

# BIOSECURITY MATTERS

*In the last twelve months, we have seen at least two new exotic pests move onto our island home and spread rapidly. Fall armyworm is now found across the whole top half of the country and Serpentine Leaf Miner populations have been identified in several locations.*

**Farm biosecurity is a set of measures designed to protect a property from the entry and spread of pests and diseases. Farm biosecurity is your responsibility, and that of every person visiting or working on your property.**

**If a new pest or disease becomes established on your farm, it will affect your business through increased costs (for monitoring, production practices, additional chemical use and labour), reduced productivity (in yield and/or quality) or loss of markets.**

Use the simple step-by-step guide in our Farm Biosecurity Action Planner – generously sponsored by JE Tipper – to ensure that you have an actionable and relevant biosecurity plan for your farm.



## FOCUS ON *Fusarium solani*

**One disease that is rearing its head in several growing regions and causing significant damage to orchards is *Fusarium solani*. SEE FIGURES 1, 2 & 3.**

### WHAT IS IT?

*Fusarium solani* is a soil-borne fungus which causes base rot. It can have an aerial stage of air-borne spores from the red spheres on the stem referred to as *Haematonectria haematococca*.

Infection occurs under wet conditions through damaged areas in the stem base or roots. Young plants with twisted and/or J-roots are predisposed to infection and waterlogged conditions exacerbate the disease. The fungus survives in soil by means of dormant spores.

We generally refer to it as a 'stress' pathogen - which means it needs a predisposing factor, which can be varied for example, waterlogging, wounding (physical or insect) or infection from another pathogen.

### WHAT HAPPENS ONCE A VINE IS INFECTED?

Vines lose vigour and young vines can collapse suddenly. A soft decay or pronounced swelling develops at the soil line leading to decay of the entire root system. Adventitious roots can develop above the damage. In conditions of high humidity, the crimson *Haematonectria* stage may occur on stems. Cut stems exhibit a reddish-brown discolouration of vascular tissue that is generally restricted to less than 0.5 metres above soil line but occasionally up to 2 metres in ungrafted Panama varieties.

*Passiflora flavicarpa* rootstock itself is highly susceptible to virus diseases and succumbs to base rot when it is below optimum health. This is the main reason for the use of other varieties as rootstock for grafted vines. SEE FIGURE 4.

### WHAT CAN BE DONE ONCE INFECTED VINES ARE IDENTIFIED?

It is extremely important for growers to immediately fully remove affected vines as they will not recover and the longer they remain in the orchard, the more likely they are to become a source of disease for other plants.

When the disease is advanced, and the vine shows rusty-red air-borne spores from the spheres on the base, it is very important to remove that material carefully from the orchard and destroy it completely. The spores can be spread by air, equipment, and water.

**Note that cutting the vine down and mowing it in will simply spread the disease further through the orchard.**

SEE FIGURE 5.

### WHY DOES FUSARIUM SOLANI SEEM TO OCCUR ONLY SPORADICALLY?

The hot summer months with frequent tropical downpours are tailor-made for both soilborne fungi *Phytophthora nicotianae* and *Fusarium solani* as these fungi are common in tropical and subtropical soils. Both fungi can be dispersed by the splashing of infested soil particles onto the stems of passionfruit vines.

*Phytophthora* will rapidly invade susceptible plant tissue. As most current rootstocks are resistant to *Phytophthora* the fungus can only infect stems above the graft union. *Fusarium solani* alone is unable to initiate an attack on sound tissue or vigorous vines.

Plants subjected to stress as a result of other diseases, excessive heat stress, wounding, old age, poor growing conditions, and insect attack are the most susceptible. In humid weather *Fusarium solani* may be seen on the stems of vines as a white mass.

Recent base rot outbreaks in both NSW and FNQ are believed to have started from previous dry weather which has put significant stress on plants. *Fusarium solani* present in the soil has infected and killed plants through the collar or roots.



Figure 1: Air-borne phase of *Fusarium solani* spores on stem tissue  
Photo credit: Department of Agriculture and Fisheries



Figure 2: Impact of *Fusarium solani* on roots of vines  
Photo credit: Department of Agriculture and Fisheries



Figure 3: Crimson haematonecrosis may appear on affected stems during periods of high humidity. Photo credit: Passionfruit problem solver field guide



Figure 4: Base rot on infected passionfruit vine  
Photo credit: Department of Agriculture and Fisheries



Figure 5: Vines severely affected  
Photo credit: Jay Anderson

Subsequent severe wet weather has enabled the fungus to produce the red spheres (which contain spores) on dead and dying plants. These spores have then been washed or blown onto neighbouring vines which may have open wounds from wires or insect damage, thus continuing the disease cycle.

It is also suspected that the pathogen can be carried in planting material without symptoms (as an endophyte) and then cause problems when conditions are favourable.

In the absence of any concrete knowledge, the recommendation is to take tips for grafting from healthy plants only, ensuring you check the base for any signs of *Fusarium solani*.

## HOW CAN THE DISEASE BE BEST MANAGED?

The aim is to control *Phytophthora* not just *Fusarium*.

1. Graft high (at least 30cm) using only rootstocks that are resistant to *Phytophthora*. High grafting can prevent soil splash onto the more vulnerable scion and will discourage the disease.
2. Use phosphonate fungicides (e.g. Agri-Fos). These slow the growth of *Phytophthora* and activate natural defence mechanisms in the host. There is an APVMA permit PER87607 for the use of phosphorous acid to control *Phytophthora* blight of passionfruit.

**Note that heavy applications of lime will increase *Phytophthora* activity.**

3. Use cultural control practices to prevent splash dispersal of infested soil. Some suggestions are; plant sweet smother grass under vines, use collars or guards around the base of vines, implement mulching. Improve plantation drainage (e.g. planting on mounds) so that soil does not remain water-logged.

**Note that fumigation to control soilborne inoculum is not a good idea. It will not kill *Fusarium* propagules at depth in the soil and they will soon reinfest the treated site.**

## OTHER GENERAL MANAGEMENT ADVICE

There are a small number of general measures that you can take to reduce the potential for a severe disease load:

- minimise damage from insects to reduce the susceptibility of the vines
- avoid applying herbicides too close to plants that may cause stem damage
- ensure you have good drainage to stop roots from sitting in water-logged soil
- try not to plant in exactly the same site each year
- consider alternating vine locations with some form of restorative cover crop
- a well fertilised vine, without injury to the crown tissue, growing in a good biologically active soil is less likely to be infected

When replanting avocado fields, it is recommended to prepare the site some six months prior to planting by incorporating fresh chicken manure and covering the site with straw or wood mulch. There is a possibility that a similar process is useful to control base rot of passionfruit. The ammonia and nitrite produced will be toxic to *Fusarium*, and a biologically active soil will be available for planting after the ammonia has dissipated and salts have leached out.

## KNOW YOUR WILT FROM YOUR SOLANI

Base rot is often confused with *Fusarium* wilt. Base rot is caused by *Fusarium solani* while *Fusarium* wilt is caused by the xylem invading pathogen *Fusarium oxysporum* f.sp. *passiflorae*. Any wilted plant from which any *Fusarium* was isolated has been often regarded as having the vascular disease *Fusarium* wilt. They are totally different fungi and they infect in different ways and produce different diseases. The *Fusarium* wilt pathogen is a species without a sexual stage, therefore has no airborne phase. It only infects through the roots.

*With great thanks to Dr Jay Anderson, Kathy Grice and Dr Ken Pegg for their insight and advice on tackling this difficult disease.*