



AGROMETEOROLOGICAL BULLETIN

The Weather of March 1988

Summary:

The influence of high pressure was greatest to 12th; Atlantic southwesterlies dominated for much of the remainder of the period. The month was very wet (except in the southwest), mild and dull.

Meteorological Situation:

Initially, high pressure in the North Atlantic and active troughs over the North Sea produced rainbelts which moved southwards over Ireland but later fronts approached from the west as pressure intensified over Europe. After the 6th extensions of the high over Ireland yielded to occasional frontal passages, in particular rainfall was especially heavy and extensive on 9th. The general decline of high pressure on 12th allowed active frontal passages go west from 13th to 15th. A ridge from the north on 16th preceded the establishment of a southwesterly airflow and a succession of frontal waves and rainbelts to 26th. Subsequent conditions were changeable, the most notable event being heavy rain in southwestern areas on 29th at the passage of a trough centre.

Precipitation:

Amounts were very much above normal almost everywhere. These varied from 220% of normal at Clones to over 150% generally but only 68% at Dungarvan. Wettest days were 9th, 13th to 15th, 17th/18th, 22nd to 25th and in southwestern areas on 29th.

Temperature:

Mean air temperature varied from 1.1°C above normal at Shannon Airport to 0.7°C above at many coastal stations. Positive night-time deviations , reaching a maximum of 1.9°C at Shannon Airport, were especially large. Soil temperatures peaked in the five-day spell 16th to 20th (1.5°C to 2.5°C above average). Air frost was widespread to 5th and occurred in some places on 10th, 17th and 29th. Ground frost occurred more frequently and was severe in a few places on 5th and 10th.

Sunshine and Radiation:

Bright sunshine hours varied from 91% of normal at Dublin Airport to 63% at Malin Head. It remained dull up to the 20th. Global radiation varied from 97% of normal at Valentia to 74% of normal at Dublin Airport.

Wind:

Gales or general gale gusts occurred on 15th, 24th and 25th. Otherwise gale gusts occurred on 1st,3rd,6th, 16th, 22nd to 26th and 29th/30th.

NOTE: The data contained in this bulletin are provisional. Some of the material in Table 1 will be published in its final form in the Monthly Weather Report; final values of Global Radiation at stations in Table 2 will be published in the annual Solar Radiation Observations.

