Cherry rot risk – weather-based tool

User guide

During project CY13001 a tool was developed by the Tasmanian Institute of Agriculture which is available to growers on request from March 2017.

This is a preliminary version that has not been widely tested or field validated. As such, it is useful for "situational awareness" of infection risk but not as a reliable indicator of rot infection at this stage.

Developing "situational awareness" is particularly useful for new orchard owners or managers, or when growing in new locations.

This document outlines what is needed to use the tool, how to use the tool and what the outputs mean.

To obtain a copy of the tool when it is available, please send an email to Dr Karen Barry (Karen.Barry@utas.edu.au) with your name, orchard or business name and contact details. Please use "cherry rot risk tool" in the subject line. Demo data will also be provided to you in order to help learn how to use the tool.

1. What is needed to use the tool?

1.1 Data

Weather data is needed that includes temperature, relative humidity, rainfall and leaf wetness. This should all be recorded from one weather station or site.

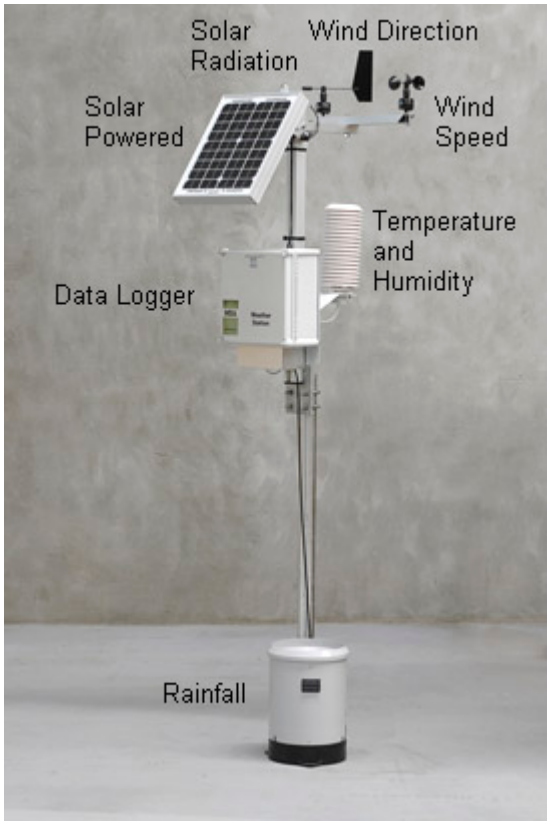
The tool is currently formatted for data collected either from:

- TinyTag loggers (Hastings Data Loggers Pty Ltd.), or

- MEA weather stations (as used for the Australian Pome Fruit Improvement Program weather station network, which operate mostly via a MEA Junior weather station http://mea.com.au/soil-plants-climate/weather/weather-stations).

To obtain the most accurate situational awareness of infection-risk, weather data should be collected from as close to the orchard block as possible. Weather stations should be placed outside the spray zone of the crop so that leaf wetness sensors do not record sprays as wetness. Temperature and relative humidity sensors should be placed within a Stevenson Screen or similar. A tipping bucket rain gauge (or similar) and leaf wetness sensor are also required.

The weather-based infection risk tool requires data with **10 minute intervals**. Weather data can be input for a whole season with historical data (up to about 20 years), or with selected periods of data.



A Junior Weather Station from MEA

MEA format data

The format of the "MEA" files should be as below and all in one file.

Column 1	Date (header row); format as 1/01/2016
Column 2	Time (header row); 24 hour format including seconds, 00:00:00
Column 3	Ave AirTemp (degC)

Column 4	Ave Humidity (%)
Column 10	Ave LeafWet (%)
Column 11	Total Rain (mm)

Header text should be in all other columns per standard output (columns 5-9, 12-18) to enable the model to function, but the data cells can be empty.

Tiny Tag data format

The format of the three “Tiny Tag” files should be as below. If the start time of each set of files is slightly offset, this does not need to be corrected.

