

METEOROLOGICAL SERVICE



AGROMETEOROLOGICAL MEMORANDUM No. 6

FIRST AND LAST OCCURRENCES OF GROUND FROST

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References

1. Connaughton, M. J., 1969. Air Frosts in Late Spring and Early Summer. Agromet. Mem. No. 2, Irish Meteorological Service.
2. Connaughton, M. J. 1973. Air Frosts in Late Autumn and Early Winter. Agromet. Mem. No. 4, Irish Meteorological Service.
3. Pearson, E.S. and Hartley, H.O. 1956. Biometrika Tables for Statisticians. Cambridge University Press. pp. 60 - 63.

FIRST AND LAST OCCURRENCES OF GROUND FROST

In earlier Agrometeorological Memoranda (Connaughton 1969, 1973), information was given on the mean dates and variability of first and last air frosts in Autumn/Winter and Spring/Summer. This information, based on temperature records from climatological stations throughout the country, referred to occurrences of air temperature of 0.0°C or below* as measured in standard ventilated screens at a height of 1.2 metres over short grass. In this present Memorandum, similar information is provided on the occurrences of first and last ground frosts which, by definition, occur when the "grass-minimum" temperature falls to or below 0.0°C *. Grass-minimum temperature is measured by means of an ordinary unshielded minimum spirit thermometer which is exposed horizontally over short grass with its bulb just touching the grass tips. Although temperatures recorded by these thermometers may differ from the temperatures of nearby vegetation - because of the different radiative properties of glass and vegetation and also because of the cooling effect due to evapotranspiration from growing plants - nevertheless, grass-minimum temperatures provide a useful first-approximation to the lowest temperatures to which low-growing crops are subjected; they are not, however, appropriate for the estimation of minimum temperatures over bare soil or over concrete or asphalt surfaces.

Since grass-minimum temperatures, because of their dependence on local soil, vegetation and land form factors, are known to be extremely variable even within small areas, it is not feasible to present ground frost data in map form as has been done in the case of air frost. In this present publication, Tables 1 and 2 give the mean dates of the first and last occurrence of ground frost at climatological stations. The probability Tables 1a and 2a on pages 4 and 6 may be used to get an indication of the risk of ground frost occurring before or after specific dates at the stations listed. These latter tables are based on the fact that the distribution of first and last dates are near-normal and that the variations of these dates are statistically homogeneous over the range of stations. (Pearson and Hartley 1956).

* As from January 1975, frost refers to the occurrence of temperature below 0.0°C .

Table 1: Dates of First Ground Frost in Autumn/Winter, 1944-1968

Group A (25-year stations)

<u>Station</u>	<u>County</u>	<u>Mean Date</u>	<u>Earliest Date</u>	<u>Latest Date</u>
Claremorris	Mayo	September 23	August 8	November 1
Shannon Apt.	Clare	October 7	August 22	November 13
Valentia Obsy.	Kerry	November 1	September 10	November 28
Phoenix Park	Dublin	August 22	August 1	October 1
Dublin Apt.	Dublin	October 16	September 9	November 1
Hillsborough	Down	September 15	August 2	October 27
Aldergrove Apt.	Antrim	September 17	August 13	November 2
Moneydig	Derry	August 19	August 1	September 25

Group B (10- to 24- year stations)

<u>Station</u>	<u>County</u>	<u>Mean Date</u>	<u>Station</u>	<u>County</u>	<u>Mean Date</u>
Belmullet	Mayo	October 28	Carlow	Carlow	September 1
Mallaranny	Mayo	October 19	Kilkenny	Kilkenny	September 8
Glenamoy	Mayo	September 19	Birr	Offaly	September 18
Tuam	Galway	September 19	Kells	Meath	September 9
Roche's Pt.	Cork	October 22	Narynsdown	Meath	September 24
Mallow	Cork	September 9	Clones	Monaghan	September 14
Thurles	Tipperary	September 1	Kilkeel	Down	November 11
Tycor	Waterford	August 27	Stormont	Down	November 8
Rosslare	Wexford	October 24	Creighton's Green	Down	November 13
Enniscorthy	Wexford	September 27	Lough Gall	Armagh	September 12
Johnstown Castle	Wexford	October 5	Ballykelly	Derry	October 8
Rathdrum	Wicklow	August 30	Lislap	Tyrone	September 21
Rathfarnham	Dublin	September 26	Malin Hd.	Donegal	November 18
Glasnevin	Dublin	September 28			

Group C (5- to 9- year stations)