TABLE 1

MARCH 1988

STATION	PERIOD	RAINFALL (mm)				TEMPERATURE (°C)														BRIGHT SUNSHINE		WIND				
		AMOUNT	% OF AVERAGE	RAIN DAYS	WET DAYS	AIR								GROUND		SOIL (10cm)		TOTAL NO. OF HOURS	% OF AVERAGE	MEAN SPEED (ms ⁻¹)	DAYS WITH GALE GUSTS	P.E. (PENMAN) (mm)				
						MEAN MAX.	MEAN MIN.	MEAN DAILY	DIFFERENCE FROM AVERAGE	LOWEST MIN.	DATE	DAYS WITH AIR FROST	DEGREE DAYS ABOVE 4.4°C	% OF AVERAGE	DEGREE DAYS ABOVE 10.0°C	% OF AVERAGE	LOWEST "GRASS-MIN"						DATE	DAYS WITH GROUND FROST	MEAN DAILY	DIFFERENCE FROM AVERAGE
Carlow (Oak Park) Co. Carlow	1-10	5.1	-	5	3	8.7	2.3	5.5	-	-2.2	2	3	21	-	1	-	-7.7	2	6	-	-	N/A	-	2.1	-	-
	11-20	35.7	-	8	8	10.4	5.9	8.1	-	1.5	17	0	38	-	2	-	-1.8	17	1	-	-	N/A	-	1.9	-	-
	21-END	31.0	-	9	5	11.3	4.4	7.8	-	0.5	29	0	40	-	3	-	-3.2	29	4	-	-	N/A	-	6.2	-	-
	MONTH	71.8	135	22	16	10.2	4.2	7.2	-	-2.2	2	3	98	-	7	-	-7.7	2	11	-	-	N/A	-	3.4	-	N/A
Shannon Airport Co. Clare	1-10	9.3	-	6	3	10.1	3.8	6.9	-	0.2	4	0	29	-	2	-	-5.4	5	5	6.5	-	19.7	-	4.5	2	-
	11-20	57.0	-	8	7	11.5	7.1	9.3	-	5.1	15	0	49	-	5	-	-0.5	17	1	8.6	-	15.4	-	4.4	2	-
	21-END	44.6	-	11	10	11.1	5.2	8.2	-	3.5	31	0	42	-	3	-	-1.0	31	3	8.0	-	53.5	-	6.1	7	-
	MONTH	110.9	179	25	20	10.9	5.4	8.1	+1.1	0.2	4	0	120	109	10	59	-5.4	5	9	7.7	+0.7	88.6	82	5.0	11	35
Cork Airport Co. Cork	1-10	3.3	-	7	1	8.9	3.0	6.0	-	-0.6	4	1	21	-	1	-	-2.7	4	5	6.0	-	23.5	-	6.3	4	-
	11-20	55.2	-	7	6	10.5	6.2	8.4	-	4.5	11	0	40	-	2	-	1.5	11	0	7.8	-	12.9	-	6.5	3	-
	21-END	56.5	-	10	8	10.5	4.2	7.4	-	2.1	31	0	35	-	2	-	-0.5	29	3	7.5	-	51.6	-	8.0	7	-
	MONTH	115.0	112	24	15	10.0	4.5	7.2	+0.9	-0.6	4	1	96	113	5	-	-2.7	4	8	7.1	+0.7	88.0	81	6.9	14	36
Fermoy (Coolnakilla) Co. Cork	1-10	4.8	-	6	1	7.9	2.4	5.2	-	-1.5	4	2	16	-	0	-	-4.0	5	4	-	-	11.3	-	N/A	-	-
	11-20	52.2	-	10	7	10.1	4.9	7.5	-	1.2	17	0	32	-	2	-	0.9	11	0	-	-	9.7	-	N/A	-	-
	21-END	52.3	-	11	9	9.8	3.1	6.5	-	0.2	27	0	27	-	1	-	-2.0	31	4	-	-	58.0	-	N/A	-	-
	MONTH	109.3	-	27	17	9.3	3.5	6.4	-	-1.5	4	2	75	-	3	-	-4.0	5	8	-	-	79.0	-	N/A	-	N/A
Fermoy (Moore Park) Co. Cork	1-10	5.3	-	4	3	9.4	2.8	6.1	-	-2.9	10	3	24	-	1	-	-8.0	10	5	-	-	11.0	-	4.0	-	-
	11-20	40.3	-	9	6	11.1	6.0	8.5	-	3.0	11	0	42	-	4	-	-2.5	17	1	-	-	13.1	-	3.4	-	-
	21-END	35.5	-	10	9	11.2	3.6	7.4	-	0.4	29	0	37	-	3	-	-2.1	29	6	-	-	49.4	-	5.0	-	-
	MONTH	81.1	104	23	18	10.6	4.1	7.3	-	-2.9	10	3	103	-	9	-	-8.0	10	12	-	-	73.5	-	4.1	-	27
Roches Point Co. Cork	1-10	3.0	-	3	2	9.4	4.2	6.8	-	1.2	4	0	27	-	1	-	-2.2	10	4	6.7	-	23.0	-	6.8	6	-
	11-20	47.2	-	7	6	10.9	7.0	8.9	-	5.6	15	0	45	-	3	-	0.6	17	0	8.6	-	13.4	-	7.1	5	-
	21-END	56.6	-	9	6	11.2	5.6	8.4	-	3.4	31	0	45	-	4	-	-0.9	21	1	8.1	-	53.3	-	8.6	9	-
	MONTH	106.8	142	19	14	10.5	5.6	8.1	+0.9	1.2	4	0	117	111	8	-	-2.2	10	5	7.8	+0.4	89.7	82	7.6	20	41
Glencolumbkille Co. Donegal	1-10	28.3	-	10	8	8.4	3.9	6.2	-	0.8	2	0	21	-	0	-	-4.5	2	5	-	-	N/A	-	4.0	-	-
	11-20	62.2	-	10	7	9.8	5.2	7.5	-	2.5	14	0	32	-	2	-	-2.4	17	2	-	-	N/A	-	4.2	-	-
	21-END	56.3	-	11	9	10.2	5.0	7.6	-	3.0	29	0	36	-	1	-	-1.3	29	1	-	-	N/A	-	6.0	-	-
	MONTH	146.8	-	31	24	9.5	4.7	7.1	-	0.8	2	0	89	-	4	-	-4.5	2	8	-	-	N/A	-	4.8	-	N/A

