IPM Decisions

D4.1 Data set for DSS evaluation collected: apple scab and potato late blight

Grant agreement number: 817617

Start date of project: 01/06/2019 **End date of project:** 31/05/2024

Deliverable due date: 01/12/2019 **Date of delivery:** 29/11/2019

Classification: Public

Version History

Version number	Implemented by	PME approval date	Reason
1.0	Niels Holst		Deliverable 4.1 – apple scab and potato late blight data sets.

Contents

Horizon 2020

1 Apple scab

1.1 Data delivered from BASF

Data were received in the form of three Excel-files (observations) and a document describing the measurements carried out (meta data).

1.1.1 Observations

We retrieved 3,281 records from the Excel-files which were put in a tab-separated text file (data set) with 11 columns (Table 1).

Table 1. Record layout of data set on apple scab obtained from BASF.

Record field	Description
Country	Country of observation.
Year	Year of observation.
Latitude	Latitude of observation.
Longitude	Longitude of observation.
Treatment	Treatment code.
Untreated	Was treatment the untreated control? (0/1).
Trial	Running number; observations with the same trial number were obtained concurrently on the same location.
Date	Date of observation.
Value	Value observed.
Measure	The type of measure observed (details in Table 2).
Row	The row in the original spreadsheet where this observation was retrieved.

The data set covered 10 countries from 2008 to 2018 (Table 2).

Table 2. Number of records from each country and year in the BASF apple scab data set.

Country	Year										
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Belgium	44	0	0	92	121	152	0	38	38	18	0
Czech Republic	0	0	0	20	0	0	0	0	0	0	0
Denmark	0	0	0	0	22	34	0	0	0	0	0
France	6	4	10	28	73	125	0	0	30	27	6
Germany	115	73	119	243	102	130	0	30	231	25	10
Hungary	0	0	0	17	56	280	0	0	0	0	0
Netherlands	12	8	16	8	32	16	0	0	0	0	0
Poland	0	0	0	47	91	126	0	0	0	0	0
Slovakia	0	0	0	0	62	168	0	0	0	0	0
United Kingdom	0	0	32	142	130	14	0	0	0	58	0

1.1.2 Meta data

The measurements were coded as *P%INF*, *P%FREQ*, *etc.*, as given in the *Measure* column of the data set (Table 1) and explained in Table 3.

Table 3. Measures used in the BASF apple scab data set.

Measure	Description
P%FREQ	Estimated frequency of attack %
P%INF	Estimated severy of attack %
%ANTK1	Class 1 (%)
%ANTK2	Class 2 (%)
%ANTK3	Class 3 (%)
%ANTK4	Class 4 (%)
BEFHKT	Frequency of attack
BEFWER	Index of attack
INFECT	Infection (F); Infestation (F)
KR%ABB	Diseased (%)
WIRKGR	Percent of untreated

Assessments

The disease infection was expressed as the intensity of attack (=severity) and/or the frequency of attack. Two assessment methods were used:

1. **Visual assessment**:
   - *P%INF*: intensity of attack was obtained as a visual estimation of the percentage of each plant part (leaves or fruits) affected by disease
   - *P%FREQ*: frequency of attack was represented by the number of infected leaves or fruits. The frequency is expressed as a percentage of the number sampled.

2. Class assessment (H 1-4 or A1-2)

The level of the attack (intensity and frequency) was evaluated and calculated by classing plants into different severity categories ranging from no disease to severe attack.

- *BEFHKT*: frequency of disease attack expressed as a percentage, considering 4 damage classes
- *BEFWER*: intensity of attack expressed as a percentage, considering 4 damage classes.

From the damage classes – no disease (1), low (2), intermediate (3) and severe (4), the intensity of attack *BEFWER* and the frequency of attack *BEFHKT* were calculated:

BEFWER = (((Cl 1 x 0) + (Cl 2 x 1) + (Cl 3 x 2) + (Cl 4 x 3)) / 3 x N) x 100
Calculation according to Townsend-Heuberger
Intensity of attack (0-100 %)

Frequency of attack:

$$BEFHKT = \frac{cl_2 + cl_3 + cl_4}{\text{total } (cl_1 \text{ to } cl_4)} \times 100$$

In addition, the frequency of attack (*KR%ABB*) was calculated as the percentage of infected plant parts, considering 2 classes (diseased – not diseased).

2 Potato late blight

2.1 Data delivered from Corteva

Data were received in the form of 42 Excel-files (observations).

2.1.1 Observations

We retrieved 127,034 records from the Excel-files which were put in a tab-separated text file (data set) with 13 columns (Table 4). Pest severity (%) was recorded in both untreated and treated plots.

Table 4. Record layout of data set on late blight obtained from Corteva.

