0			−1			−2		
Week Beginning	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days
March 26 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 16	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 23	5	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 30	6	3	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
May 7	19	6	1	9	3	1	1	1	0	1	1	0	1	0	0	0	0	0
May 14	35	14	1	18	1	0	9	0	0	4	0	0	1	0	0	0	0	0
May 21	44	20	9	25	11	4	11	5	1	8	0	0	4	0	0	0	0	0
May 28	49	29	13	37	10	3	18	6	1	11	4	1	4	1	1	3	1	1
June 4	58	33	24	39	18	11	24	8	3	20	5	3	13	3	1	1	1	1
June 11	61	37	22	49	19	11	28	13	4	20	9	4	9	4	0	4	1	0
June 18	59	46	29	48	32	16	38	19	5	30	9	4	22	3	0	9	0	0
June 25	75	47	28	61	33	16	41	22	8	38	18	4	24	6	1	9	3	1
July 2	80	62	42	68	51	29	57	34	22	52	23	14	33	11	4	13	4	3
July 9	75	51	37	66	42	27	47	22	16	38	18	14	22	13	8	11	3	1
July 16	90	76	51	76	51	28	57	33	13	49	22	11	29	9	1	9	4	0
July 23	85	65	42	68	44	23	48	29	8	37	19	4	22	10	1	11	3	0
July 30	80	57	42	68	43	20	48	16	5	43	11	4	16	3	1	4	0	0
August 6 ..	81	41	19	65	32	11	42	13	4	39	11	4	13	1	0	3	0	0
August 13 ..	73	49	28	56	28	15	37	10	0	32	5	0	16	0	0	1	0	0
August 20 ..	53	25	13	34	17	8	19	8	3	14	3	0	5	0	0	1	0	0

TABLE 14. GOONDIWINDI—Frost Occurrence and Duration Probabilities (%)—*continued*

Temperature °C	3			2			1			0			−1			−2		
Week Beginning	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days
August 27 ..	49	27	14	30	6	3	11	1	0	8	1	0	3	0	0	0	0	0
September 3 ..	35	8	4	13	3	1	4	3	1	4	1	1	3	0	0	1	0	0
September 10 ..	24	4	3	9	1	0	5	0	0	3	0	0	0	0	0	0	0	0
September 17 ..	11	0	0	4	0	0	3	0	0	3	0	0	0	0	0	0	0	0
September 24 ..	14	4	0	8	3	0	5	0	0	1	0	0	0	0	0	0	0	0
October 1 ..	5	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
October 8 ..	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 15 ..	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 22 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 29 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
November 5 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 15. ROMA—FROST OCCURRENCE AND DURATION PROBABILITIES (%)

Temperature °C	3			2			1			0			−1			−2		
Week Beginning	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days
March 26 ..	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 9	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 16	4	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April 23	14	10	3	11	4	0	1	0	0	0	0	0	0	0	0	0	0	0
April 30	25	9	6	9	3	0	3	0	0	1	0	0	1	0	0	0	0	0
May 7	29	14	9	20	9	4	9	4	1	6	4	1	4	0	0	1	0	0
May 14	49	24	10	33	11	4	11	4	0	6	1	0	1	0	0	0	0	0
May 21	49	33	24	41	20	13	23	9	4	18	8	1	8	3	0	1	1	0
May 28	70	46	22	52	32	11	32	18	8	23	14	6	15	5	1	8	4	0
June 4	73	49	32	59	38	18	43	24	11	35	19	10	22	10	5	9	6	3
June 11	67	52	34	57	41	27	47	29	22	37	25	18	30	18	6	15	4	3
June 18	80	56	39	68	51	33	59	42	23	54	35	15	44	20	3	19	6	0
June 25	84	66	47	76	54	34	62	46	25	57	38	24	43	29	15	24	10	1
July 2	94	67	49	90	61	41	68	48	28	59	39	20	47	20	13	33	11	6
July 9	82	66	47	75	54	43	63	46	37	56	44	28	46	30	15	33	18	8
July 16	86	77	54	80	70	47	77	63	38	72	53	30	57	37	17	34	19	5
July 23	91	72	52	80	66	44	75	54	30	71	46	25	44	27	13	27	16	8
July 30	86	67	44	80	61	37	63	49	27	54	38	15	39	20	6	14	6	3
August 6 ..	84	65	39	72	52	19	61	43	16	51	27	11	33	14	5	14	4	1
August 13 ..	82	65	43	68	47	29	53	34	19	44	28	13	27	15	6	15	9	5
August 20 ..	68	43	22	53	28	16	43	16	8	34	13	6	18	9	3	6	0	0

TABLE 15. ROMA—Frost Occurrence and Duration Probabilities (%)—*continued*

Temperature °C	3			2			1			0			−1			−2		
Week Beginning	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days	At Least 1 Day	2 Consec. Days	3 Consec. Days
August 27 ..	70	35	25	54	30	14	43	16	8	28	11	3	14	5	1	5	3	1
September 3 ..	58	32	11	41	18	9	22	9	3	13	5	3	5	1	1	3	0	0
September 10 ..	41	14	6	24	9	4	10	3	1	5	3	1	1	1	1	1	0	0
September 17 ..	32	14	3	23	4	1	6	1	0	3	0	0	0	0	0	0	0	0
September 24 ..	22	11	4	11	4	4	4	3	1	3	0	0	0	0	0	0	0	0
October 1 ..	15	4	1	9	3	0	1	0	0	0	0	0	0	0	0	0	0	0
October 8 ..	3	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 15 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 22 ..	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October 29 ..	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
November 5 ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0