TABLE 1 (CONTINUED)

MARCH 1988

STATION	PERIOD	RAINFALL (mm)				TEMPERATURE (°C)														BRIGHT SUNSHINE		WIND		P.E. (PENMAN) (mm)		
		AMOUNT	% OF AVERAGE	RAIN DAYS	WET DAYS	AIR							GROUND			SOIL (10cm)				TOTAL NO. OF HOURS	% OF AVERAGE	MEAN SPEED (ms ⁻¹)	DAYS WITH GALE GUSTS			
						MEAN MAX.	MEAN MIN.	MEAN DAILY	DIFFERENCE FROM AVERAGE	LOWEST MIN.	DATE	DAYS WITH AIR FROST	DEGREE DAYS ABOVE 4.4°C	% OF AVERAGE	DEGREE DAYS ABOVE 10.0°C	% OF AVERAGE	LOWEST "GRASS-MIN"	DATE	DAYS WITH GROUND FROST						MEAN DAILY	DIFFERENCE FROM AVERAGE
Cahirciveen (Valentia Obsy.) Co. Kerry	1-10	9.9	-	5	2	9.9	4.7	7.3	-	-0.2	10	1	32	-	1	-	-2.5	10	1	8.1	-	19.0	-	5.1	2	-
	11-20	67.4	-	10	6	11.6	7.9	9.7	-	5.8	15	0	53	-	6	-	4.0	13	0	9.9	-	15.3	-	5.9	5	-
	21-END	45.4	-	11	9	11.0	6.5	8.7	-	4.7	29	0	48	-	3	-	3.3	29	0	9.1	-	35.5	-	7.6	8	-
	MONTH	122.7	107	26	17	10.8	6.4	8.6	+0.8	-0.2	10	1	132	108	10	59	-2.5	10	1	9.1	+1.2	69.8	66	6.3	15	31
Ardfert (Liscahane) Co. Kerry	1-10	10.4	-	6	3	9.7	4.6	7.2	-	0.1	10	0	30	-	1	-	-7.6	4	4	-	-	18.9	-	-	-	-
	11-20	65.5	-	10	8	11.4	6.7	9.1	-	4.5	17	0	47	-	5	-	-0.6	17	1	-	-	17.9	-	-	-	-
	21-END	50.3	-	11	10	10.7	5.7	8.2	-	3.8	29	0	42	-	2	-	-0.7	29	1	-	-	N/A	-	-	-	-
	MONTH	126.2	-	27	21	10.6	5.7	8.2	-	0.1	10	0	119	-	8	-	-7.6	4	6	-	-	N/A	-	-	-	-
Lullymore Co. Kildare	1-10	N/A	-	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A	N/A	-	N/A	-	N/A	N/A	N/A	N/A	-	-	N/A	-	N/A	-	-
	11-20	N/A	-	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A	N/A	-	N/A	-	N/A	N/A	N/A	N/A	-	-	N/A	-	N/A	-	-
	21-END	N/A	-	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A	N/A	-	N/A	-	N/A	N/A	N/A	N/A	-	-	N/A	-	N/A	-	-
	MONTH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A	N/A	-	N/A	-	N/A	N/A	N/A	N/A	-	-	N/A	-	N/A	-	N/A
Kilkenny Co. Kilkenny	1-10	3.6	-	5	2	9.1	2.3	5.7	-	-1.6	4	3	22	-	1	-	-5.8	10	5	5.2	-	14.7	-	3.7	1	-
	11-20	41.0	-	8	5	11.1	6.0	8.5	-	3.5	17	0	42	-	4	-	-0.6	17	1	7.6	-	6.8	-	3.7	2	-
	21-END	34.6	-	9	6	11.4	3.6	7.5	-	-0.4	29	1	37	-	4	-	-6.1	29	6	7.6	-	57.6	-	5.1	6	-
	MONTH	79.2	139	22	13	10.6	3.9	7.2	+1.0	-1.6	4	4	100	108	8	-	-6.1	29	12	6.8	+0.8	79.1	76	4.2	9	31
Mooncoin (Silverspring) Co. Kilkenny	1-10	2.7	-	4	1	9.3	2.2	5.8	-	-1.0	4	3	22	-	1	-	-5.8	2	7	-	-	20.7	-	-	-	-
	11-20	38.7	-	8	5	11.0	6.0	8.5	-	2.3	17	0	42	-	3	-	-1.2	17	2	-	-	10.9	-	-	-	-
	21-END	17.0	-	9	5	11.1	3.8	7.4	-	0.0	29	0	39	-	5	-	-3.6	29	5	-	-	63.3	-	-	-	-
	MONTH	58.4	74	21	11	10.5	4.0	7.2	-	-1.0	4	3	103	-	10	-	-5.8	2	14	-	-	94.9	-	-	-	-
Ballinamore Co. Leitrim	1-10	25.2	-	9	7	8.4	2.2	5.3	-	-1.5	4	3	18	-	0	-	-6.5	2	5	-	-	19.0	-	3.6	-	-
	11-20	81.5	-	9	9	10.2	3.9	7.0	-	-1.4	17	1	30	-	2	-	-6.5	17	1	-	-	6.8	-	3.3	-	-
	21-END	67.6	-	11	11	10.2	3.1	6.7	-	0.0	29	0	29	-	2	-	-3.7	29	3	-	-	57.4	-	4.7	-	-
	MONTH	174.3	208	29	27	9.6	3.1	6.3	-	-1.5	4	4	77	-	4	-	-6.5	17	9	-	-	83.2	-	3.9	-	25
Ardee (Boharnamoe) Co. Louth	1-10	11.1	-	7	3	9.0	2.1	5.5	-	-2.2	2	3	20	-	1	-	-4.2	2	5	-	-	-	-	-	-	-
	11-20	53.8	-	9	6	10.8	4.1	7.4	-	1.7	17	0	32	-	3	-	-2.6	16	4	-	-	-	-	-	-	-
	21-END	29.9	-	9	9	11.0	2.7	6.9	-	0.1	30	0	32	-	3	-	-2.0	31	5	-	-	-	-	-	-	-
	MONTH	94.8	166	25	18	10.3	2.9	6.6	-	-2.2	2	3	84	-	7	-	-4.2	2	14	-	-	-	-	-	-	-

