Presentation by

Tom Keane

at the

European Association for Potato Research (EARP)

Conference on

Phytophthora infestans

at

Trinity College, Dublin 1995

in commemoration

of the

150th anniversary

of the

Irish Famine, 1845-47

(See Conference Proceedings, pp. 191-200)

HISTORY

1926	Dutch (Van Everdingen) rules:	cumbersome criteria
1947	Beaumont:	referred to critical periods before first outbreak. Limitations: Low humidity threshold (75%) occurred too frequently in Ireland
1953	Bourke:	10°C & 90% RH, simplified criteria, shorter lead period; conditions which could be forecast ahead of occurrence.
1956	Smith:	Adopting the 10°C threshold and 90% criteria, Smith defined conditions for a 'critical period' over 2 day periods and a so called 'near miss'.
1962	Wallin:	Temperature-humidity criteria. Lead period depended on temp: 10 hrs if temp 15-26°C; 13 hrs if 12-15°C; or 16 hrs if 7-12°C. Severity values are calculated.
1967	Schrödter and Ullrich:	Negative prognoses; Weighting factor for T-RH-Rain gives a weekly rating Σ to threshold value for start of a special stage of an epidemic.

HISTORY (cont.)

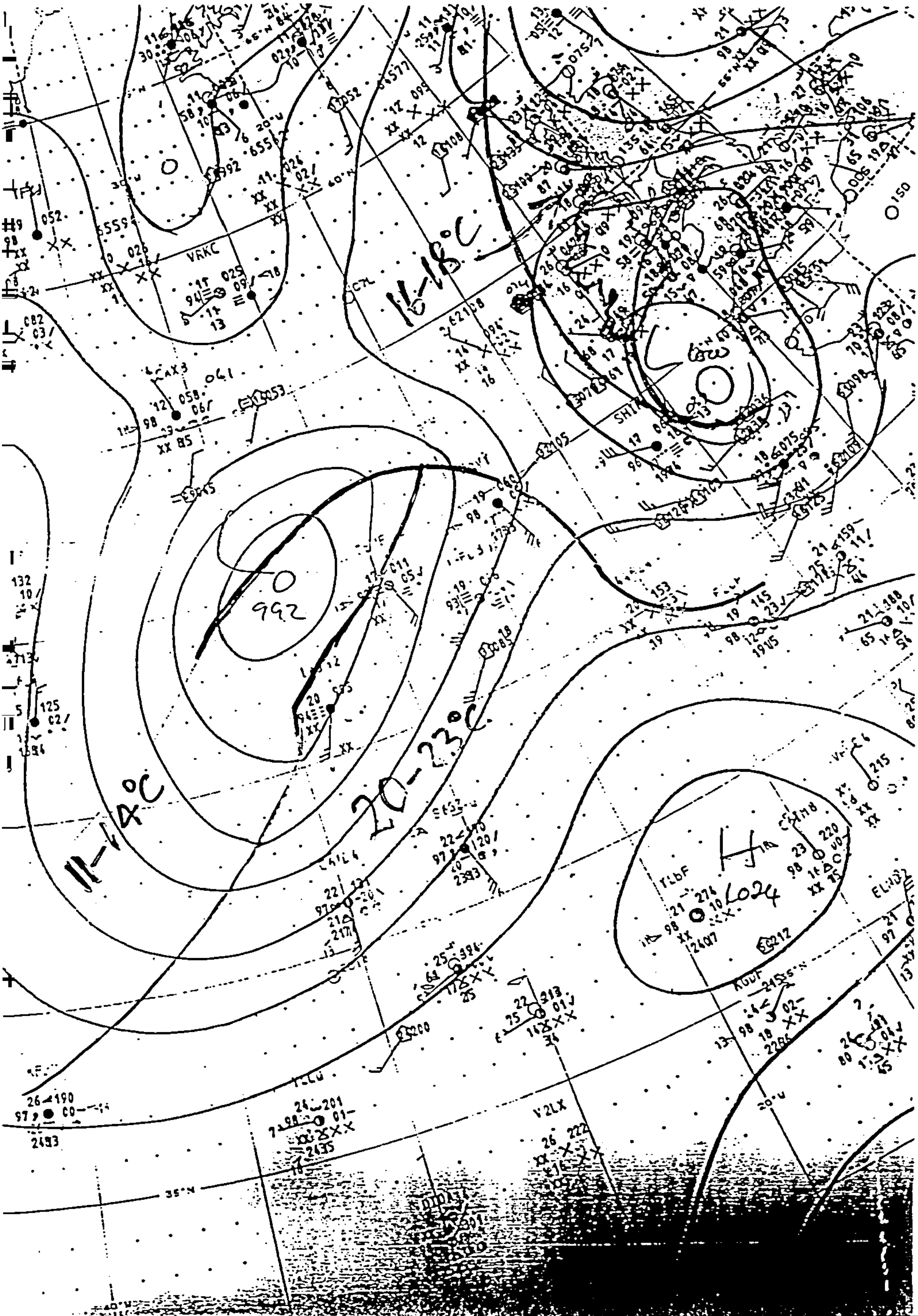
1975	Krause et al (Wallin/Hyre);	Blitecast provides a forecast of 'zero date' from severity ratings and time since last spray, etc. Requires field microprocessor monitoring.
1980	Sparks:	Very detailed simulation model of disease progress but attempts at guidance are too prescriptive, it thus lacked flexibility and failures were unacceptably misleading.
1984	Sparks:	Simplified model which gives an 'infect' rating, 1-3, and specification of critical periods to give rise to successive generations of disease. Not suitable for more moist regions of Ireland.

