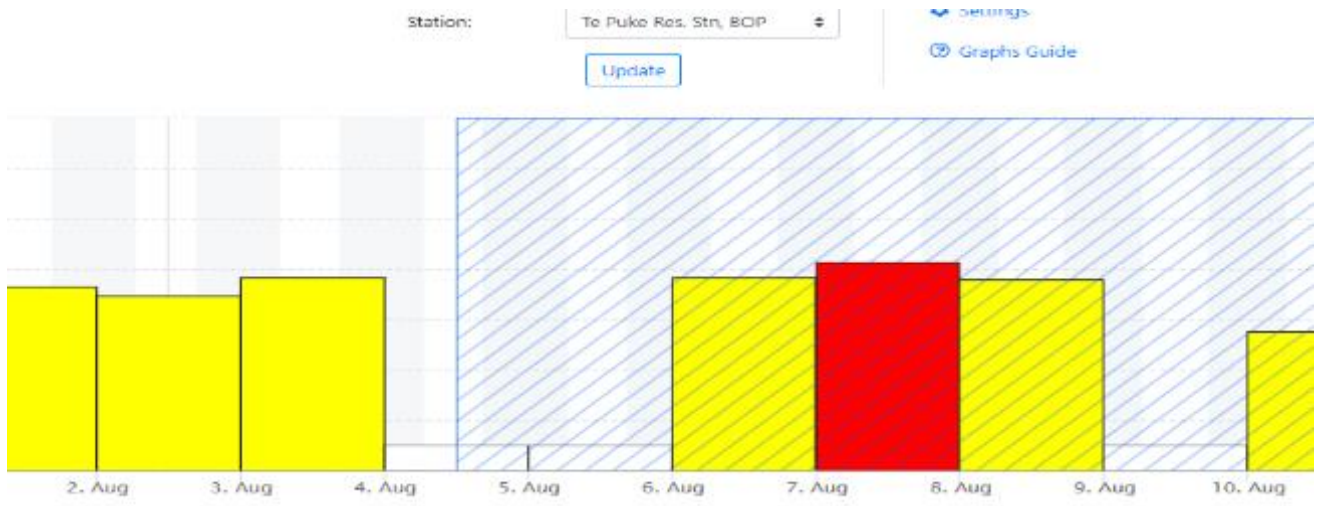
What's new (and old) with the Psa risk model?

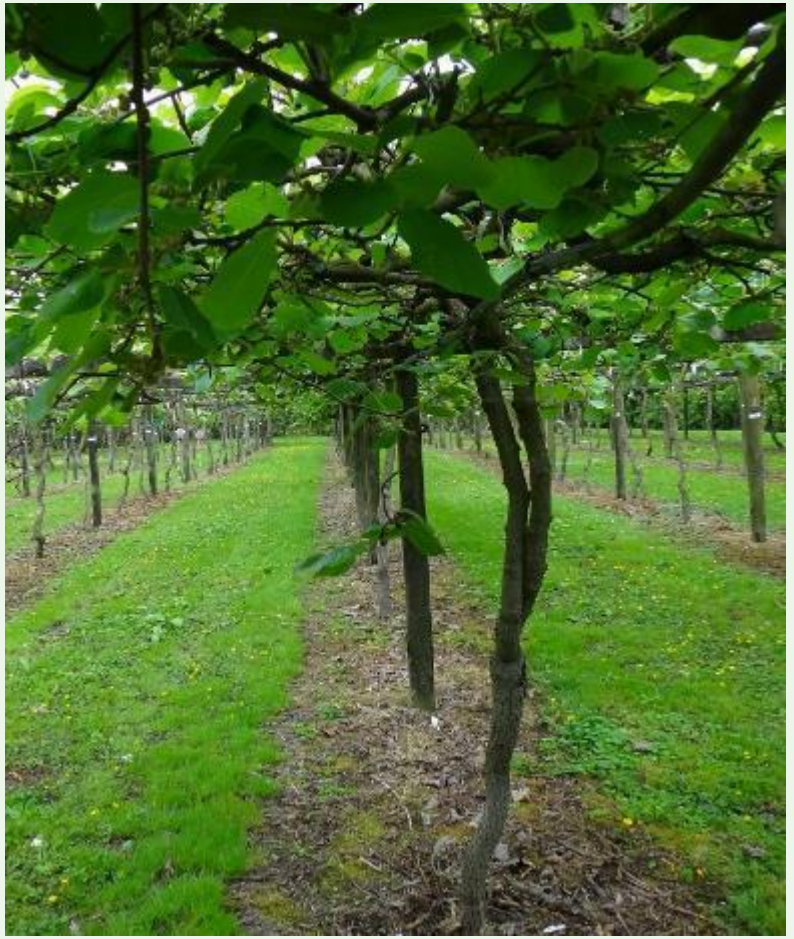
Rob Beresford Plant & Food Research



Zespri R & D day 9 September 2020

Psa risk model – What is it?

