A management plan for spider mites in production nurseries

Spider mites are the most common group of pest mites in production nurseries. All species feed on plants and most plants have at least one spider mite that can cause significant damage. All spider mites feed using needle-like mouthparts to suck contents from plant cells. Typically, this results in small chlorotic spots giving leaves a stippled effect. All spider mites produce silk (hence their common name), but some species produce more than others.

*Two-spotted mite (*Tetranychus urticae*) is the most notorious and widespread owing to its fast development time, ability to damage plants and an extraordinary capacity to develop pesticide resistance. However, without slide mounting and examining individuals at high magnification, many species appear identical to* T. urticae.

Management of spider mites relies on an integrated approach, including cultural practices to passively reduce spider mite populations, monitoring plants regularly and proactively managing hot spots of spider mites as required. All of these topics are summarised here specifically for the Australian production nursery industry including biological control agents and pesticides that are commercially available for use against spider mites. Information on their biology, identification and spread within nurseries is also discussed.

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Adult female *Tetranychus ludeni*

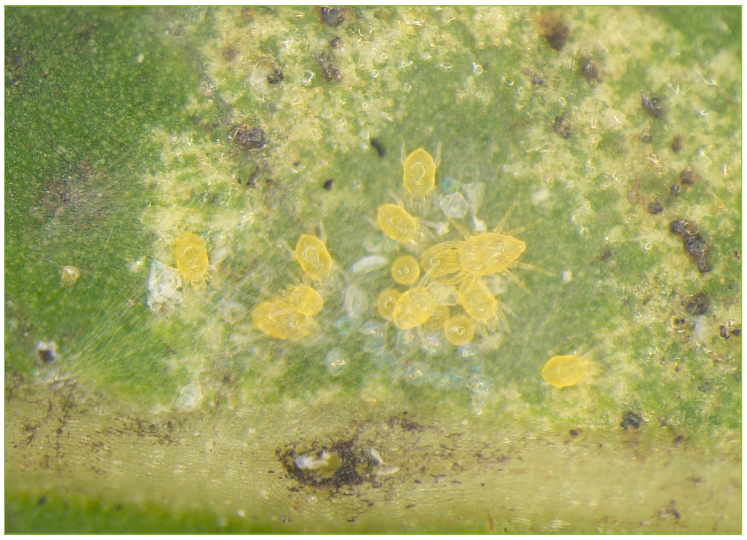
Male mounting female spider mite

GENERAL BIOLOGY

Spider mites are soft-bodied, growing to a maximum of about 0.5mm. Females tend to have an ovoid, bulbous body shape and are far more common than males. Males are narrower, more active and have an angular body shape, particularly at the posterior end of the body. They are often red, green-orange, opaque or yellow in colour and colouration may change slightly as they develop.

The eggs are generally spherical and opaque white in colour, although some may be slightly yellow, orange, red, or brown and some species have cylindrical or 'cake' shaped eggs. The eggs are not visible to the naked eye, but with careful observation it may be possible to observe them with a ×10 hand lens. Eggs hatch into six-legged larvae. They have two nymphal stages with eight legs before turning into an adult (also with eight legs). Immature stages are similar in appearance to adults, but are smaller. With each moult the individual also gains body hairs, adults having the full complement.

Under optimal environmental conditions, development from egg to adult typically takes 1–2 weeks, but this may be extended at cooler temperatures or on poor host plants and for certain mite species. Females start laying eggs after just a few days and may lay 10 or more eggs per day over their month-long lifespan. In cooler climates, female spider mites overwinter in protected areas of the plant. A distinct cool period, follow by warm conditions, may be required before they reactivate and start laying eggs again in warmer periods. However, most spider mites in Australia will not overwinter, especially in protected cropping structures.



Stigmaeid predatory mites that feed on spider mites.

Some mites can appear superficially similar to spider mites but may actually feed on pollen, fungal growth, or may be predators. Stigmaeid mites are predators that often live under the silk produced by spider mites and consume the pests.

SPREAD

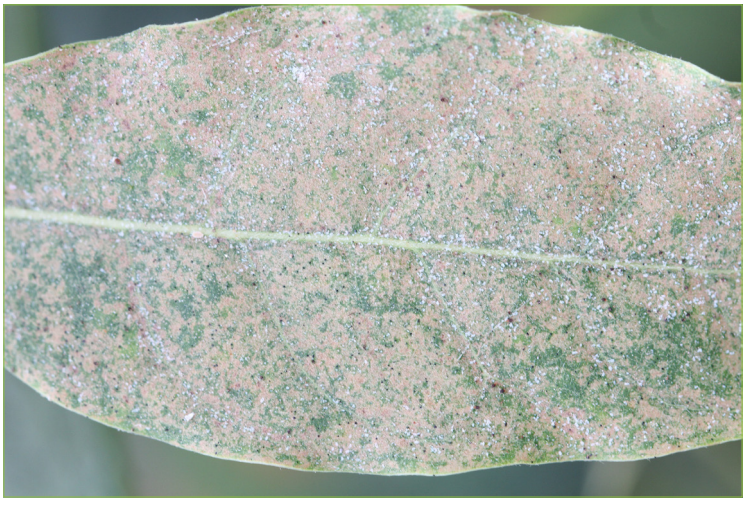
Spider mites can be spread on incoming stock, particularly when populations are low. They are also spread by wind, staff brushing against infested plants and on tools and other equipment. They easily crawl between plants with touching foliage. Like other pest mite species, spider mites can be found on most above-ground plant parts. At low densities, they tend to occur on the underside of leaves and may be difficult to observe. As populations increase, individuals may be present anywhere on the plant and may be seen in large masses over the plant.