<u>Station</u>	<u>County</u>	<u>Mean Date</u>	<u>Station</u>	<u>County</u>	<u>Mean Date</u>
Ballinahinch	Galway	October 11	Casement Airport	Dublin	October 3
Pallaskenry	Limerick	September 12	Ballybrittas	Laois	September 4
Tralee	Kerry	August 29	Lullymore	Kildare	August 11
Cork Airport	Cork	October 12	Helen's Bay	Down	November 10
Fermoy	Cork	September 4	Parkmore	Antrim	September 16
Rathluirc	Cork	September 28	Somerset	Derry	October 6
Clogheen	Tipperary	September 17	Lough Bradan	Tyrone	September 1
Dungarvan	Waterford	September 25	Castle Archdale	Fermanagh	September 22
Mooncoin	Kilkenny	August 25	Glenties	Donegal	September 5
Arklow	Wicklow	September 24	Milford	Donegal	September 23
Kinsealy	Dublin	October 14			

Table 1a : Probability of Occurrence of Ground Frost
in Autumn/Winter

<u>PROBABILITY OF GROUND FROST BEFORE</u>			
	<u>Mean Date</u>	<u>50%</u>	
Mean Date + 6 Days	60%	Mean Date - 6 Days	40%
Mean Date + 12 Days	70%	Mean Date - 12 Days	30%
Mean Date + 18 Days	80%	Mean Date - 18 Days	20%
Mean Date + 28 Days	90%	Mean Date - 28 Days	10%

Table 2 : Dates of Last Ground Frost in Spring/Summer, 1944-1968

Group A (25- year stations)

<u>Station</u>	<u>County</u>	<u>Mean Date</u>	<u>Earliest Date</u>	<u>Latest Date</u>
Claremorris	Mayo	June 3	May 4	June 27
Shannon Airport	Clare	May 24	April 24	June 16
Valentia Obsy.	Kerry	April 26	February 21	May 29
Phoenix Park	Dublin	July 10	June 1	July 31
Dublin Airport	Dublin	May 18	April 20	June 10
Hillsborough	Down	June 11	April 24	July 27
Aldergrove Airport	Antrim	June 6	April 24	July 27
Moneydig	Derry	June 27	May 29	July 29

Group B (10- to 24- year stations)

<u>Station</u>	<u>County</u>	<u>Mean Date</u>	<u>Station</u>	<u>County</u>	<u>Mean Date</u>
Belmullet	Mayo	May 3	Carlow	Carlow	June 24
Mallaranny	Mayo	May 22	Kilkenny	Kilkenny	June 12
Glenamoy	Mayo	May 31	Birr	Offaly	June 11
Tuam	Galway	May 27	Kells	Meath	June 15
Roche's Pt.	Cork	May 13	Harrenstown	Meath	June 1
Mallow	Cork	June 25	Clones	Monaghan	June 15
Thurles	Tippary	June 17	Kilkeel	Down	April 27
Tycor	Waterford	June 23	Stormont	Down	May 1
Rosslare	Wexford	May 2	Creighton's Green	Down	May 14
Eniscorthy	Wexford	June 14	Lough Gall	Armagh	June 4
Johnstown Castle	Wexford	May 29	Ballykelly	Derry	May 27
Rathdrum	Wicklow	June 25	Lislapp	Tyrone	June 2
Rathfarnham	Dublin	May 25	Malin Head	Donegal	May 4
Glasnevin	Dublin	May 26			

Group C (5- 9- year stations)

Ballinahinch	Galway	May	14	Casement Airport	Dublin	June 10
Pallaskenry	Limerick	May	26	Ballybrittas	Laois	June 20
Tralee	Kerry	June	19	Lullymore	Kildare	June 30
Cork Airport	Cork	May	26	Helen's Bay	Down	May 7
Fermoy	Cork	June	5	Parkmore	Antrim	May 19
Bathluirc	Cork	May	23	Somerset	Derry	May 17
Clogheen	Tipperary	May	28	Lough Bradan	Tyrone	May 24
Dungarvan	Waterford	June	7	Castle Archdale	Fermanagh	May 17
Mooncoin	Kilkenny	July	2	Glenties	Donegal	June 25
Arklow	Wicklow	June	8	Milford	Donegal	June 2
Kinsealy	Dublin	May	28			

Table 2a : Probability of Occurrence of Ground Frost
in Spring/Summer

<u>PROBABILITY OF GROUND FROST AFTER</u>			
	Mean Date	50%	
Mean Date + 5 Days	40%	Mean Date - 5 Days	60%
Mean Date + 11 Days	30%	Mean Date - 11 Days	70%
Mean Date + 17 Days	20%	Mean Date - 17 Days	80%
Mean Date + 26 Days	10%	Mean Date - 26 Days	90%