Record field	Description
Country	Country of observation.
Year	Year of observation.
Latitude	Latitude of observation.
Longitude	Longitude of observation.
Altitude	Altitude of observation.
Treatment	Treatment code.
Untreated	Was treatment the untreated control? (0/1).
Trial	Running number; observations with the same trial number were obtained concurrently on the same location.
Plot	Experimental plot id.
Date	Date of observation.
Value	Pest severity (%).
CropStage	Crop growth stage.
FileName	Name of original Excel file.

The data set covered two countries from 2013 to 2017 (Table 5).

Table 5. Number of records from each country and year in the Corteva late blight data set.

Country	Year				
	2013	2014	2015	2016	2017
Ireland	0	296	528	75200	132
United Kingdom	1628	2298	1684	44572	696

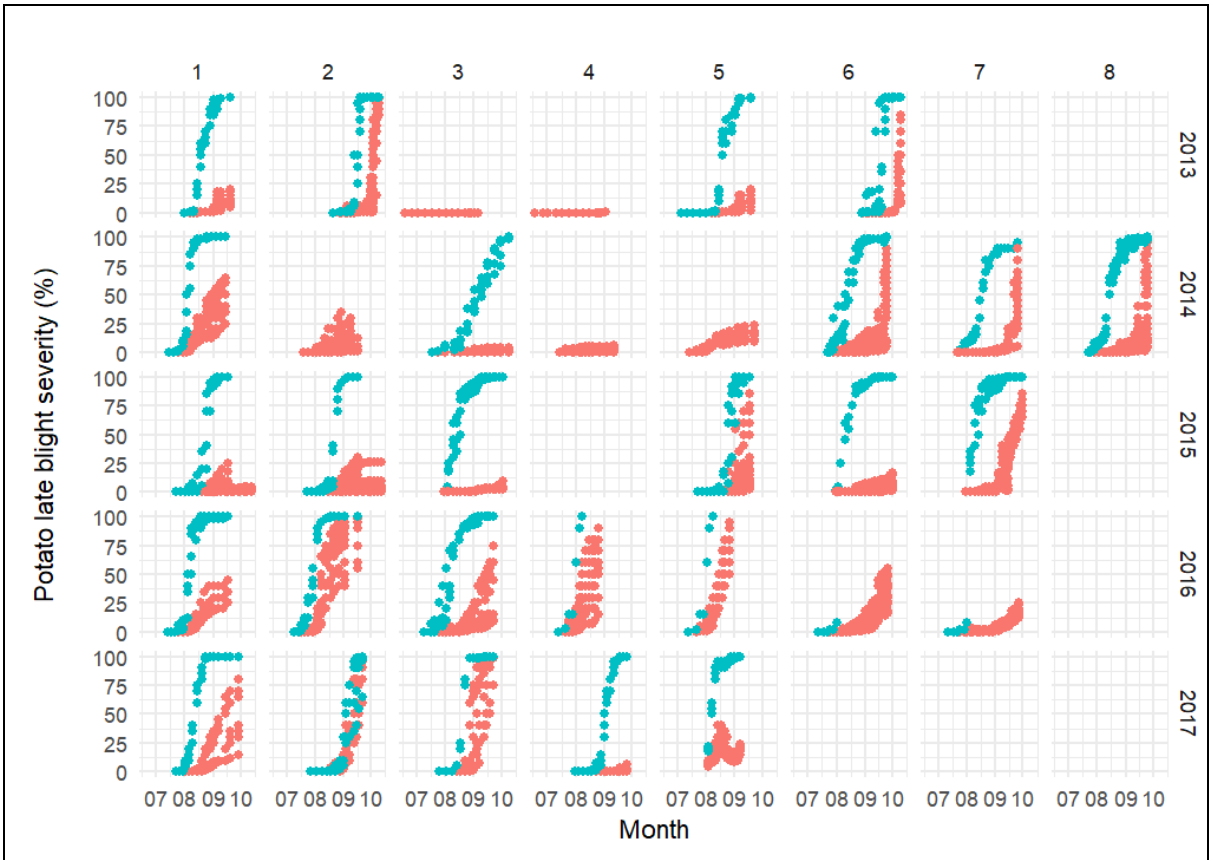

Fig. 1. The course of potato late blight epidemics through five years at up to eight different locations in the UK and Ireland. Treated (red) and untreated (blue) trials. From the Corteva data set.

The apple scab and potato late blight data sets will be accessible internally only until statistical analysis (D4.12) and quality control of the data sets has been completed. The statistical analysis will help to identify priorities for further data acquisition.

3 Weather data

Weather data will consist of hourly weather data (temperature, relative humidity and precipitation) for all locations and years covered in the data sets above. Data will be retrieved from the nearest weather, alternatively from gridded (interpolated) data. The acquisition of weather data is delayed. Expected delivery by end of December.