- A computer model available on the KVH website
- Provided through the HortPlus platform
- Commissioned by Zespri in 2011
- Developed by Plant & Food Research



Psa risk model – What is it used for?

- A decision support tool that provides information to help Psa mangement

- Interprets how weather conditions are affecting Psa infection activity in the orchard, using local weather station data

- Compares current season Psa risk with previous seasons.

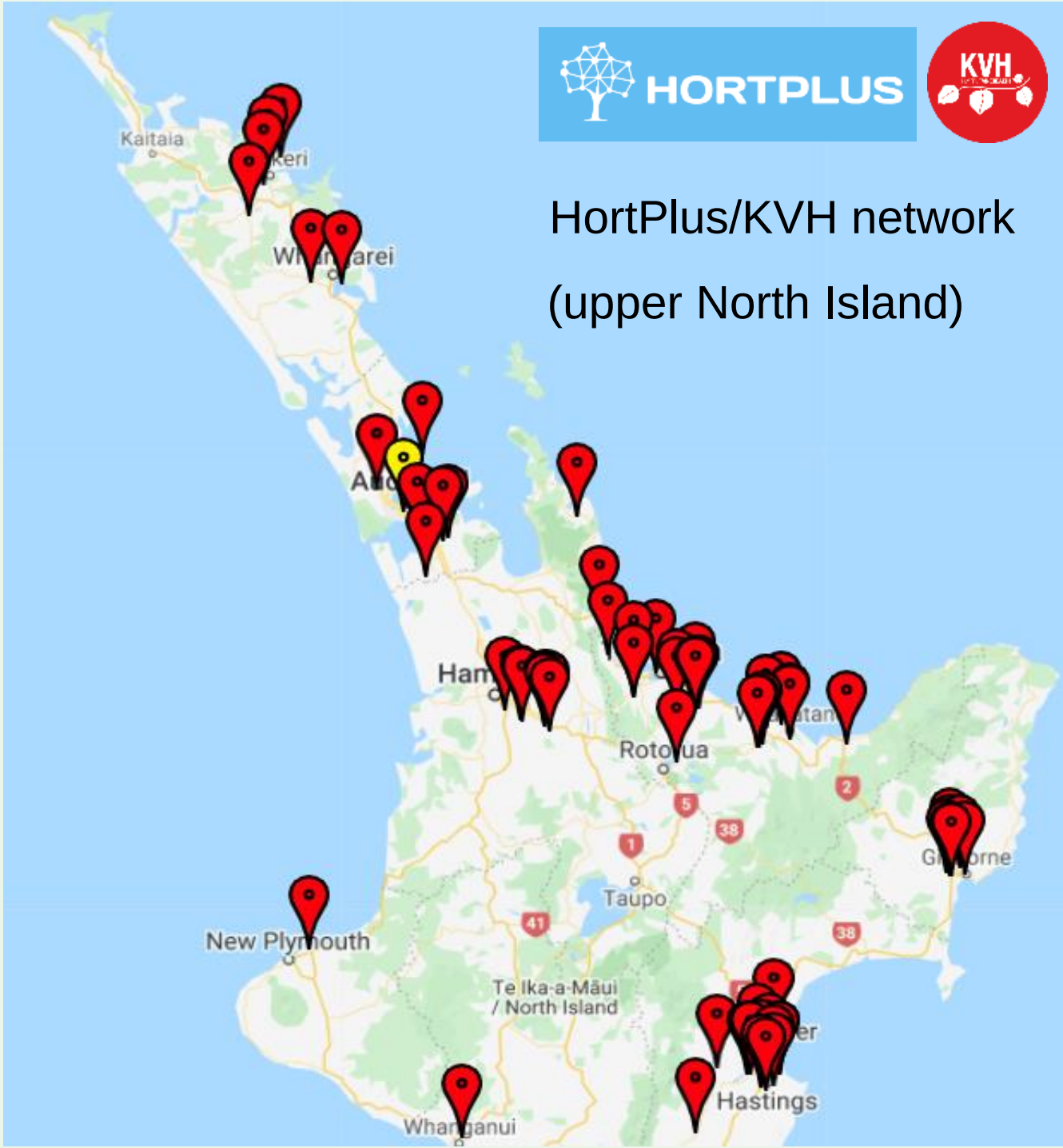
Psa risk model – How is it used?