Rainfall

	Time	1			
S/N		364335			
Type		Tinytag Plus Rainfall			
Description		styx cherrys			
Property		Rainfall			
1	21/09/2015 16:01	0.0 mm per interval			
2	21/09/2015 16:11	0.0 mm per interval			
3	21/09/2015 16:21	0.0 mm per interval			

Temperature and RH

	Time	1	2		
S/N		366119	366119		
Type		TGU-4500	TGU-4500		
Description		Styx cherrys	Styx cherrys		
Property		Temperature	Humidity		
1	21/09/2015 15:57	22.932 °C	40.0 %RH		
2	21/09/2015 16:07	22.700 °C	39.5 %RH		
3	21/09/2015 16:17	22.616 °C	38.1 %RH		

Leaf wetness

	Time	1			
S/N		305669			
Type		Tinytag+ Leaf Wetness			
Description		styx cherrys			
Property		Wetness			
1	21/09/2015 16:00	0.0 %%			
2	21/09/2015 16:10	0.0 %%			
3	21/09/2015 16:20	0.0 %%			

1.2. Computing requirements

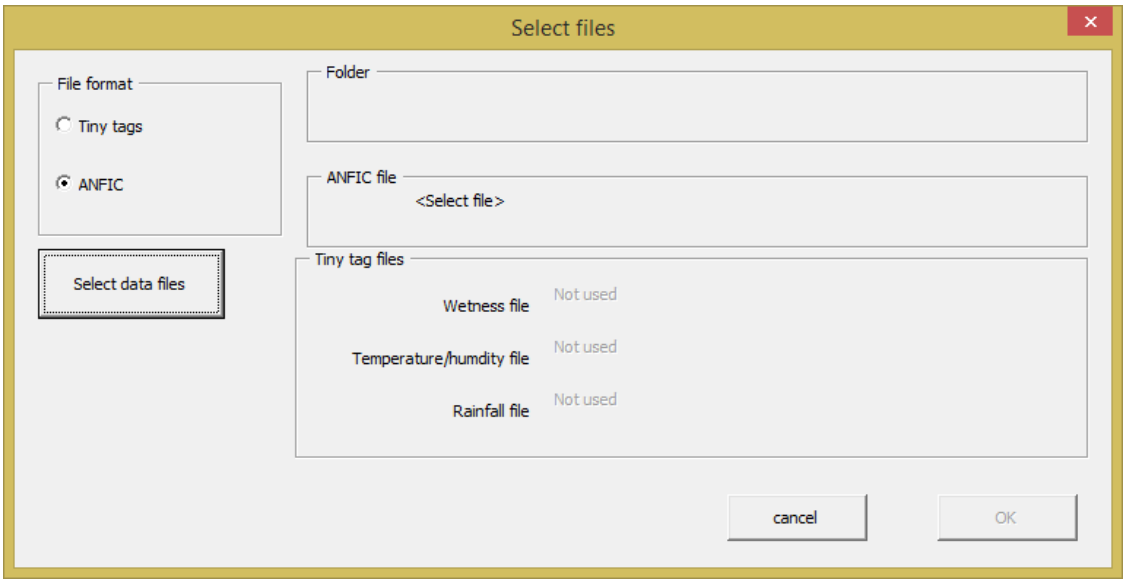
As the tool runs from MS Excel, you need to have MS Office installed on your PC. The tool has been tested with MS Office 2013 (Windows 8.1) and MS Office 2010 (Windows 7).

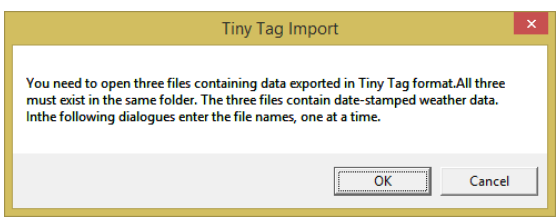
The tool will not work on MS Excel for mac (any version) as the macros cannot be enabled to function.

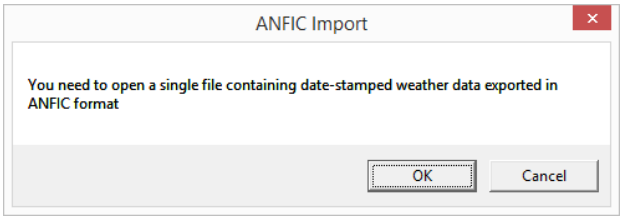
The tool cannot be operated from an ipad or iphone.

