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

<table>
<thead>
<tr>
<th>Year</th>
<th>Author(s)</th>
<th>Criteria/Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1926</td>
<td>Dutch (Van Everdingen)</td>
<td>Cumbersome criteria</td>
</tr>
<tr>
<td>1947</td>
<td>Beaumont</td>
<td>Referred to critical periods before first outbreak. Limitations: Low humidity threshold (75%) occurred too frequently in Ireland.</td>
</tr>
<tr>
<td>1953</td>
<td>Bourke</td>
<td>10°C &amp; 90% RH, simplified criteria, shorter lead period; conditions which could be forecast ahead of occurrence.</td>
</tr>
<tr>
<td>1956</td>
<td>Smith</td>
<td>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'.</td>
</tr>
<tr>
<td>1962</td>
<td>Wallin</td>
<td>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.</td>
</tr>
<tr>
<td>1967</td>
<td>Schrödter and Ullrich</td>
<td>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.</td>
</tr>
</tbody>
</table>
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.
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
## Blight Spells ending on 29 July, 1995

<table>
<thead>
<tr>
<th>No.</th>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Period</th>
<th>Year</th>
<th>EBH</th>
<th>Period Day</th>
<th>Year 10-Day</th>
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</thead>
<tbody>
<tr>
<td>953</td>
<td>Valentia Observatory</td>
<td>27/1300</td>
<td>29/1100  e</td>
<td>47</td>
<td>36</td>
<td>50</td>
<td>274</td>
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<tr>
<td>955</td>
<td>Cork Airport</td>
<td>28/1600 C after 2</td>
<td>29/2300 e</td>
<td>32</td>
<td>32</td>
<td>84</td>
<td>277</td>
<td></td>
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<tr>
<td>957</td>
<td>Rosslare</td>
<td>28/2000</td>
<td>29/0700  e</td>
<td>12</td>
<td>1</td>
<td>43</td>
<td>203</td>
<td></td>
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<tr>
<td>957</td>
<td>Rosslare</td>
<td>29/1200 C after 4</td>
<td>29/2300 e</td>
<td>12</td>
<td>12</td>
<td>55</td>
<td>215</td>
<td></td>
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<tr>
<td>960</td>
<td>Kilkenny</td>
<td>29/0000</td>
<td>29/1100  e</td>
<td>12</td>
<td>1</td>
<td>1</td>
<td>34</td>
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<tr>
<td>962</td>
<td>Shannon Airport</td>
<td>28/2000</td>
<td>29/0900  e</td>
<td>14</td>
<td>3</td>
<td>13</td>
<td>80</td>
<td></td>
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<tr>
<td>965</td>
<td>Birr</td>
<td>No Blight</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>967</td>
<td>Casement Aerodrome</td>
<td>No Blight</td>
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<td>969</td>
<td>Dublin Airport</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>970</td>
<td>Claremorris</td>
<td>28/1900 C after 4</td>
<td>29/1200 e</td>
<td>18</td>
<td>18</td>
<td>47</td>
<td>137</td>
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<td>971</td>
<td>Mullingar</td>
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<td>974</td>
<td>Clones</td>
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<td>976</td>
<td>Belmullet</td>
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<td>29/1000  e</td>
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<td>28</td>
<td>38</td>
<td>157</td>
<td></td>
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<tr>
<td>980</td>
<td>Malin Head</td>
<td>No Blight</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
POTATO BLIGHT SURVEY

INITIAL OUTBREAKS

1) Grower's name, and place where outbreak occurred: Edward McCannath

Ballinasloe, Roscommon Co. Roscommon

Grid reference of location of outbreak: 

2) Date of observation of outbreak: 24/2/95

3) Is outbreak on open field crop: Yes, garden crop: No

4) clamp site: , discard dump: , ground keepers: 

DETAILS OF FIELD OR GARDEN OUTBREAKS

5) Variety: Recced

6) Area of crop: 4.30 ha.

7) Whether sprayed: YES/NO.
   If Yes, when? 
   Material used: 

8) State of growth: Plants not yet meeting along rows: 

9) (Tick one)
   Plants meeting along but not across rows: 
   Plants meeting across rows: 

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

   Single patch: 
   Several patches: One plant only: 
   Several isolated plants: 

11) 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 AND 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 SWELLED OR 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 Mushkay 9/5/95"
FORM B2

POTATO BLIGHT SURVEY. WEEKLY DEVELOPMENT REPORT (GENERAL CROP)

1) DISTRICT. Area to which report refers: North Tipperary

2) PERIOD. Report refers to week ending Saturday 18-95

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

- 95% has no infection.
- 1% has 0.1% infection.
- 1% has 1% infection.
- 1% has 5% infection.
- 1% has 25% infection.
- 1% has 50% infection.
- 1% has 75% infection.
- 1% has 90% infection.

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 on evening 31st.
- Dry and warm otherwise.

8) OTHER NOTES AND REMARKS

- Harvesting of crops intended for early market continued.

9) INSPECTOR'S NAME, DISTRICT, AND DATE OF REPORT: Mr. Keeney

Date 10-5-95
Daily EBH at Claremorris
May to August, 1995
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 - 2 hr 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
Malin Head

10-day intervals
May - September, 1994

Column 1
Birr 1987

Sparks (open canopy)

Sparks (closed canopy)

May June July August September
Malin Head 1987

Bourke Model

| 1st | 15 | 50 | 20 | 50 | 5 | 0 | 0 |

Blight Reports
BMS Rating Scale
(Reports on Kerrs Pink var.)

Sparks (open canopy)

Sparks Model (closed canopy)

Effective Blight Hours
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

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

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