- Provides warning of days with high risk of Psa infection
- Allows planning of protective spray applications
- Identifies low risk periods suitable for pruning, girdling, shoot trimming, fruit thinning, etc
- Its main period of use is during spring.

Weather data sources

The weather station network covers most of New Zealand's kiwifruit growing areas

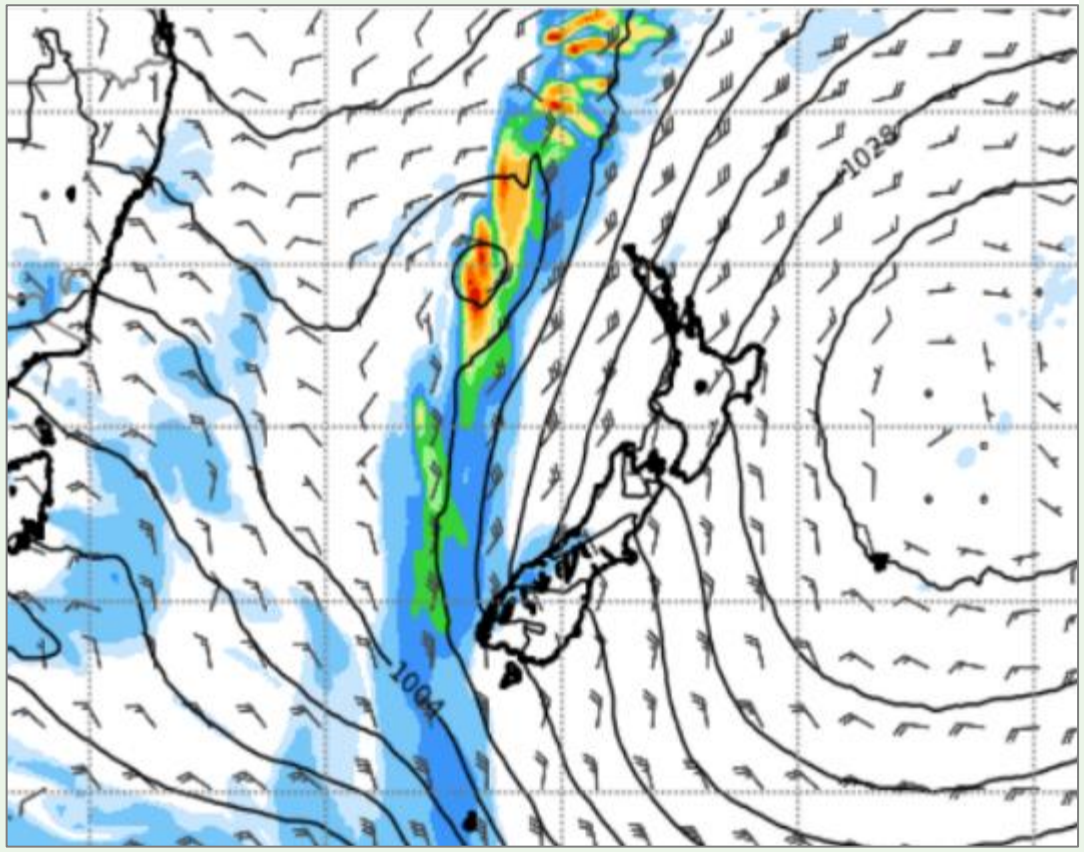
Monitored weather station data gives current risk as well as historical risk over previous weeks, months or years.



Weather data sources

Weather forecast data is provided by the New Zealand MetService

Forecasts identify infection risk from approaching weather systems up to 10 days ahead.



What determines Psa infection activity?

- Psa requires wet, humid conditions for the bacteria to multiply in the orchard
- Rainfall is required to spread Psa bacteria to sites where they can infect
- A risk alert from the model is triggered on any day with more than 1 mm of rainfall
- Degree of risk is determined by temperature and humidity during the preceding 3 days.