NOTES ON THE TABLES IN JANUARY ISSUE

TABLE 1 (CONTINUED)

MARCH 1988

STATION	PERIOD	RAINFALL (mm)				TEMPERATURE (°C)														BRIGHT SUNSHINE		WIND				
		AMOUNT	% OF AVERAGE	RAIN DAYS	WET DAYS	AIR								GROUND			SOIL (10cm)			TOTAL NO. OF HOURS	% OF AVERAGE	MEAN SPEED (ms ⁻¹)	DAYS WITH GALE GUSTS	P.E. (PENMAN) (mm)		
						MEAN MAX.	MEAN MIN.	MEAN DAILY	DIFFERENCE FROM AVERAGE	LOWEST MIN.	DATE	DAYS WITH AIR FROST	DEGREE DAYS ABOVE 4.4°C	% OF AVERAGE	DEGREE DAYS ABOVE 10.0°C	% OF AVERAGE	LOWEST "GRASS-MIN"	DATE	DAYS WITH GROUND FROST						MEAN DAILY	DIFFERENCE FROM AVERAGE
Ballinrobe (Creagh) Co. Mayo	1-10	19.6	-	9	7	9.3	3.3	6.3	-	-1.1	4	2	24	-	1	-	-9.2	4	9	-	-	16.9	-	3.3	-	-
	11-20	60.5	-	10	6	11.0	5.4	8.2	-	1.0	17	0	39	-	3	-	-3.5	16	3	-	-	7.3	-	3.7	-	-
	21-END	57.8	-	11	10	10.7	3.9	7.3	-	-0.4	29	1	34	-	2	-	-4.4	21	10	-	-	52.2	-	5.1	-	-
	MONTH	137.9	144	30	23	10.3	4.2	7.3	-	-1.1	4	3	97	-	6	-	-9.2	4	22	-	-	76.4	-	4.0	-	26
Belmullet Co. Mayo	1-10	24.0	-	10	8	9.6	4.4	7.0	-	1.1	4	0	28	-	1	-	-1.5	2	3	7.0	-	17.4	-	6.5	2	-
	11-20	49.0	-	8	7	10.6	6.2	8.4	-	1.9	17	0	41	-	3	-	-2.2	17	1	8.3	-	14.7	-	6.9	3	-
	21-END	44.1	-	11	9	10.4	4.9	7.7	-	3.7	31	0	36	-	1	-	-0.2	31	1	7.9	-	46.2	-	8.9	9	-
	MONTH	117.1	141	29	24	10.2	5.2	7.7	+0.7	1.1	4	0	105	105	5	-	-2.2	17	5	7.7	+0.8	78.3	69	7.5	14	37
Claremorris Co. Mayo	1-10	32.2	-	8	6	9.4	2.4	5.9	-	-1.2	4	2	23	-	1	-	-5.4	2	5	6.1	-	14.6	-	4.7	3	-
	11-20	58.1	-	9	7	10.4	5.0	7.7	-	-0.4	17	1	35	-	3	-	-3.0	17	1	7.7	-	5.5	-	5.1	2	-
	21-END	48.5	-	11	11	10.5	2.9	6.7	-	-0.5	29	1	30	-	2	-	-4.0	29	5	7.2	-	42.9	-	6.5	7	-