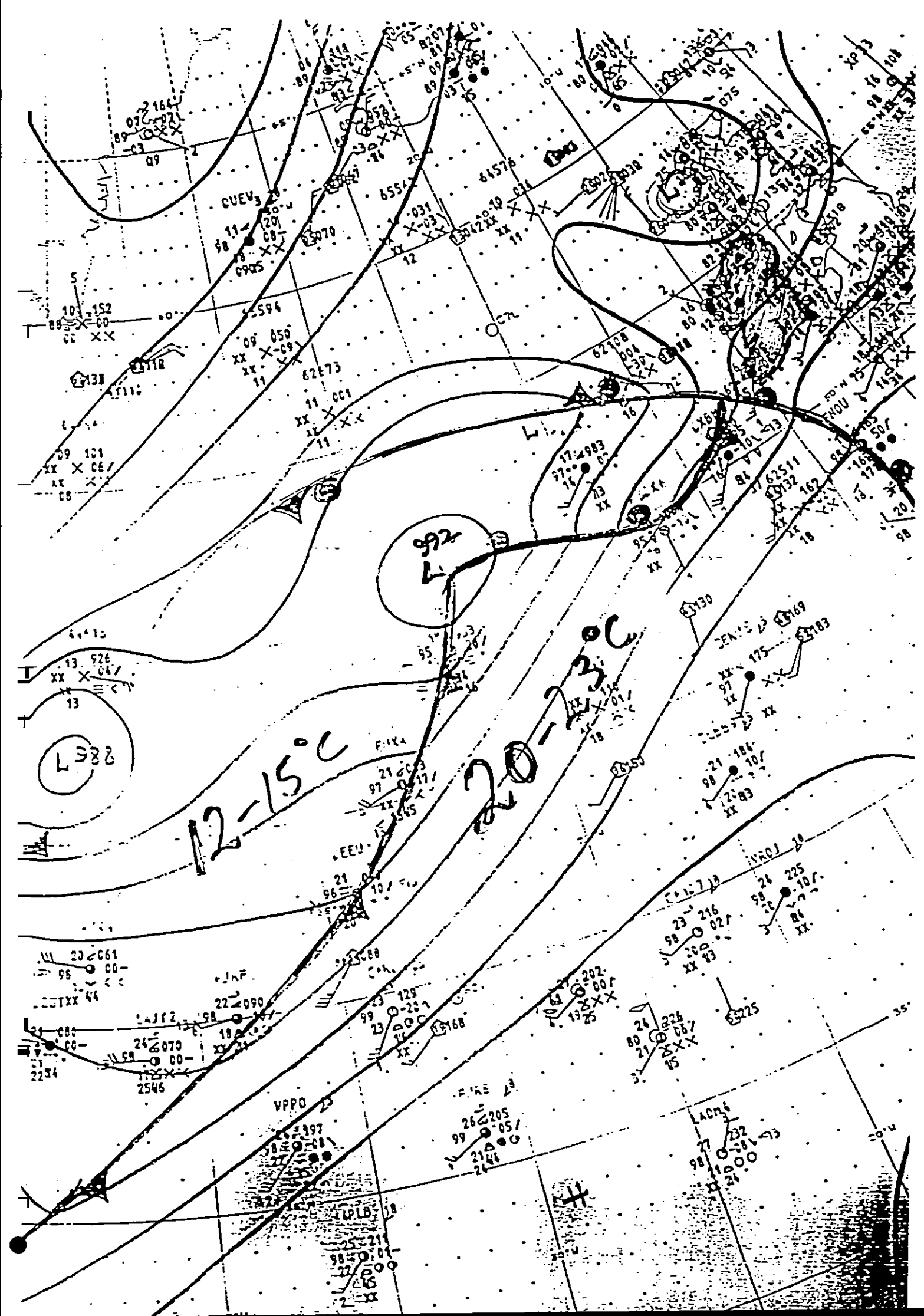
P M Austin Bourke 1913 - 1995

1939 - 1978
Irish Meteorological Service
(Director, 1964 - 1978)

- 1950's
Took active role in development of Agricultural Meteorology both in Ireland and World-wide

• 1955	Adviser to Government of Chile on Agricultural Meteorology under UN technical co-operation
• 1958 - '62	President of the World Meteorological Organisation (WMO) Commission in Agricultural Meteorology (CAgM)
• 1967	Ph.D. Thesis: Epidemiology of Potato Blight in the years 1845 -'47
• 1975	Awarded William F. Petersen Gold Medal for his work on plant biometeorology
• 1978	D.Sc. (*honoris causa*)
• 1988	Butler Medal of the Society of Irish Plant Pathologists


11-18°C
Low
992
20-23°C
11-14°C
H
1024
VRKC
V2LX


992
L
L988
12-15°C
20-23°C

Blight Spells ending on 29 July, 1995

				Totals EBH day	Totals EBH Period 10-day	Totals Year
953	Valentia Observatory	27/1300	29/1100 e	47 36	50	274
955	Cork Airport	28/1600 C after 2	29/2300 e	32 32	84	277
957	Rosslare	28/2000	29/0700 e	12 1	43	203
957	Rosslare	29/1200 C after 4	29/2300 e	12 12	55	215
960	Kilkenny	29/0000	29/1100 e	12 1	1	34
962	Shannon Airport	28/2000	29/0900 e	14 3	13	80
965	Birr		No Blight		6	52
967	Casement Aerodrome		No Blight		0	15
969	Dublin Airport		No Blight		0	8
970	Claremorris	28/1900 C after 4	29/1200 e	18 18	47	137
971	Mullingar		No Blight		3	74
974	Clones		No Blight		1	24
976	Belmullet	27/2000	29/1000 e	39 28	38	157
980	Malin Head		No Blight		5	46

FORM A

POTATO BLIGHT SURVEY

INITIAL OUTBREAKS

Grower's name, and place where outbreak occurred Patrick Mc Cormack Ballingarry Roscrea Co. Tipperary

Grid reference of location of outbreak

Date of observation of outbreak 31/7/95

Is outbreak on open field crop [✓], garden crop [ ]

clamp site [ ], discard dump [ ], ground keepers [ ],

DETAILS OF FIELD OR GARDEN OUTBREAKS

Variety Record 6) Area of crop 2.80 ha.