How was the model developed?

- The Psa risk model was developed during the initial Psa incursion

- Lab experiments determined effects of temperature and humidity on the amount of Psa infection that an occur, based on leaf spotting.

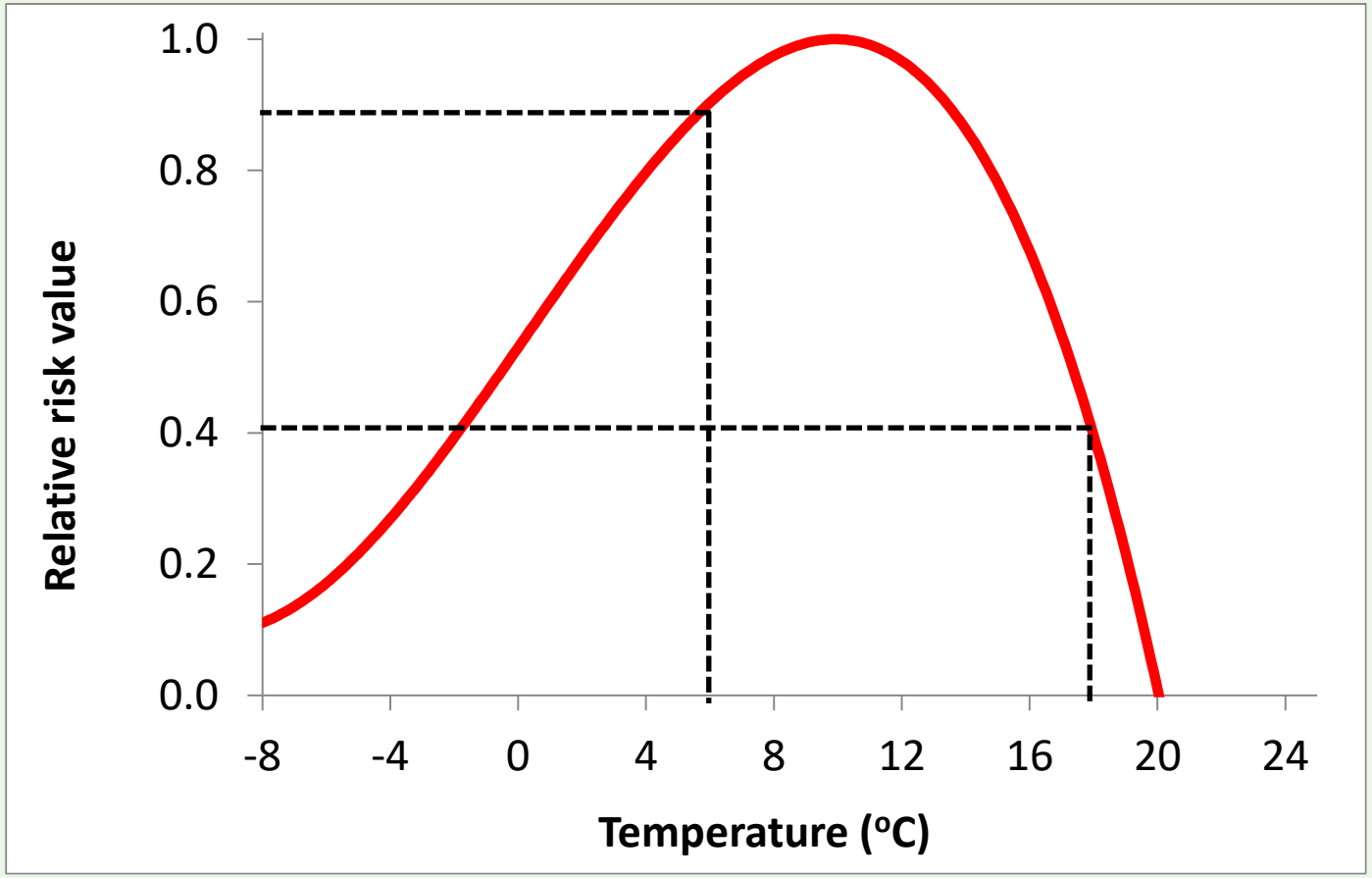
How was the model developed?

Field studies using trap plants exposed for different periods in kiwifruit canopies determined how much rainfall is required for infection.