	MONTH	138.8	171	28	24	10.1	3.4	6.8	+0.8	-1.2	4	4	88	102	6	-	-5.4	2	11	7.0	+1.0	63.0	64	5.5	12	24
Glenamoy Co. Mayo	1-10	36.4	-	9	8	9.2	3.7	6.4	-	0.6	2	0	24	-	1	-	-3.3	2	3	-	-	17.5	-	3.3	-	-
	11-20	72.3	-	8	7	10.4	5.6	8.0	-	0.0	17	0	38	-	2	-	-2.3	17	1	-	-	11.3	-	4.1	-	-
	21-END	45.7	-	10	9	10.4	4.4	7.4	-	1.5	29	0	35	-	2	-	-0.9	31	3	-	-	43.6	-	5.4	-	-
	MONTH	154.4	150	27	24	10.0	4.6	7.3	-	0.0	17	0	97	-	5	-	-3.3	2	7	-	-	72.4	-	4.3	-	23
Dunsany (Grange) Co. Meath	1-10	14.6	-	7	3	8.2	1.7	4.9	-	-1.7	4	4	16	-	0	-	-6.6	2	7	-	-	19.8	-	-	-	-
	11-20	60.9	-	9	8	9.8	3.7	6.7	-	-0.2	18	2	27	-	2	-	-5.0	17	1	-	-	5.4	-	-	-	-
	21-END	31.1	-	11	9	10.5	3.6	7.0	-	0.1	29	0	32	-	2	-	-3.2	29	1	-	-	57.6	-	-	-	-
	MONTH	106.6	184	27	20	9.5	3.0	6.3	-	-1.7	4	6	74	-	4	-	-6.6	2	9	-	-	82.8	-	-	-	-
Clones Co. Monaghan	1-10	27.1	-	9	7	8.0	2.2	5.1	-	-1.4	4	4	17	-	0	-	-3.3	4	5	5.0	-	17.9	-	4.8	3	-
	11-20	66.4	-	8	6	9.9	4.6	7.3	-	0.8	14	0	31	-	2	-	-2.6	17	1	6.8	-	3.7	-	4.9	0	-
	21-END	43.1	-	11	11	10.8	3.7	7.2	-	0.0	29	0	33	-	2	-	-3.2	29	1	7.0	-	56.1	-	6.1	5	-
	MONTH	136.6	220	28	24	9.6	3.5	6.5	+0.9	-1.4	4	4	81	104	5	-	-3.3	4	7	6.3	+0.7	77.7	80	5.3	8	30
Birr Co. Offaly	1-10	12.3	-	5	4	8.8	2.2	5.5	-	-1.4	4	2	20	-	0	-	-4.6	10	6	6.0	-	12.8	-	3.0	0	-
	11-20	47.5	-	8	6	10.8	6.1	8.4	-	2.8	17	0	41	-	3	-	0.5	17	0	8.1	-	6.3	-	3.4	1	-
	21-END	40.6	-	9	9	10.8	3.7	7.2	-	0.7	29	0	34	-	2	-	-1.5	29	3	7.6	-	50.4	-	4.4	6	-
	MONTH	100.4	189	22	19	10.2	4.0	7.1	+0.8	-1.4	4	2	94	102	6	-	-4.6	10	9	7.2	+0.8	69.5	65	3.6	7	24