Whether sprayed: YES/~~NO~~.
If Yes, when? 17/7/95 material used Ridomil Plus

State of growth: (Tick one)
Plants not yet meeting along rows : [ ]
Plants meeting along but not across rows : [ ]
Plants meeting across rows : [✓]

Blight extent: Tick one or two categories as they apply (Blight may occur as patches of infected plants and/or isolated plants)

Single patch [✓] One plant only [ ]

Several patches [ ] Several isolated plants [ ]

Comments One small patch

OPTIONAL EXTRA INFORMATION ON FIELD OR GARDEN ATTACKS

WEATHER. General weather conditions prior to outbreak
Wet and Humid evening of 27th to morning of 28th. Dry & very warm otherwise

OTHER FACTORS which might affect the disease level,
e.g. fertilizer treatment, type of soil, etc.:

DISTRIBUTION: describe any feature of distribution of attack
(e.g. on edge of field, near gateway, etc.) and possible explanations
(e.g. damp hollow, in shelter of trees, etc.):
Edge of field, shelter of hedge

SOURCE OF INFECTION. If probable source of infection is known, give its nature and position , e.g. 'affected plants on old clamp site 150 yards to NNW':

Extra notes and sketches (Enter tick here and use back of form):

Inspector's name, district and date of report Michael Murtagh
2/8/95 Offaly

FORM B2

POTATO BLIGHT SURVEY. WEEKLY DEVELOPMENT REPORT (GENERAL CROP)

1) DISTRICT. Area to which report refers Laois/Offaly/North Tipperary

2) PERIOD. Report refers to week ending Saturday 5/8/95

3) EXTENT. Indicate percentage of crops which show the specified level of infection (according to B.M.S. rating):

95 %	has no infection.	____ %	has 25% infection.
4 %	has 0.1% infection.	____ %	has 50% infection.
1 %	has 1% infection.	____ %	has 75% infection.
____ %	has 5% infection.	____ %	has 90% infection. or greater.

4) VERDICT. Give your judgement on how present blight infection on the foliage compares with what you would ordinarily expect at this time of year (tick one). This year has:

Much less	✓	less		About average	
More		Much More		No opinion	

5) EXTENSION OF DISEASE. Spread of blight during the week.

(a) In crops in which blight has previously been noted:

No spread		Slow spread	✓	Rapid spread	

(b) To crops not previously seen to be infected:

No spread		Slow spread	✓	Rapid spread	

6) STEM BLIGHT AND TUBER BLIGHT.

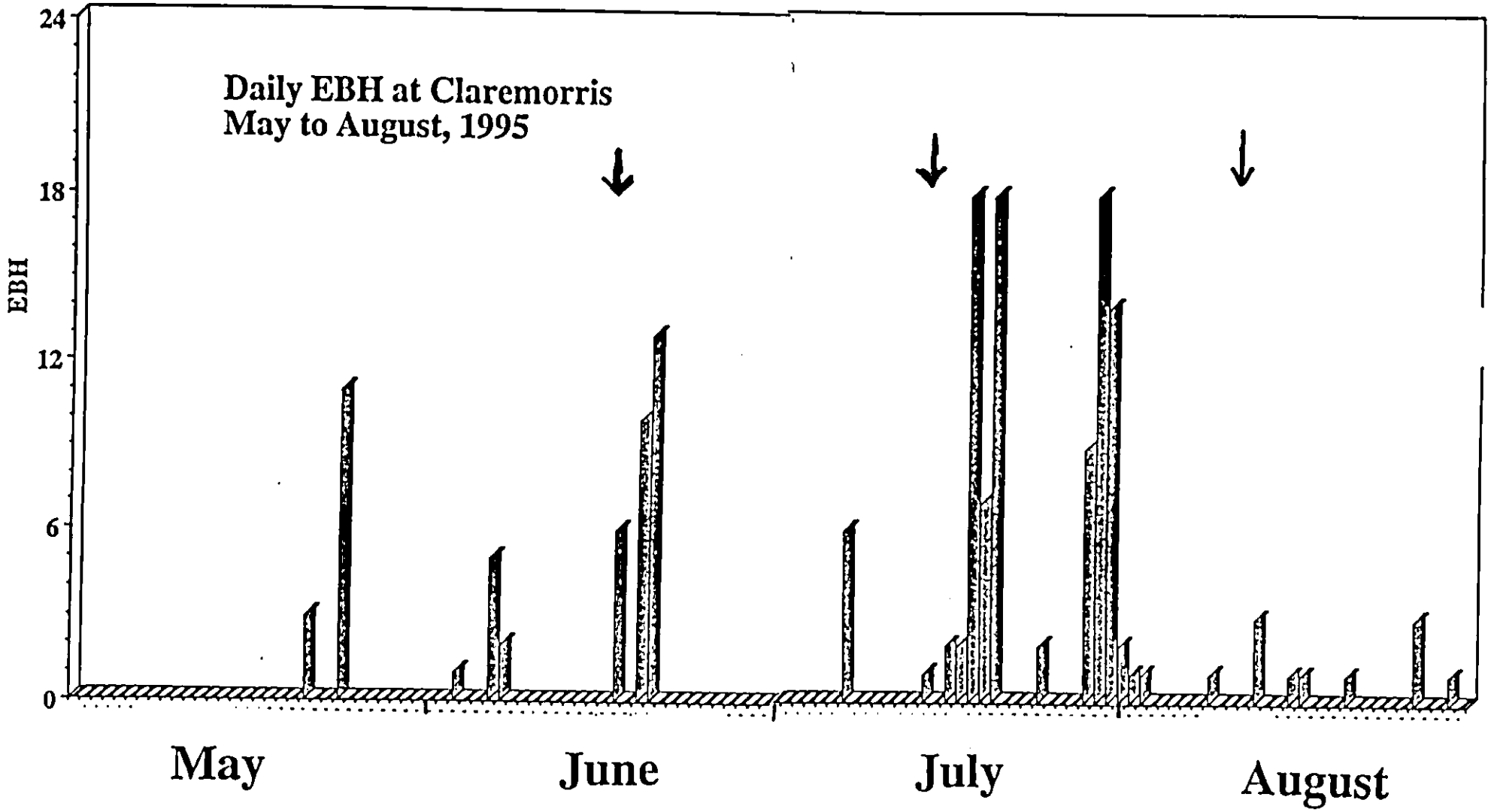
If blight on stems or on tubers has come to notice, place a tick in the corresponding box and enter any available information on back of form:

