

Managing passionfruit plantations affected by wet weather

Inundated fields

Passionfruit vines are sensitive to inundation and if flooded for more than a few days their roots may die from lack of oxygen.

When safe to do so, inspect the plantation as soon as possible and note areas that are affected by poor drainage. If possible, immediately take steps to improve the drainage of these areas so that the water can get away. In the longer term building better mounds prior to replanting may help, as long as they are orientated to allow the water to get away and not dam it up.

Diseases

After extended periods of cool, cloudy weather the ability of passionfruit vines to resist diseases is low because they have not been able to photosynthesize adequately to build up reserves of carbohydrate to fight against them.

Passionfruit are susceptible to *Phytophthora* root rot and stem canker which thrives in saturated, cool soils. In addition, wet conditions favour the development of *Phytophthora* blight on leaves and fruit.

As soon as possible make a foliar application of phosphorous acid, this is a systemic fungicide that will be translocated through the whole plant and help to minimise the development of the various *Phytophthora* diseases. Apply this chemical every 3 weeks until the disease is under control and dryer conditions prevail.

A number of other diseases affect the stems, leaves and fruit of passionfruit and often more than one disease will be present. After extended periods of wet weather the incorporation of azoxystrobin, pyraclostrobin or iprodione fungicides into the preventative spray program of regular applications of mancozeb will assist in control of these diseases.

- Preventative (also sometimes called protective) fungicides prevent the build-up of diseases on leaves and fruit. These fungicides do not kill or control existing disease infections that may be present on the surface of a fruit or leaf before the fungicide is applied. It is therefore essential to apply protective fungicides frequently to maintain a layer of fungicide to protect new growth and to replace any fungicide that is washed off by rain. Do not stop using them during dry weather, maintaining your protective fungicide spray program in dry weather will minimise disease outbreaks during and after wet weather.
- Clean-up fungicides are most effective when applied prior to the onset of wet weather. Sometimes applications can be made in advance on the basis of weather forecasts and at other times not, fortunately these chemicals do assist with control of disease outbreaks even when applied after wet weather, especially where preventative sprays have been used regularly beforehand. Clean-up fungicides (unlike preventative fungicides) have very specific modes of action, as a result resistant strains of diseases will develop if they are not used correctly and they will become completely ineffective. The label details resistance management strategy guidelines that limit the number of applications per crop and stipulate their use in combination with protective fungicides.

The following table outlines which chemicals are recommended and registered in Queensland for use to control diseases which are likely to occur after wet weather.

Disease controlled (as shown on the label)	Chemical (active ingredient)	Activity	Application and timing
Anthracnose, Brown spot (<i>alternaria passiflorae</i>), Septoria leaf spot	Mancozeb	Preventative/ protective	Every 10 to 14 days from October to May and every 21 – 28 days for the remainder of the year.
Alternaria, Cladosporium	Azoxystrobin*	Preventative/ protective	Apply 2 to 3 applications at no less than 14 day intervals over flowering. Apply a further 1 to 2 applications finishing 1 day prior to harvest (Follow resistance management strategy on label).
Anthracnose (<i>Colletotrichum gleosporioides</i>), Septoria spot (<i>Septoria passiflorae</i>)	Pyraclostrobin* (Permit 12781)	Preventative/ protective	Apply when symptoms first appear. Do not apply more than three applications of strobilurin fungicides per crop per season. Applications should be alternated with other registered protectant fungicides.
Brown spot (<i>alternaria passiflorae</i>), Septoria spot (<i>Septoria passiflorae</i>)	Copper oxychloride	Preventative/ protective	Apply every 2 weeks (4 weeks in NSW) from October to May and 3 to 4 weeks (2 months in NSW) during winter.
Alternata spot, (brown spot), (<i>alternaria</i> spp., <i>alternaria passiflorae</i>)	Iprodione	Clean-up	Maintain a protective cover with a protectant fungicide and apply 10 -14 day intervals before, during and after wet periods. No more than 4 sprays per season (Follow resistance management strategy on label).
Phytophthora blight	Phosphorous acid (Permit 14552)	Clean-up	Preventative: apply every 5 - 6 weeks Curative: apply every 3 weeks until disease is under control.