2. What are the steps to use the tool?

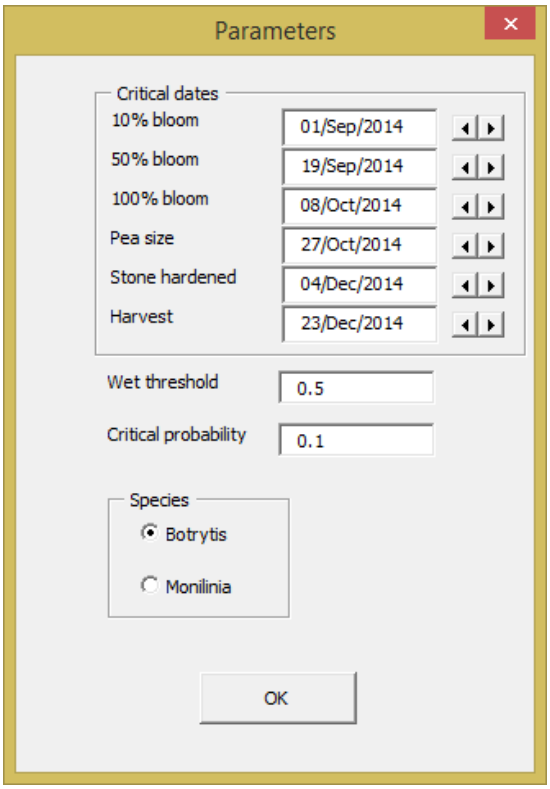
1. Export your weather data to MS Excel format (as above) and check for any data errors.
2. Save the cherry rot risk file on to your computer in a suitable location.
3. Open the cherry rot risk file and “enable content” if requested
4. To get started with the demo data or your own data, choose “select file(s)”
5. Select the file format and then hit “select data files”