Stem blight	✓	Tuber blight	

7) WEATHER. Conditions during week: Wet as ending 31st. Dry and warm otherwise

8) OTHER NOTES AND REMARKS Harvesting of crops intended for early market considered

9) INSPECTOR'S NAME, DISTRICT, AND DATE OF REPORT: M. Kavanagh Offaly 10/8/95


Daily EBH at Claremorris
May to August, 1995
EBH
24
18
12
6
0
May
June
July
August

First Warning of the Season

- Zero Date
- Potato Inspector Reports
- Upcoming favourable Conditions

Timing & Frequency of Warnings

Appropriate application of Fungicide:

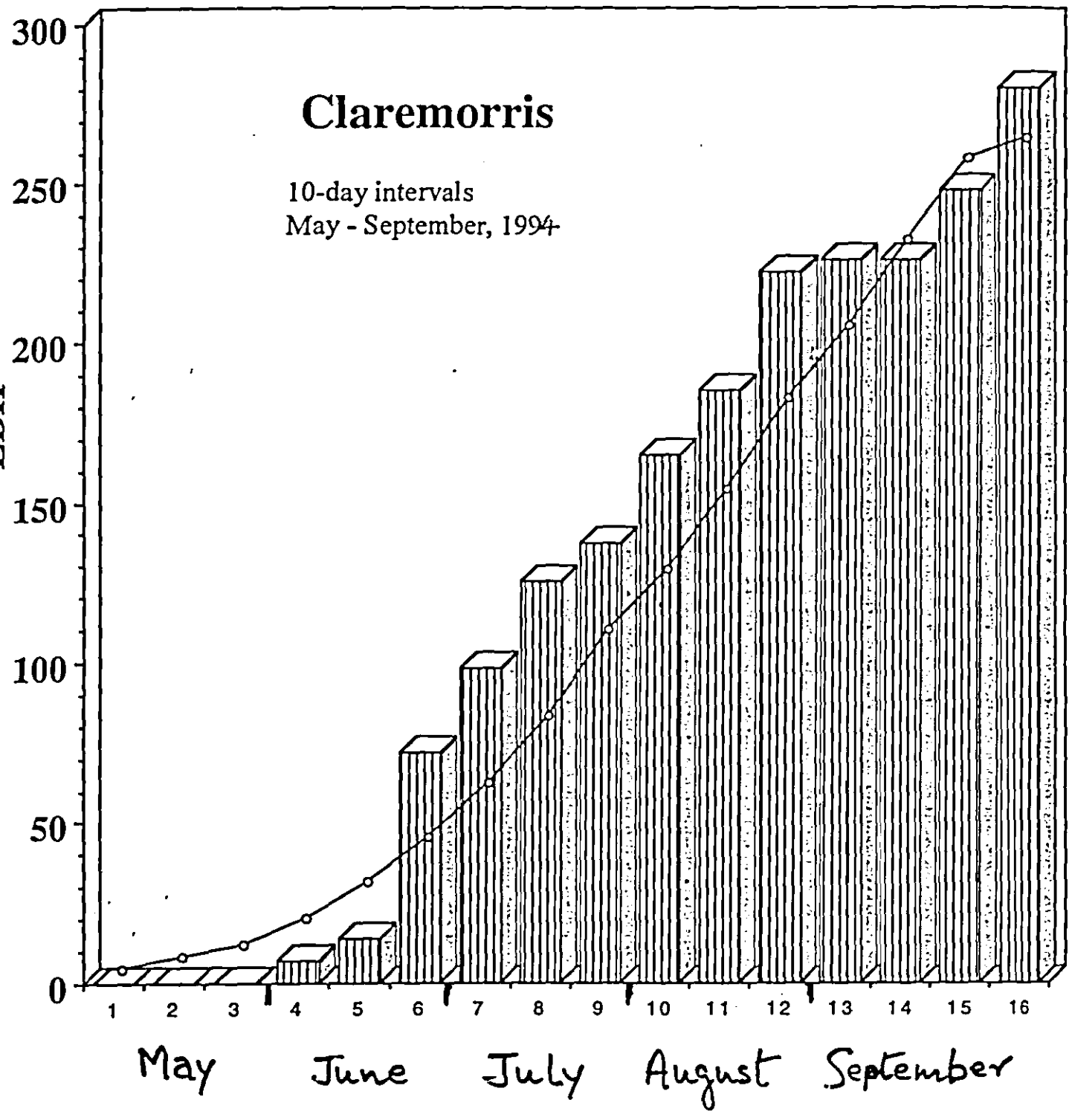
- Effectiveness
- Environment
- Economy

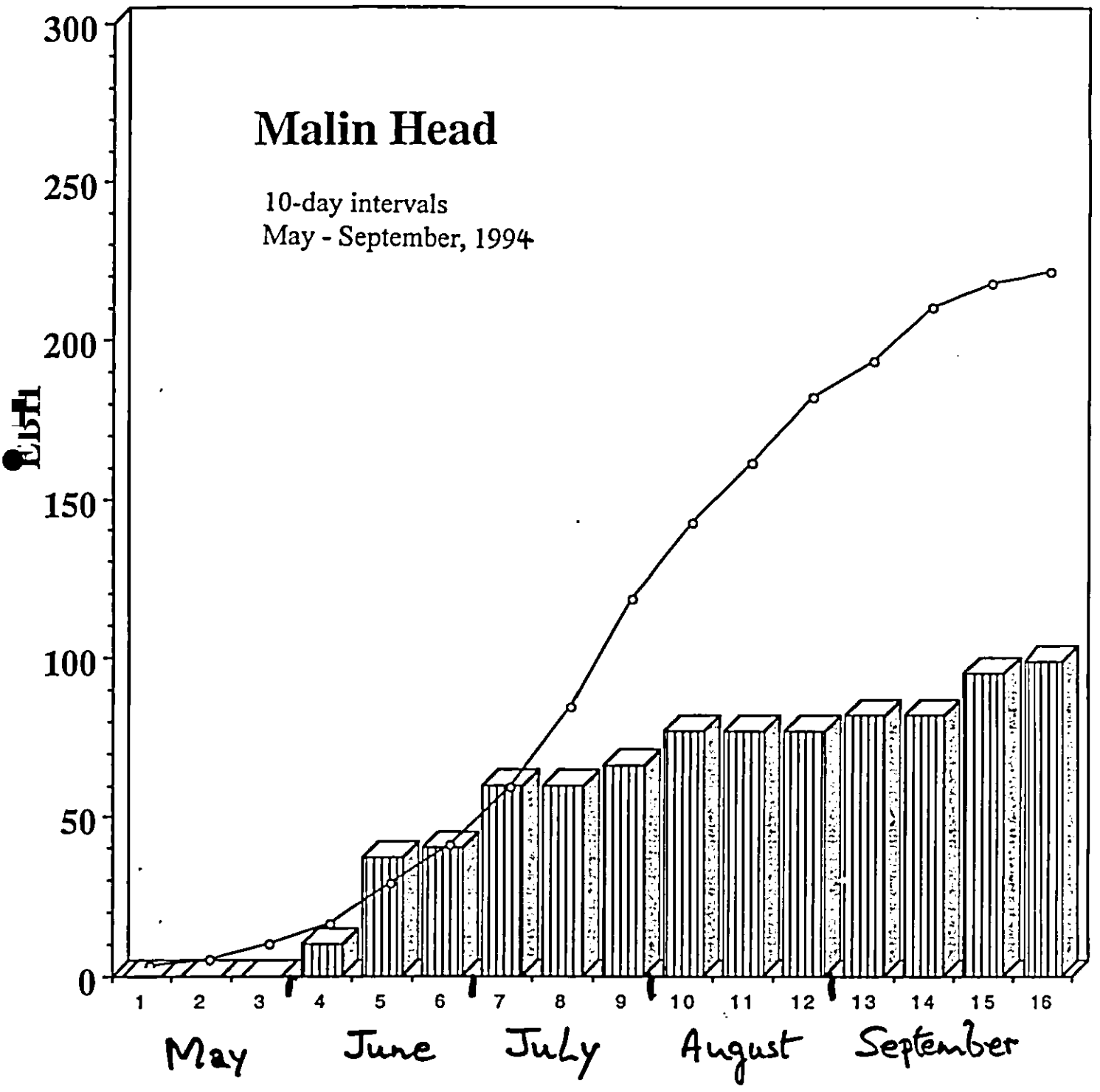
Considerations for Spraying

- Light breeze, < 5m/s, for an even spread
- Dry on day or dry at least 1 -3 hr before spraying
- Low or moderate Relative Humidity
- Dry for 1 - 2hr after spraying
  - if foliage is wet a longer spell may be necessary
- Field conditions (based on water balance estimates)