* Both of these fungicides belong to the strobilurin group. To prevent the build-up of disease resistance do not apply more than three applications combined per crop per season.

Check the label for application rate, mixing recommendations, with-holding period, resistance management strategies etc. and to confirm the product is registered. Make sure your spray equipment is properly calibrated and worn nozzles are replaced; this is essential to ensure the best possible coverage of the vine.

Growers have reported some copper fungicides have caused burn to fruit and leaves and that others are less problematic in this respect. Therefore, before spraying the whole plantation, trial copper fungicides on a few vines and monitor them for the development of any burn symptoms.

Iprodione is 'locally systemic', it is not translocated throughout the plant. It will kill both the spores and their mycelium (feeding structures in the leaf tissue) but because it is only locally systemic, good coverage is essential to obtain good results.

Phosphorous acid is effective against all *Phytophthora* infections, it is highly systemic and after application as a foliar spray it will be translocated throughout the whole plant, including the roots. DO NOT apply phosphorous acid to the soil or through the irrigation system, the chemical becomes unavailable to the plant on contact with the soil.

Base rot caused by the fungus *Fusarium solani*, is often a problem in vines that have been stressed. Plants subjected to stress as a result of poor growing conditions (such as when soils are saturated for long periods) are susceptible base rot. There is no chemical control for base rot but anything that can be done to control diseases and improve vine vigour will help to limit the development of the disease. The pathogen that causes base rot, *Fusarium solani*, does not attack sound tissue or vigorous vines but previous infection by *Phytophthora* provides an ideal entry point so control of *Phytophthora* will help minimise the development of base rot.

Long-term management

There are a number of management strategies which growers can adopt to help prevent and reduce the impact of adverse weather:

- **Replant old vines.** Diseases build up in older vines with thick canopies not easily penetrated by fungicide sprays and during wet weather periods these vines rapidly deteriorate. To avoid this situation arising many growers replant very vigorous varieties every 12 to 24 months.
- **Apply the correct amount of chemical.** Check labels for correct chemical application rates and ensure that spray equipment is in good condition and correctly calibrated. Applying the correct amount of chemical and achieving good spray coverage is essential if fungicides are to be effective.
- **Protect the vines from wind.** Wind increases the detrimental effect of wet weather so establish shelter belts to reduce the exposure of vines to wind.
- **Varietal resistance.** Different varieties have different susceptibilities to diseases and this is one of the reasons why a range of varieties should be grown. An on-farm trial is the best way to assess if a variety performs well on your farm.

Empty fruit

Periods of wet weather during flowering cause pollen grains to swell and rupture rendering them unviable, in addition bees and other insect pollinators are not active during wet weather. This results in a subsequent crop of empty or poorly filled fruit. There is no guaranteed solution to this problem but introduction of managed bee hives into the plantation may help improve fruit set and pulp content in future crops.

Leached nutrients

Three of the important nutrients for passionfruit are prone to leaching from the soil and as a result of the high rainfall are likely to be low, these are:

- Nitrogen
- Potassium

- Boron

Growers need to adjust their fertiliser applications to make up for expected shortfalls, typically rates are raised by up to 20% above normal but be very careful with boron (especially on light sandy soils) not to overdo the rates since this element can easily reach toxic levels.

If there is a likelihood of continued heavy rain, fertiliser rates are best split into frequent applications of small amounts, this means that the amount that can potentially be lost with each rainfall event will be lower and the levels will be topped up sooner with the next application.

More information

Peter Rigden

Development Horticulturist

Agri-Science Queensland

Department of Agriculture and Fisheries

Ph: 13 25 23 or visit www.daf.qld.gov.au

For essential information on important diseases affecting fruit crops grown across Australia, pick up a copy of Diseases of fruit crops in Australia, available for purchase from CSIRO at www.publish.csiro.au

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