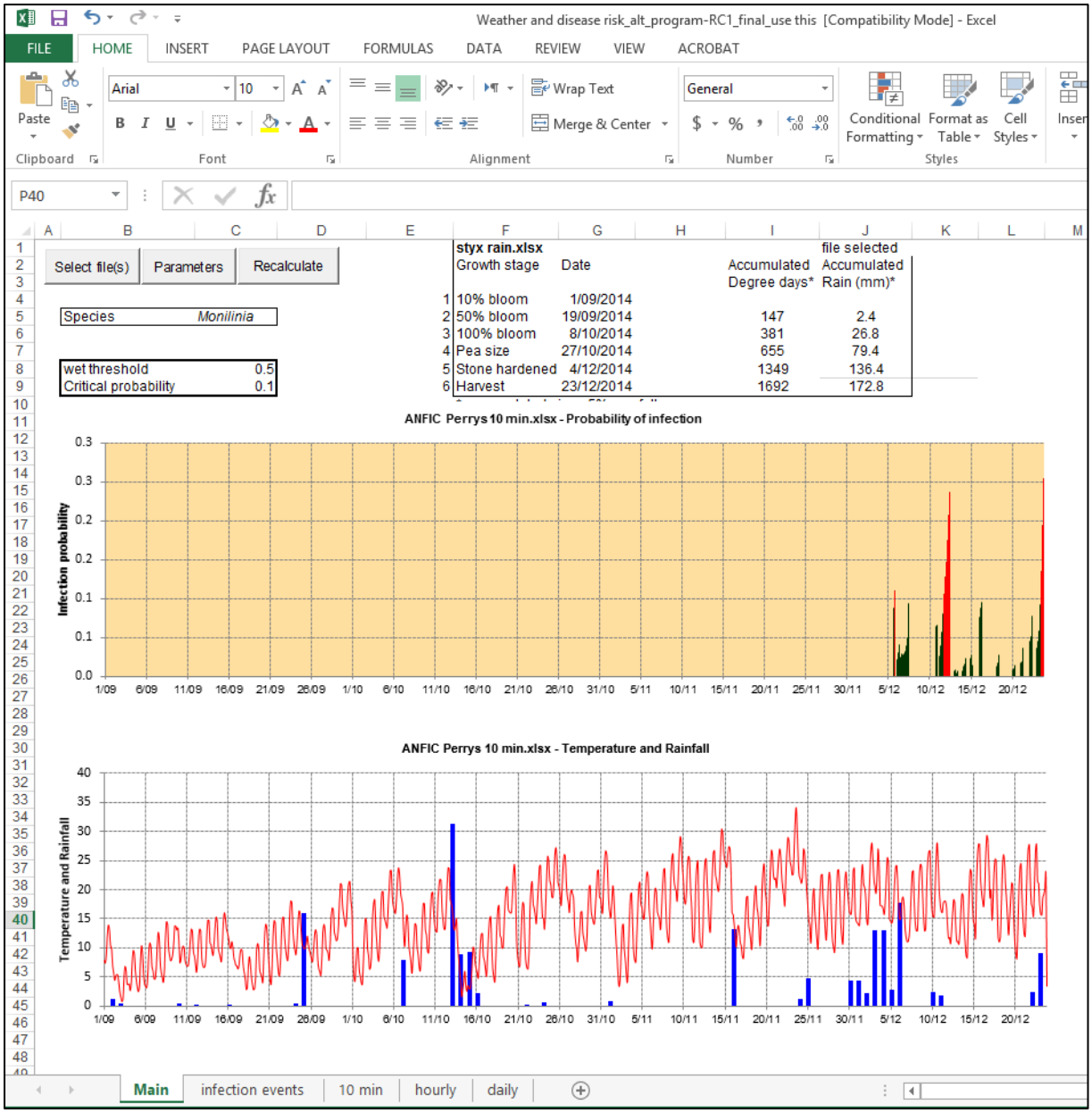




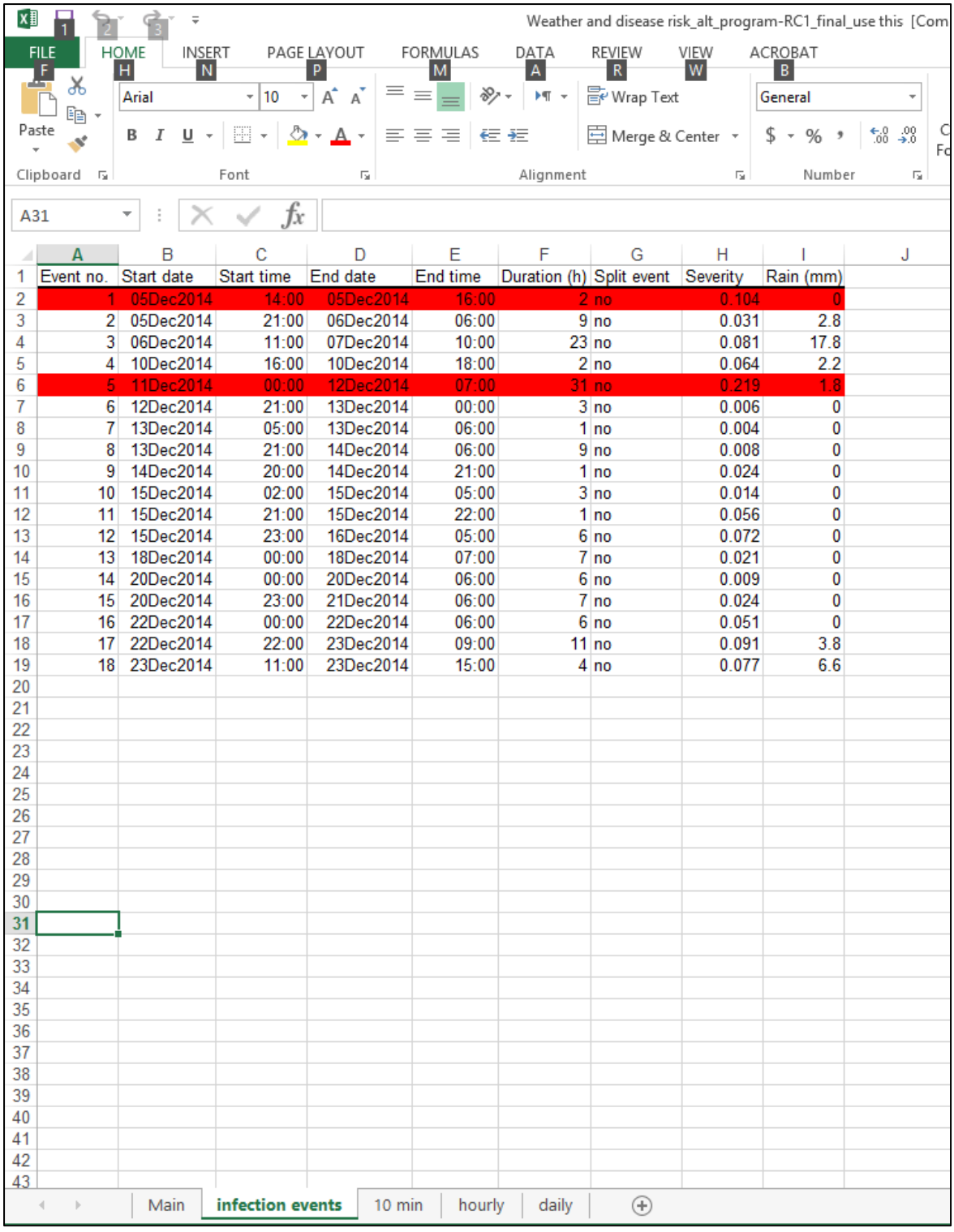
6. Upload files from any drive and folder on your computer, then select OK if prompted.
7. The display on all worksheets should be refreshed with the data you have selected.
8. Now alter parameters to suit your data – first the critical dates that relate to the growing season, then the rot pathogen you want to monitor.
9. Keep wetness threshold at 0.5 and critical probability at 0.1. Close the dialog box.



