



DEPARTMENT OF TRANSPORT AND POWER
METEOROLOGICAL SERVICE



AGROMETEOROLOGICAL MEMORANDUM No. 4

AIR FROSTS IN LATE AUTUMN
AND EARLY WINTER

BY

M. J. CONNAUGHTON, M. Sc.

U. D. C.
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Although frosts in Autumn and Winter are less of a hazard in agricultural production than those which occur early in the growing season, they sometimes cause damage both to growing crops and to crops which have been left uncovered after harvesting, for example, sugar beet and potatoes. In 1972, for example, widespread defoliation of the potato crop and scorching of maize foliage was caused by frost which occurred in early September.

The purpose of this Memorandum is to provide information on the occurrence of air frost in late Autumn and early Winter. In following the format used in Agrometeorological Memorandum No. 2, which dealt with the occurrence of air frost in Spring and early Summer, the mean dates of the first air frosts in Autumn/Winter at 72 meteorological stations are given in the Table in pages 3 and 4, the extreme dates of the first Autumn/Winter air frosts at 15 stations are given in page 3 and a generalised map of mean dates of first Autumn/Winter air frosts and a first probability table are shown on page 5. The data are based on temperature records covering the 25-year period 1944 - 1968. Of the stations listed in the Table on pages 3 and 4, Group A stations were in operation during the full 25-year period while stations in Groups B and C were in operation for shorter periods; 25-year means have been obtained for those latter stations by comparing their temperature records with those of the nearest appropriate long-term stations. For each station, the earliest date in Autumn or Winter on which the air temperature dropped to or below 0°C is taken as being the date of first Autumn/Winter air frost.

In investigating the variability from year to year of the date of first air frost, it was found that the variation was approximately the same at all stations and that about two-thirds of the dates for each station were within 16 days of the mean date. In statistical terms, the frequency distributions of the dates of the first air frosts were found to be near-normal at all stations with a standard deviation of sixteen days. Using this information, a general rule regarding the probability of occurrence of air frost in Autumn and early Winter was formulated and is given below the map on page 5. The rule may be used in conjunction with the map to determine the risk of air frost occurring before specified

dates; for example, near the south-east coast, air frost is likely to occur before December 2 in only 2 years in 10 while in most inland areas, air frost is likely to occur in 9 years in 10 before November 21.

It must be again emphasised here as in Agrometeorological Memorandum No. 2, that, since the occurrence of air frost is very much influenced by local factors such as topography and shelter, the dates of the first air frosts given in the Table apply, strictly speaking, only to the stations listed. The map on page 5, which is based on interpolation between stations, is therefore subject to error where such local effects are likely to cause deviations from the general pattern of frost occurrence. The map is intended to give a broad indication of the variation over the country of the mean dates of first air frosts in Autumn/Winter: it should be used for assessing frost risk at a particular location only after careful consideration of local physical features.

Acknowledgment: Temperature records for some northern stations were kindly supplied by the British Meteorological Office.

Table: Dates of first air frosts 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	Nov. 1	Sept. 28	Dec. 1
Tuam	Galway	Oct. 28	Sept. 10	Dec. 2
Shannon Airport	Clare	Nov. 3	Oct. 5	Dec. 1
Valentia Observatory	Kerry	Dec. 6	Oct. 10	Jan. 24
Ballinacurra	Cork	Nov. 5	Oct. 5	Nov. 24
Clonsast	Offaly	Oct. 5	Aug. 30	Nov. 9
Peamount	Dublin	Oct. 31	Oct. 6	Nov. 22
Rathfarnham	Dublin	Nov. 10	Oct. 4	Dec. 20
Glasnevin	Dublin	Nov. 2	Sept. 11	Dec. 4
Phoenix Park	Dublin	Nov. 1	Sept. 18	Nov. 23
Dublin Airport	Dublin	Nov. 13	Oct. 13	Dec. 31
Hillsborough	Down	Nov. 6	Oct. 12	Dec. 6
Aldergrove Airport	Antrim	Oct. 27	Sept. 7	Nov. 25
Moneydig	Derry	Oct. 25	Sept. 27	Nov. 29
Malin Head	Donegal	Dec. 16	Nov. 15	Feb. 1

Group B (10- to 24-year stations)