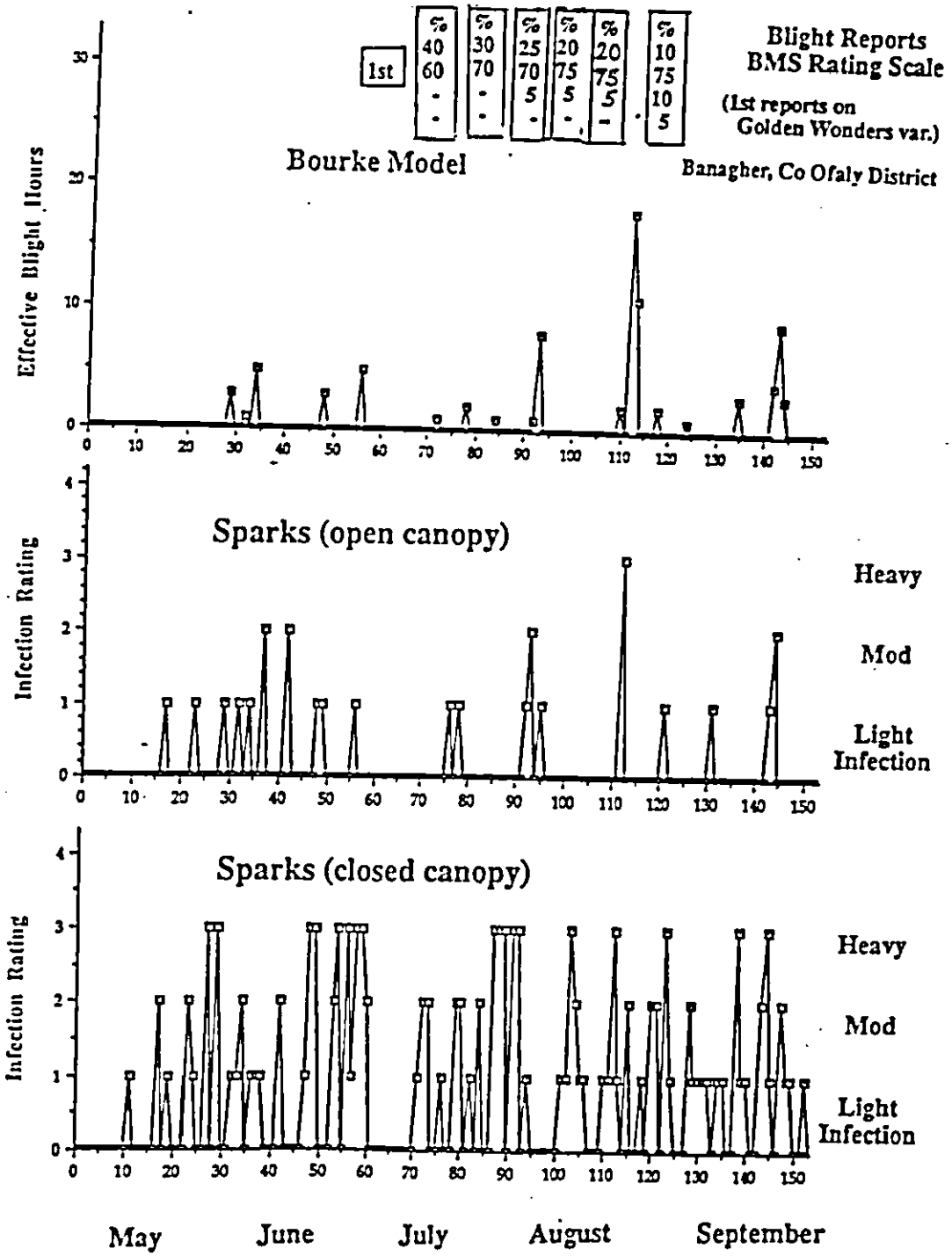
Typical Airmasses

- Extensive moist SW airflow, dew point, e.g. ≥ 15°C
- Slow moving rainbelts giving persistent rain, drizzle or fog
- Quasi-stationary thundery trough over Ireland


Claremorris
10-day intervals
May - September, 1994
EBH
300
250
200
150
100
50
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
May
June
July
August
September
Column 1


Malin Head
10-day intervals
May - September, 1994
300
250
200
150
100
50
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
May
June
July
August
September
Column 1

Birr 1987


1st
% 40 60 - -
% 30 70 - -
% 25 70 5 -
% 20 75 5 -
% 20 75 5 -
% 10 75 10 5
Blight Reports
BMS Rating Scale
(1st reports on
Golden Wonders var.)
Bourke Model
Banagher, Co Ofaly District
Effective Blight Hours
Sparks (open canopy)
Infection Rating
Heavy
Mod
Light
Infection
Sparks (closed canopy)
Infection Rating
Heavy
Mod
Light
Infection
May
June
July
August
September