NOTES ON THE TABLES IN JANUARY ISSUE

TABLE 2 GLOBAL RADIATION

STATION	PERIOD	AMOUNT MJ/m ²
Malin Head Co. Donegal	1-10	58.65
	11-20	52.95
	21-end	118.01
	Month	229.61
Dublin Airport Co. Dublin	1-10	66.35
	11-20	47.37
	21-end	71.16
	Month	186.72
Cahirciveen (Valentia Obs.) Co. Kerry	1-10	77.89
	11-20	67.95
	21-end	114.61
	Month	260.45
Kilkenny Co. Kilkenny	1-10	59.64
	11-20	56.50
	21-end	136.82
	Month	252.96
Belmullet Co. Mayo	1-10	61.64
	11-20	63.44
	21-end	115.43
	Month	240.51
Clones Co. Monaghan	1-10	58.47
	11-20	43.56
	21-end	117.68
	Month	219.71
Birr Co. Offaly	1-10	58.47
	11-20	53.46
	21-end	119.48
	Month	231.41

TABLE 3 POTENTIAL EVAPOTRANSPIRATION (P.E.) AND SOIL MOISTURE

STATION	PERIOD	P.E. (mm)		SOIL MOISTURE (mm)	
		Amount	Deficit	Accumulated Deficit	Surplus
Carlow (Oak Park) Co. Carlow	1-10	5.7	1	8	-
	11-20	5.3	-	0	30
	21-end	9.4	-	0	21
	Month	20.4	-	-	-
Kinsealy Co. Dublin	1-10	6.3	-	0	6
	11-20	7.9	-	0	38
	21-end	11.1	-	0	10
	Month	25.3	-	-	-
Cahirciveen (Valentia Obs.) Co. Kerry	1-10	11.4	-	2	-
	11-20	7.4	-	0	63
	21-end	6.6	-	0	43
	Month	25.4	-	-	-
Ballinamore Co. Leitrim	1-10	5.5	-	0	19
	11-20		overflow		
	21-end		overflow		
	Month	N/A	N/A	N/A	N/A
Glenamoy Co. Mayo	1-10	(-4.7)	-	0	41
	11-20	+6.0	-	0	66
	21-end	+14.1	-	0	31
	Month	20.1	-	-	-
Johnstown Castle Co. Wexford	1-10				
	11-20				
	21-end				
	Month				

TABLE 4 SOIL CLIMATE (MULLINGAR)

BARE SOIL TYPE	PERIOD	MEAN TEMPERATURE (°C at 100mm)			TEMPERATURE GRADIENT (to 200mm)	SOIL WATER POTENTIAL (hPa) (at depths)	
		Max.	Daily	Min.		75mm	200mm
		Peat	1-10	6.26	5.31	3.67	0.16
	11-20	8.03	7.31	5.71	-0.33	50.5	53.0
	21-end	9.42	7.49	5.58	0.27	53.1	55.1
Mineral	1-10	6.35	4.93	3.10	0.05	46.8	60.0
	11-20	8.26	7.09	5.31	-0.18	40.0	41.5
	21-end	9.48	6.93	5.04	0.05	44.7	46.1

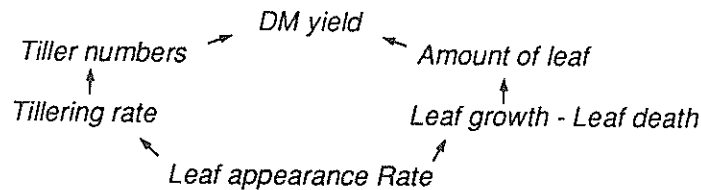
Notes on the tables in January issue

WEATHER AND GRASS GROWTH DURING WINTER (part 1)

Noel Culleton, Johnstown Castle, Co. Wexford.