10. Now hit “recalculate” to refresh the display with the new parameters.



11. Investigate time and duration of infection dates in more detail in the "infection events" tab.



Event no.	Start date	Start time	End date	End time	Duration (h)	Split event	Severity	Rain (mm)
1	05Dec2014	14:00	05Dec2014	16:00	2	no	0.104	0
2	05Dec2014	21:00	06Dec2014	06:00	9	no	0.031	2.8
3	06Dec2014	11:00	07Dec2014	10:00	23	no	0.081	17.8
4	10Dec2014	16:00	10Dec2014	18:00	2	no	0.064	2.2
5	11Dec2014	00:00	12Dec2014	07:00	31	no	0.219	1.8
6	12Dec2014	21:00	13Dec2014	00:00	3	no	0.006	0
7	13Dec2014	05:00	13Dec2014	06:00	1	no	0.004	0
8	13Dec2014	21:00	14Dec2014	06:00	9	no	0.008	0
9	14Dec2014	20:00	14Dec2014	21:00	1	no	0.024	0
10	15Dec2014	02:00	15Dec2014	05:00	3	no	0.014	0
11	15Dec2014	21:00	15Dec2014	22:00	1	no	0.056	0
12	15Dec2014	23:00	16Dec2014	05:00	6	no	0.072	0
13	18Dec2014	00:00	18Dec2014	07:00	7	no	0.021	0
14	20Dec2014	00:00	20Dec2014	06:00	6	no	0.009	0
15	20Dec2014	23:00	21Dec2014	06:00	7	no	0.024	0
16	22Dec2014	00:00	22Dec2014	06:00	6	no	0.051	0
17	22Dec2014	22:00	23Dec2014	09:00	11	no	0.091	3.8
18	23Dec2014	11:00	23Dec2014	15:00	4	no	0.077	6.6

3.What do the outputs mean?

When infection probability is above 0.1, there are suitable weather conditions for possible infection. This is indicated by a red peak on the infection risk chart, or an infection event in the “infection events” tab of the spreadsheet.

As infection relies not only on weather conditions, but also how much inoculum (fungal spores) are present, these outputs give an awareness only.

Outputs are available for both Botrytis (grey mould) and Monilinia (brown rot) therefore the data will be most relevant for growing areas where these pathogens are the major cause of rot. Infection risk of other pathogens cannot be inferred from this tool.

The outputs will also not be able to give any indication of how much rot will develop by harvest date.

The information can be used in several ways, for example:

- to retrospectively interpret disease outcomes based on the weather throughout the season) and to plan strategically for future seasons;

- to use tactically to guide decisions related to optimal management timing (e.g. fungicide application or frequency) during the season; note that this requires regular access to weather data by daily download or networked sensors that deliver information to you in real time;

- to highlight times of highest infection risk and demonstrate that management actions were conducted at the best times (i.e. useful for demonstrating compliance to disease management protocols for export).

4.Your feedback on the tool

In providing access to this preliminary tool we request that contact details of users of the tool will be kept on file.

This will allow us to seek your feedback on using the tool, i.e. how easy it has been to use, how regularly you have used it and whether it has helped you to make management decisions related to control of rot pathogens in sweet cherry orchards.

Author: Dr Karen Barry
2017

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We acknowledge the major contribution of Dr Ross Corkrey in developing this tool. We are grateful to Dr David Riches for permission to adapt an earlier version of a non-commercial weather-based tool.