

Potato Update



Issue 2

Degree Days and how to use them in tomato potato psyllid management decisions

How do insects grow and develop?

- Heat is required for insects to develop from one stage in their life to another, i.e. eggs – nymphs – adults.
- The warmer the weather the faster they develop and the cooler the temperature the slower they develop.
- All insects have a cut off temperature below which development is negligible (lower development threshold) and a maximum temperature at which the rate of development stops (upper development threshold). These thresholds can be used in predicting insect development.

What are Degree Days and how are they calculated?

- Degree days measure insect growth and development in response to daily temperatures.
- In a 24 hour period degree days can be calculated as follows:

$[(\text{Temp Min} + \text{Temp Max})/2] - \text{Lower development threshold} = \text{DD}$

- One degree day accumulates for each degree the average temperature remains between the lower and upper development threshold over 24 hours.
- Several degree-days can accumulate during a 24-hour period.
- For example with TPP (7.1–33.6°C development range), on a day when the average temperature is 18.1°C, 11 degree days would accumulate.
- It takes 358 degree days for TPP to develop from an egg to an adult, i.e. to complete 1 generation (Tran et al. 2012. Environmental Entomology 41: 1190-1198).

Tips for trapping

- Tomato potato psyllid (TPP) development occurs between 7.1 and 33.6°C.
- The warmer the weather the faster TPP develop, therefore it is possible to use degree days to predict their development.
- It takes TPP 358 degree days to develop from an egg to an adult. Thus, if the average temperature was 17.1°C it would take 35.8 days to go from an egg to adult.
- Degree days can be useful early in the season to time first insecticide application.
- Degree days are best used in conjunction with monitoring to decide on spray timings.

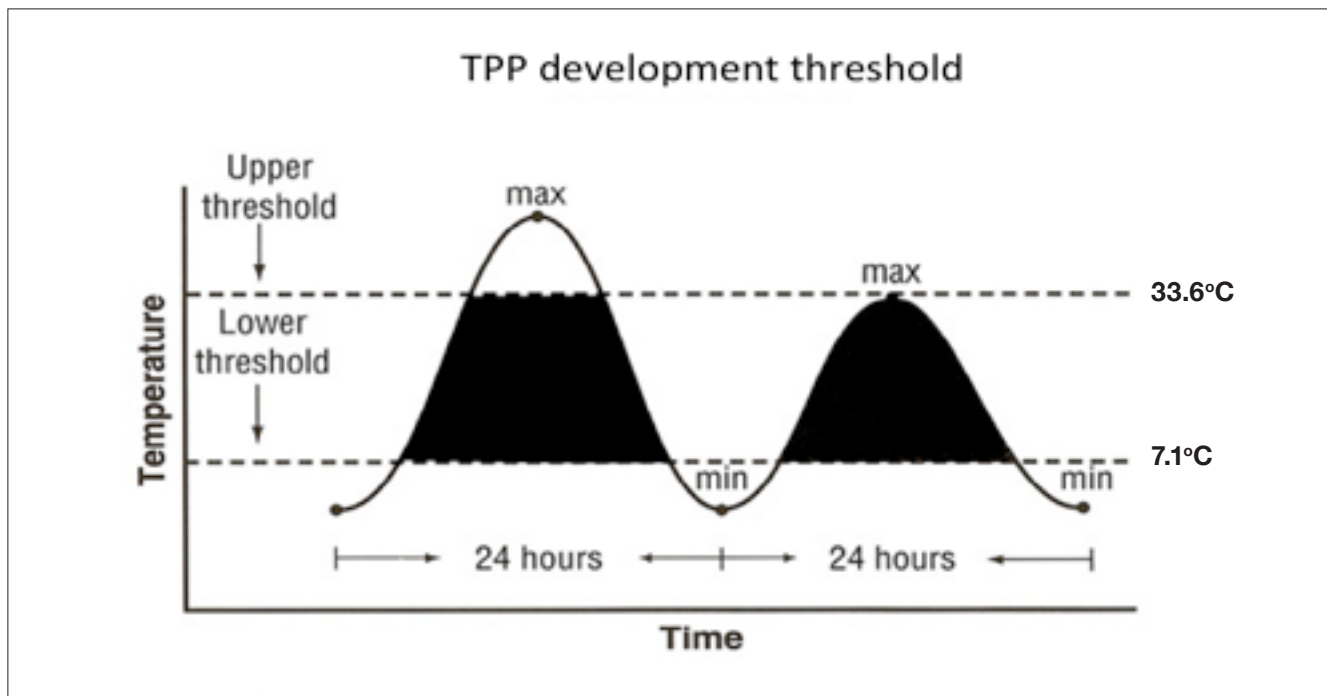


Figure 1. TPP development threshold.

Using degree days for tomato potato psyllid management

- Accumulated degree days can be an important decision support tool in Integrated Pest Management (IPM) programmes.
- Depending on weather conditions insect development varies between years and locations. For TPP, by January insect development can be one to two weeks faster in a year with warm spring weather than in a year with cold spring weather. Similarly, insect development may be several weeks faster in Pukekohe than Chertsey (Canterbury).
- Degree days can be used to optimise the timing of insecticide applications rather than relying on calendar dates.
- Degree days are most useful early in the season, as insecticide applications, rain and irrigation may alter TPP populations. Once eggs are found in your crop, 358 degree days later those eggs will potentially be adults.
- As the season progresses you will have all TPP life stages in your crop.

Things to consider

- Psyllids are active throughout the year, even in frosty areas.
- Degree days are best used in conjunction with crop monitoring using sticky traps and plant sampling. Crop monitoring provides valuable information on TPP arrival, population build up and the life stages present in your crop and you can choose your insecticide accordingly (see the PNZ TPP management poster and the other factsheets).
- It is important to be aware of other plants near your crop that can sustain TPP and act as a source of infestation. These include African boxthorn, thornapple and Poroporo but also volunteer potatoes (please see factsheet 'Non-crop host plants of tomato potato psyllid in New Zealand' for more information).

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For further information

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