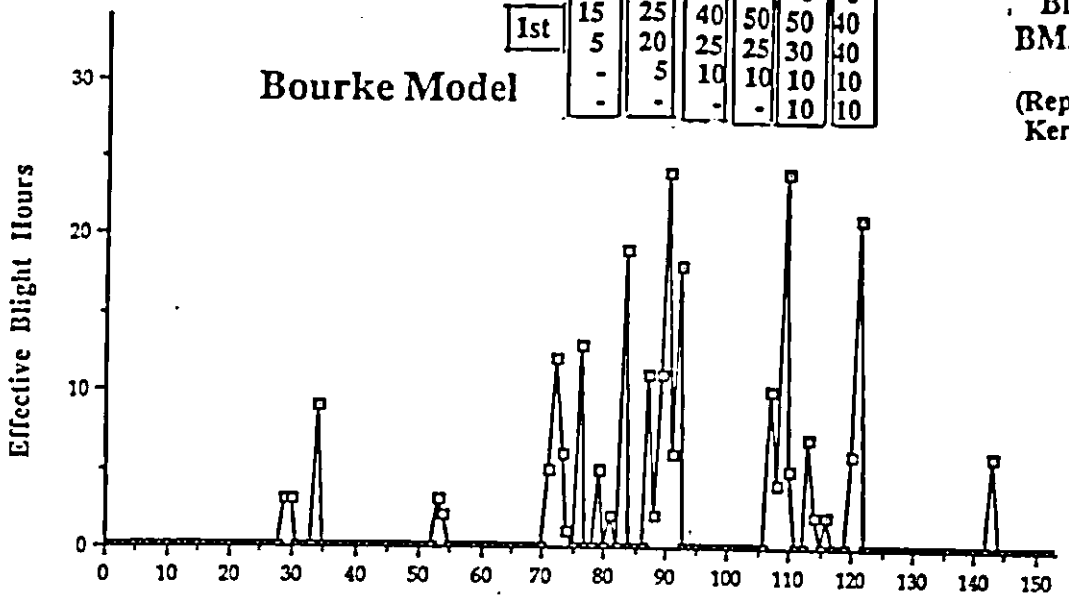
Malin Head 1987

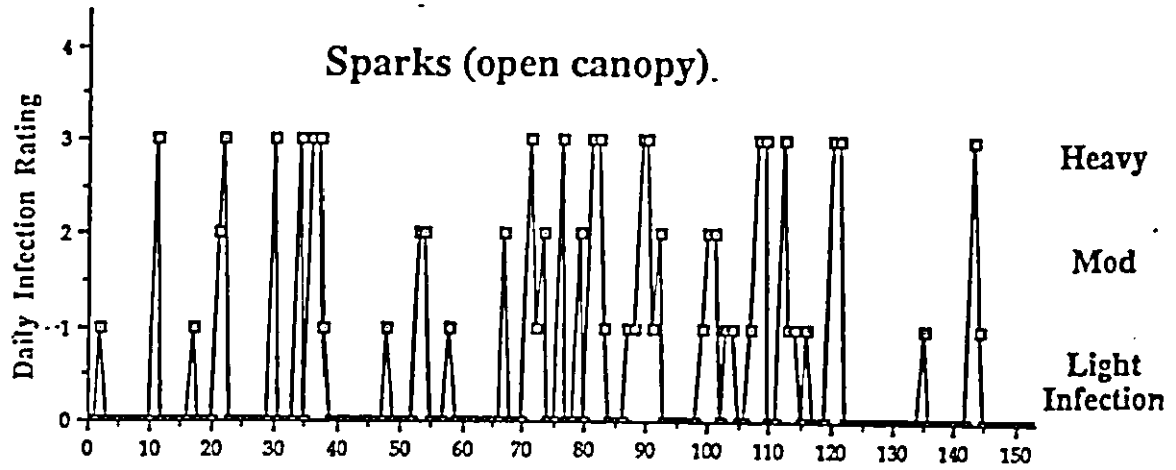
Buncrana, Co Donegal District

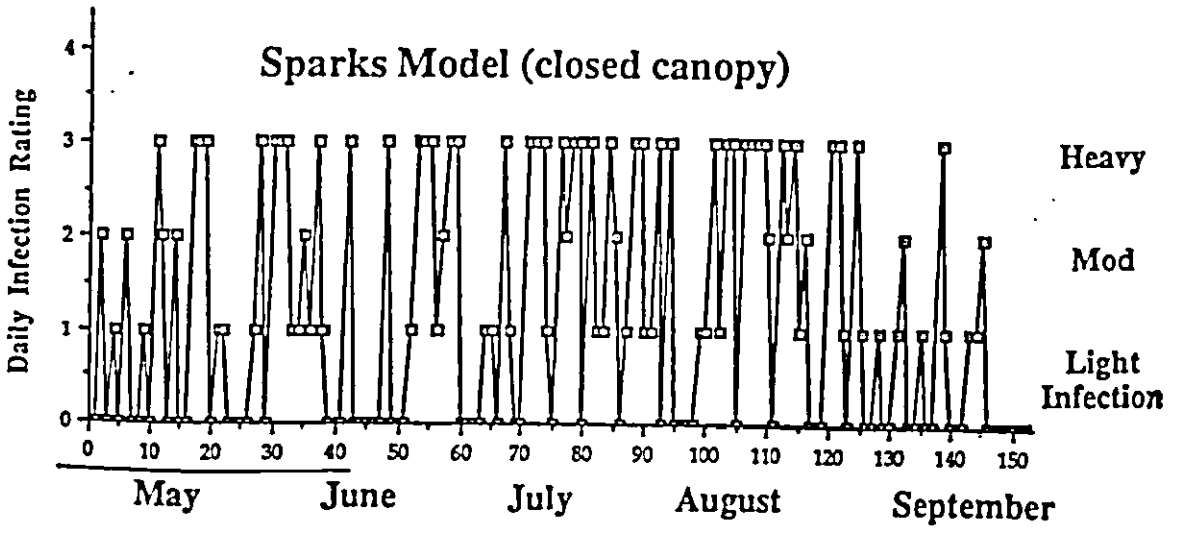
Blight Reports
BMS Rating Scale

(Reports on
Kerrs Pink var.)

	%	%	%	%	%	%
1st	80	50	20	5	0	0
	15	25	40	50	50	40
	5	20	25	25	30	40
	-	5	10	10	10	10
	-	-	-	-	10	10







Frequency of EBH totals, mid-June to end of July, and percentage of crop with stated % of blight on foliage according to the British Mycological Society rating scale at end of July

Station/ District	Year	No. of Spells ≥ threshold EBH				Max EBH	Seasonal Total	Percentage of crop infected at stated % blighted foliage					
		1	5	10	25			0%	0.1%	5%	10%	25%	50%
Dublin Apt/	1984	4	1	1	1	30	36	95	5	0	0	0	0*
Dublin	1985	4	4	3	2	47	105	0	5	29	40	12	14
	1986	8	3	2	1	28	67	5	80	10	5	0	0
	1987	5	1	1	0	17	25	95	5	0	0	0	0
	1988	4	2	0	0	6	17	75	21	4	0	0	0
Rosslare/	1984	7	2	1	0	18	32	94	5	1	0	0	0
Wexford	1985	9	5	4	3	53	157	20	72	6	2	0	0
	1986	17	6	4	1	42	132	40	50	8	2	0	0
	1987	11	5	2	1	74	118	40	45	10	4.5	0.5	0
	1988	7	4	2	1	48	84	40	50	8	2	0	0
Birr/	1984	2	0	0	0	3	4	95	5	0	0	0	0
Tullamore-	1985	8	1	0	0	9	28	0	40	40	20	0	0
Banagher	1986	8	1	1	0	13	30	20	55	20	5	0	0
	1987	6	1	0	0	5	13	30	70	0	0	0	0
	1988	6	1	0	0	7	22	20	68	6	5	1	0