Autumn management influences date of commencement of growth in the following spring. To all outward appearances growth in winter is at a standstill, everything appears to be dormant. In reality, this is far from the case. There is almost continual leaf formation and leaf death, with new leaves being formed, and old ones being shed all the time. Tillering also proceeds during winter. Fig 1 gives a schematic presentation of the components of growth during the winter months. Weather, especially temperature, has a profound influence on all these growth processes. To understand how Autumn management influences commencement of spring growth it is worthwhile examining how the growth processes are influenced by climatic conditions.

Fig . 1.



Leaf Growth

New leaves of grass continue to appear throughout the winter. Rate of leaf appearance increases with increasing temperature, but even at temperatures close to freezing, some leaves continue to appear.

The growth or extension of these leaves is also mainly a function of temperature. Fig.2 shows that at temperatures between 0 and 12°C leaf growth increases significantly. Leaf growth is also affected by the time of year in that leaves appear to grow more rapidly after late January than before. At 12°C the Spring growth rate was nearly double the Autumn growth rate. The reason for this is that after a cold spell, the tillers are vernalised i.e. tillers move from the vegetative state to the initial stages of the flowering state and these then have a greater potential growth rate. This largely explains why growth in Autumn is significantly less than growth in Spring, even though temperatures can often be higher.

Generally each grass plant or tiller has 3 leaves, one leaf just appearing, one adult or mature leaf and one dying back or senescing. Leaf senescence is as integral a part of plant growth in winter as is leaf extension. Fig. 3 shows the relationship between temperature and leaf senescence. As temperatures rise, so too, does the rate of leaf senescence. Frost or severe cold, can also cause premature senescence of leaves. This can cause the sward to take a brown appearance. However, within a few weeks new leaves appear and the sward greens up again.

Thus, leaf senescence in the sward is complex, in that there are two distinct types of senescence, one due to the natural turn of the leaves and one due to "winter kill". Senescence like growth is "pre-planned" by the grass, it is an ordered disassembly of cells in the leaf and the nutrients in that leaf are moved to the younger part of the plant. This recycling of the nutrients can be a valuable source of nutrients to the actively growing parts of the plant, especially when nutrient supply is poor. The whole area of recycling within the plant and the effect of nutrients and climate on its efficiency warrants further investigation.

During winter the rate of leaf senescence is broadly similar to the rate of leaf growth and there is therefore no net increase in size of leaves and the overall appearance of the sward stays the same. It was also found in trials at Johnstown Castle, that the size of tillers in spring was the same, regardless of the date of closure in the previous autumn. Thus, differences in commencement of spring growth due to various autumn management practices is not due to sizes of individual tillers.

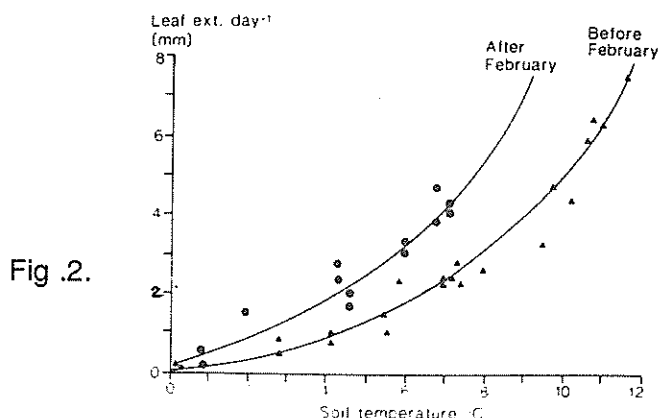


Fig .2.

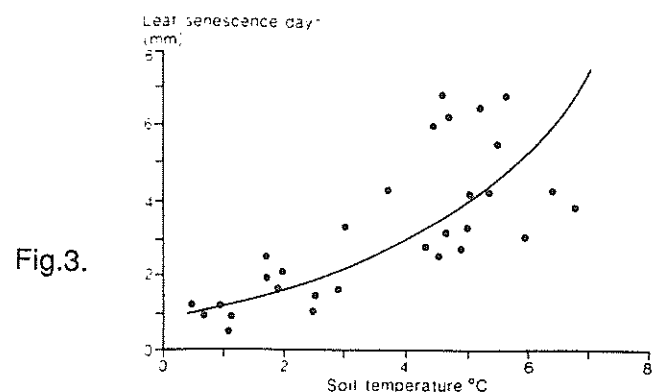


Fig.3.