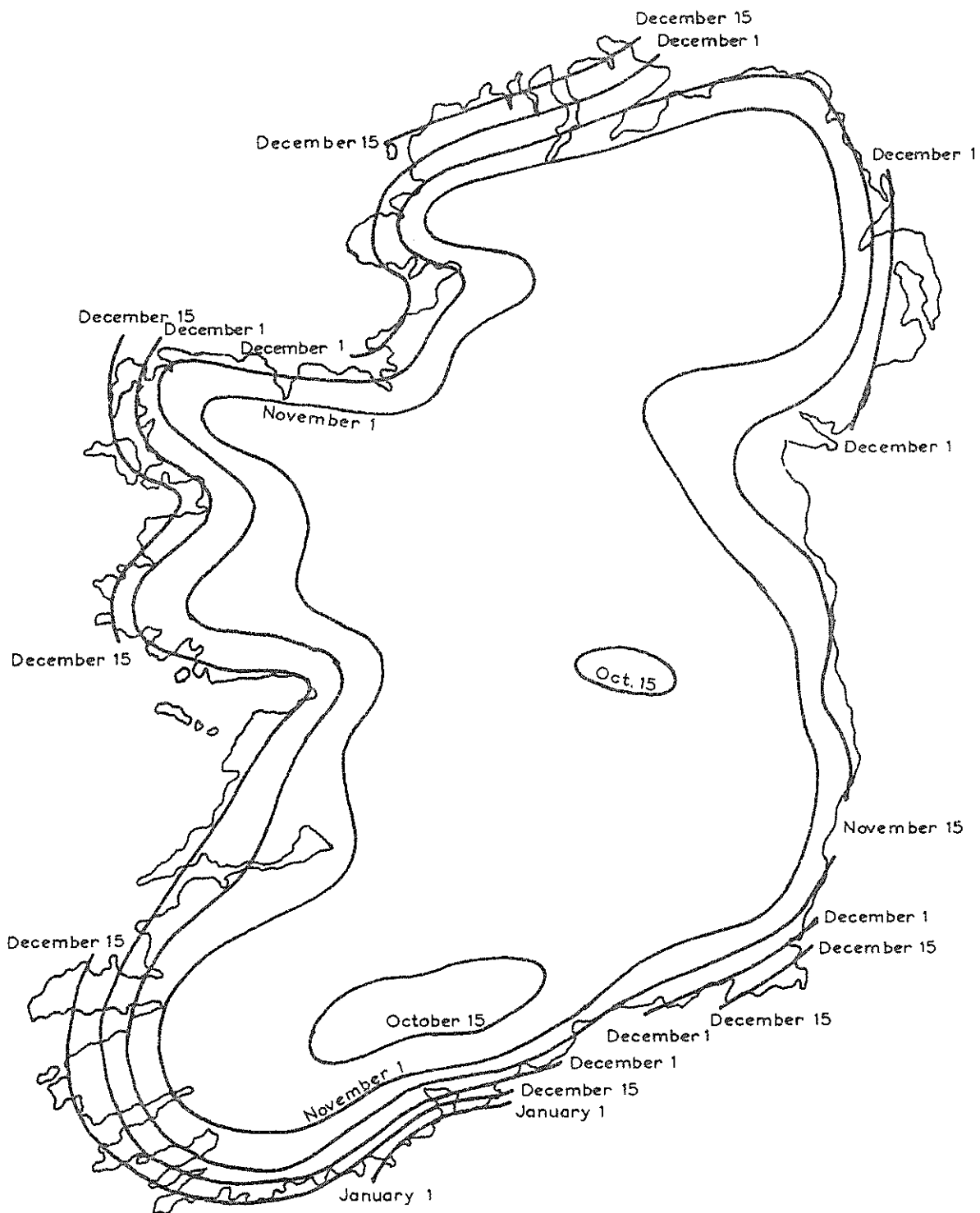
<u>Station</u>	<u>County</u>	<u>Mean Date</u>	<u>Station</u>	<u>County</u>	<u>Mean Date</u>
Bellacorrick	Mayo	Oct. 25	Tycor	Waterford	Nov. 9
Belmullet	Mayo	Dec. 8	Rosslare	Wexford	Dec. 17
Mallaranny	Mayo	Dec. 1	Enniscorthy	Wexford	Oct. 27
Glenamoy	Mayo	Nov. 10	Johnstown Castle	Wexford	Nov. 29
Pallaskenry	Limerick	Nov. 2	Rathdrum	Wicklow	Oct. 26
Tralee	Kerry	Oct. 26	Arklow	Wicklow	Oct. 31
Roche's Point	Cork	Jan. 6	Carlow	Carlow	Oct. 20
Mallow	Cork	Oct. 14	Kilkenny	Kilkenny	Oct. 19
Thurles	Tipperary	Oct. 22	Mountmellick	Laois	Oct. 20

Group B (continued)

<u>Station</u>	<u>County</u>	<u>Mean Date</u>	<u>Station</u>	<u>County</u>	<u>Mean Date</u>
Castleforbes	Longford	Oct. 21	Creighton's Green	Down	Nov. 21
Derrygreenagh	Offaly	Oct. 26	Lough Gall	Armagh	Oct. 31
Birr	Offaly	Oct. 27	Lisburn	Antrim	Nov. 2
Boora	Offaly	Oct. 26	Parkmore	Antrim	Oct. 23
Lullymore	Kildare	Oct. 22	Castlerock	Derry	Nov. 7
Kells	Meath	Oct. 24	Ballykelly	Derry	Oct. 28
Warrenstown	Meath	Oct. 25	Castle Archdale	Fermanagh	Oct. 28
Clones	Monaghan	Nov. 1	Lislap	Tyrone	Oct. 27
Kilkeel	Down	Nov. 29	Glenties	Donegal	Oct. 30
Stormont	Down	Nov. 22			

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>
Ballinamore	Leitrim	Oct. 29	Newcastle	Wicklow	Dec. 1
Ballinrobe	Mayo	Nov. 10	Kinsealy	Dublin	Nov. 9
Ballinahinch	Galway	Nov. 25	Casement Airport	Dublin	Oct. 30
Cork Airport	Cork	Nov. 14	Ballybrittas	Laois	Oct. 28
Drinagh	Cork	Nov. 6	Dunsany	Meath	Nov. 9
Fermoy	Cork	Oct. 6	Helen's Bay	Down	Dec. 1
Rathluirc	Cork	Oct. 24	Larne	Antrim	Nov. 18
Clogheen	Tipperary	Oct. 27	Somerset	Derry	Oct. 27
Dungarvan	Waterford	Oct. 24	Lough Bradan	Tyrone	Nov. 1
Moencoin	Kilkenny	Oct. 26	Wilford	Donegal	Nov. 28



PROBABILITY OF AIR FROST BEFORE			
	Mean Date	50%	
Mean Date + 4 Days	60%	Mean Date - 4 Days	40%
Mean Date + 8 Days	70%	Mean Date - 8 Days	30%
Mean Date + 13 Days	80%	Mean Date - 13 Days	20%
Mean Date + 20 Days	90%	Mean Date - 20 Days	10%

Mean Date of First Air Frost in Autumn/Winter (1944-1968)