* 95% of crop had no infection and 5% of the crop had infection at the 0.1% level

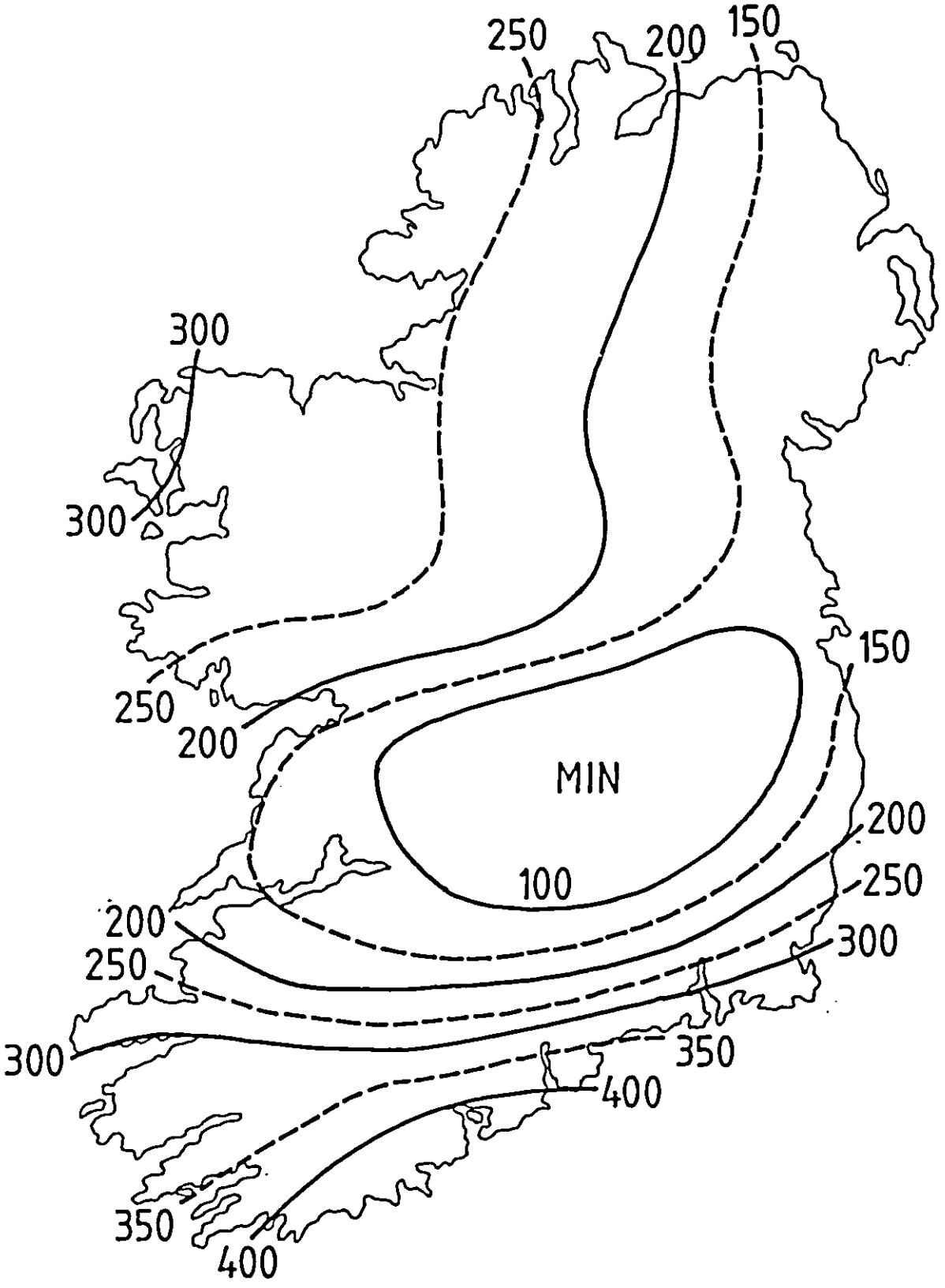


Fig 2

Fig. 3 Average (1957-81) accumulations of effective blight hours(EBH)

Example of a Potato Blight Warning

'Weather conditions over the next three days will be conducive to the spread of potato blight, especially in the west and Northwest.
Suitable spraying conditions will occur this evening and before noon tomorrow'

Issue of Warnings

- National Radio and National TV (RTE)
- Recorded Telephone *WEATHERDIAL*
- National Potato Authorities

Frequency of warnings

- 3 - 6 warnings per season (mid-June to mid-September) depending on the recurrence of suitable conditions
- Under normal conditions warnings not issued within two to three weeks of each other, except in epidemic situations
- In meteorological terms an epidemic situation occurs if extensive blight conditions are recurrent during the peak growing season, July - August, accompanied with heavy rain

HirLam 0HOUR 850MB Thr 7 Sep 1995 AT 6Z HUMIDITY

Morning Run

Age of data 3-hours [chtplt]