The workings of the model

The heart of the model is the **bacterial multiplication index**

- For every hour above 80% humidity, a risk value is calculated according to temperature
- At 6°C, risk value = 0.90
- At 18°C, risk value = 0.41

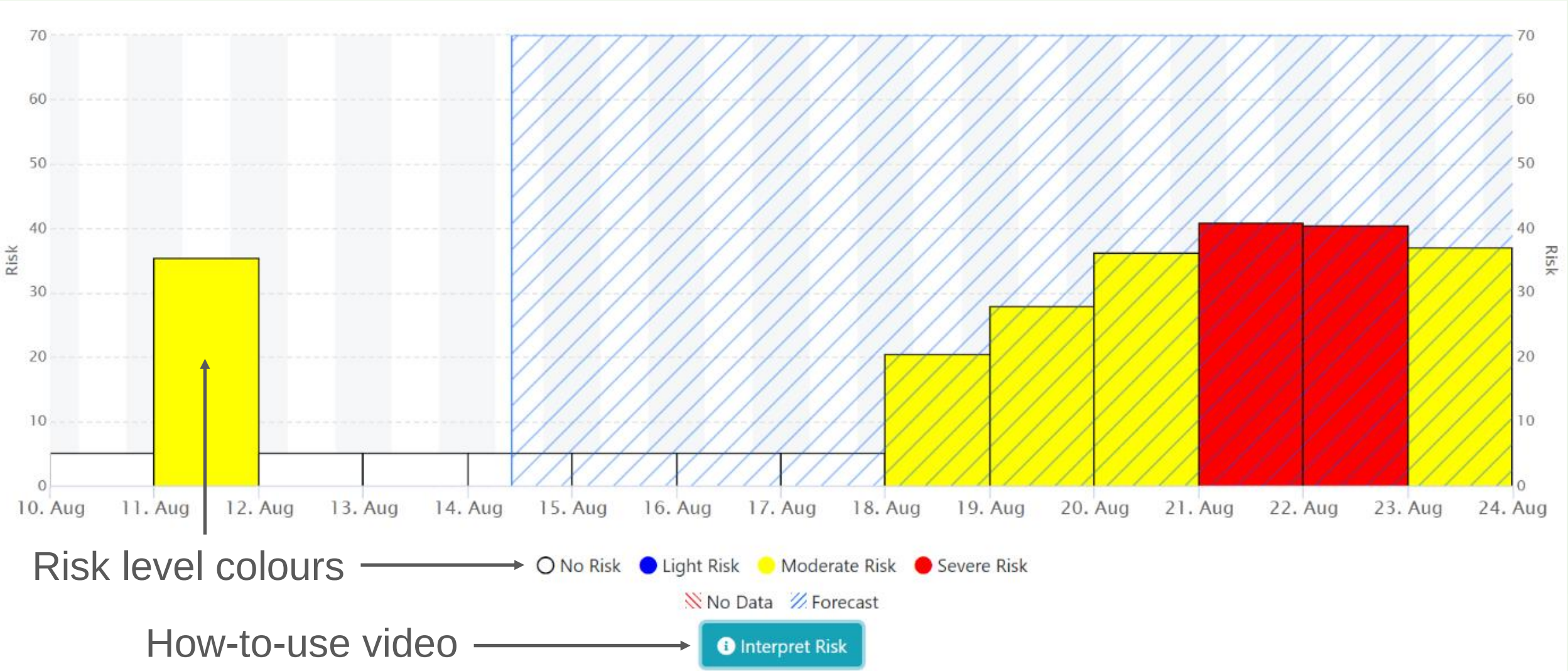


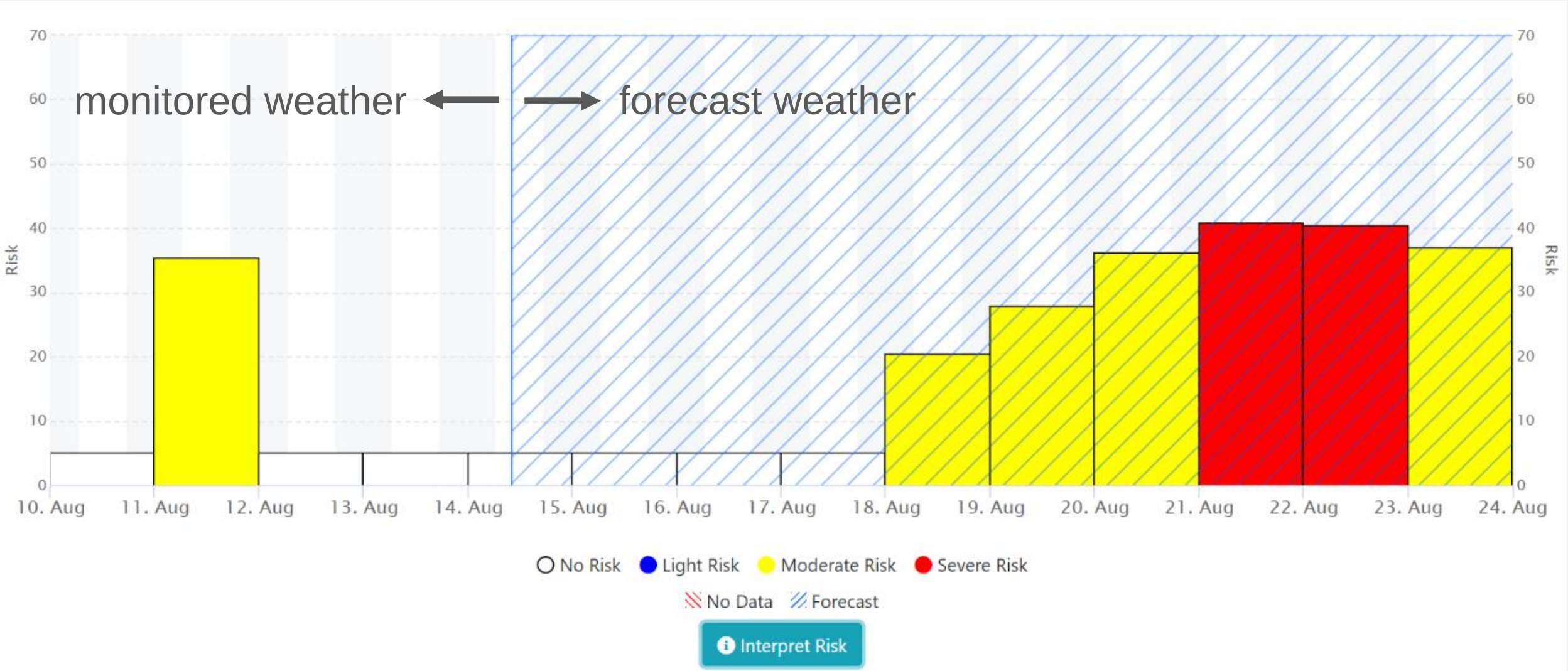
- The risk values are summed for all the high-humidity hours.

The workings of the model

- But, rainfall is required to spread Psa bacteria, so the daily risk value is only generated on days with **1 mm or more of rainfall**.

Risk model user's display




monitored weather
forecast weather
Risk
70
60
50
40
30
20
10
0
10. Aug
11. Aug
12. Aug
13. Aug
14. Aug
15. Aug
16. Aug
17. Aug
18. Aug
19. Aug
20. Aug
21. Aug
22. Aug
23. Aug
24. Aug
No Risk
Light Risk
Moderate Risk
Severe Risk
No Data
Forecast
Interpret Risk

What do the risk levels mean?

Risk value	Risk level	Interpretation of daily risk
0–5	No risk	No identifiable infection risk in the orchard
5–20	**Light**	Infection in more humid parts of the orchard
20–40	**Moderate**	Infection likely throughout the orchard
above 40	**Severe**	High infection pressure throughout the orchard

Psa risk factors, apart from weather

Risk of new Psa infection in an orchard block is greatest when:

1. Bacterial inoculum is abundant, as indicated by Psa history and current Psa symptoms (cankers, leaf spotting, bud rot, shoot dieback)

2. Early infection in male vines is not managed

3. The cultivar is highly susceptible to Psa (Gold3 more susceptible than ‘Hayward’)

Psa risk factors, apart from weather

Risk of new Psa infection in an orchard block is greatest when:

4. The vine canopy has a high proportion of new shoot growth in early spring (Psa mainly infects young plant tissue)

5. No protective sprays have been applied.

How do I respond? – examples of spraying responses

Risk value & colour	Low risk orchard - More resistant cultivar - Minor Psa problem last year	High risk orchard - More susceptible cultivar - History of severe Psa

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Greater than **40** **Severe**	- Apply copper in advance of in-coming rain events - Consider an elicitor, as well as copper, if extended rain is forecast	- Apply copper and/or bactericide in advance of in-coming rain events

Using the Psa risk model in orchard management

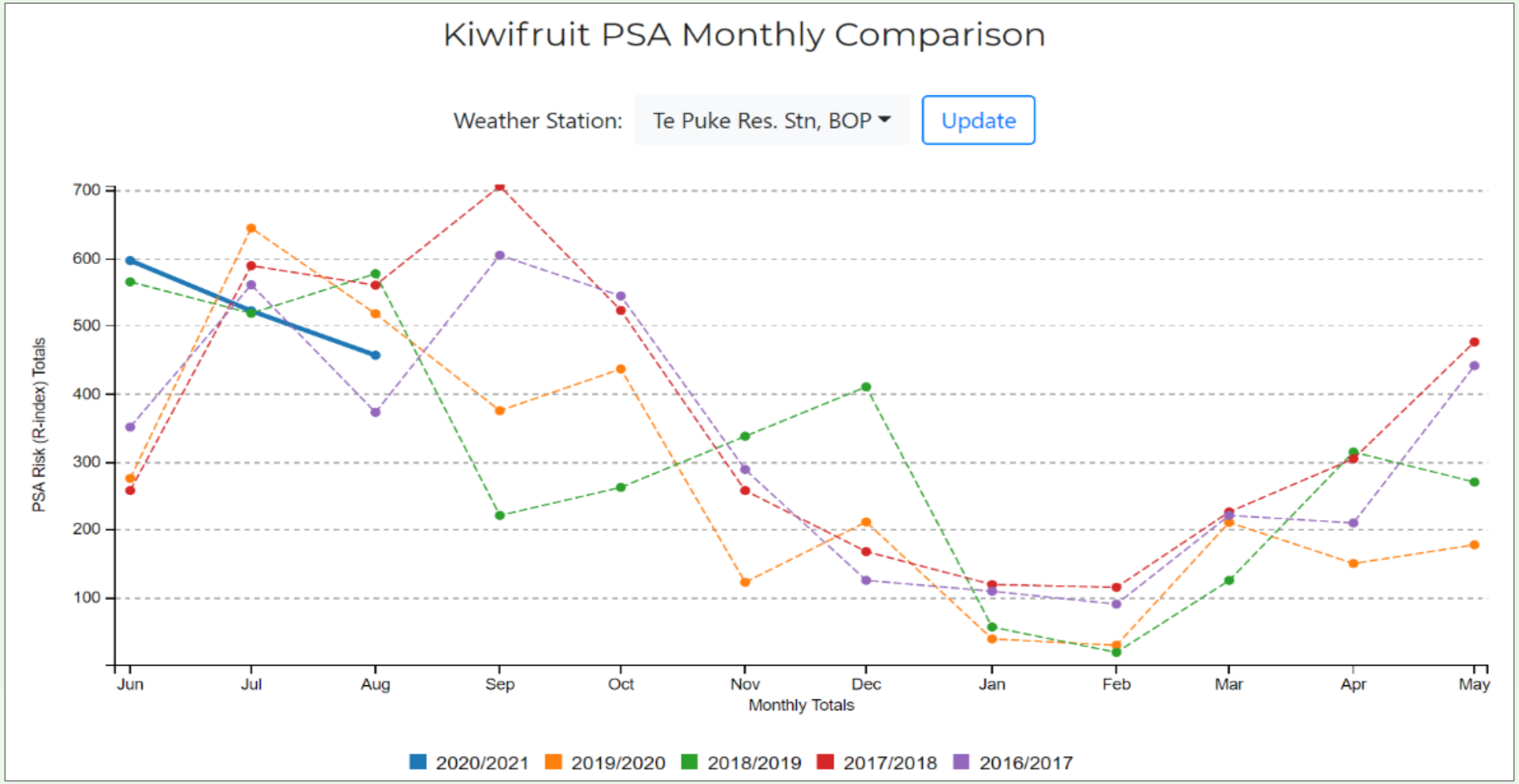
The Psa risk model provides the weather component of overall infection risk

Don’t forget to also be aware of the other Psa risk factors in the orchard, including:

Bacterial inoculum - leaf spotting and cankers

Host plant vulnerability - lush canopy growth and susceptible cultivar.

Comparing Psa risk between seasons



Thank you

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