Leaf stippling caused by spider mite feeding

DAMAGE AND HOST RANGE

All spider mites have long, needle-like mouthparts used to suck the contents from plant cells. Damage typically starts with tiny yellow-white spots on the upper surface of leaves, called stippling, and is superficially similar to that caused by leafhoppers. As spider mite populations increase, damage may develop into larger irregular white or greyish coloured regions, which typically occurs between leaf veins. The entire leaf will eventually turn yellow and may have a bronze appearance. If the damage continues the leaf will eventually turn brown and fall from the plant. Feeding on new growth can cause the maturing leaf to be slightly deformed.

Some species can also produce so much silk that the entire plant becomes covered, and millions of spider mites can be seen writhing on the plant in masses. Under such scenarios, plants may become defoliated, experience stem dieback or die. Many spider mite species are highly polyphagous, potentially damaging many host plant species, whereas others are quite host specific, feeding only on a small number of closely related plants.



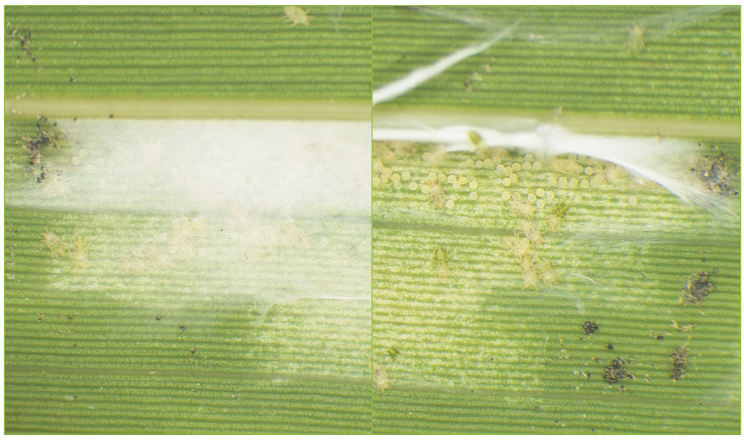
Severe leaf damage caused by spider mites with white cast-off skins visible.

IDENTIFICATION

There are over 1,200 described species of spider mites from over 70 genera. The most widespread are *Tetranychus* mites, however species from the genera *Oligonychus*, *Schizotetranychus*, *Bryobia* and others may sometimes be pests in production nurseries. Many of these species can appear virtually identical until they are closely examined on a microscope slide by a specialist diagnostician. It is often necessary to examine both males and females to identify spider mites to species level with confidence. Some species of mites can be identified by sequencing certain gene regions, but some cannot.

If you are regularly having spider mite infestations reaching damaging levels it may be worthwhile submitting a sample for identification. Knowing the species may assist you to understand the range of hosts that are likely to be infested, other aspects of their biology and allow for better management options (i.e. pesticide or predator selection). Talk to your diagnostic lab about whether they have the expertise to identify mites to genus and or species level before submitting samples.

Stigmaeopsis celarius live under thick, rectangular webs on bamboo.



Thick web produced by *Stigmaeopsis celarius*. On the left the web is intact, on the right it is exposed to show eggs, adults and nymphs.

MANAGEMENT

Like other pest mite groups, spider mites can be managed using a combination of cultural, biological, and chemical management strategies. Pesticides should never be the sole management technique because of pesticide resistance. A variety of cultural and preventative actions should be used, particularly if spider mites are regularly encountered at your nursery. As with all pests and diseases in production nurseries, regular monitoring is critical to ensure that the earliest signs of damage are recognised, particularly for those plants that are prone to damage.

MONITORING

It is important to understand the extent of the problem before informed management decisions can be made. In the case of spider mites, populations are more likely to build up to damaging levels during warm, dry conditions. Fortunately, even when populations are low, spider mites are easy to detect using a range of techniques including visual observations and plant beating method. Monitoring effort can be reduced by monitoring sentinel plants or crops that are highly susceptible to spider mites.

It is recommended to record monitoring results electronically in a database or spreadsheet. The information can then be searched and sorted easily and becomes a useful tool for understanding patterns of pest damage on farm.

In general, weekly monitoring is recommended. However, monitoring frequency depends on host susceptibility and risk of infestations. During warm, dry, high risk periods, when conditions are favourable to spider mites, and on plants that are very valuable and susceptible to spider mites, greater monitoring effort is recommended (e.g. multiple times per week). For advanced trees that rarely have spider mites and other problems, fortnightly or monthly monitoring may be suitable.

VISUAL OBSERVATION

Most spider mites can easily be observed with a x10 hand lens. Even eggs can be observed under a hand lens with practice. Preferentially monitor plants with leaf stippling or unusual symptoms. Hold the hand lens close to your eye and move close to the leaf to bring the surface into focus. Alternatively, remove suspect leaves into a zip-lock back and monitor under a stereo microscope. Microscope examinations can be particularly helpful within quality assurance programs to manage a wide range of pests (e.g. for tissue culture).

PLANT BEATING

Plant beating can detect a wide range of insect and mite pests and predators on established plants. Gently, but firmly, knock the foliage against a beating tray (which can be a folder, bucket or plastic plate). Keep hitting multiple plants by moving through or around the edge of the crop, preferentially targeting plants with symptoms. Look for anything that is moving on your tray. Once something is found use a hand lens to inspect and identify the catch.

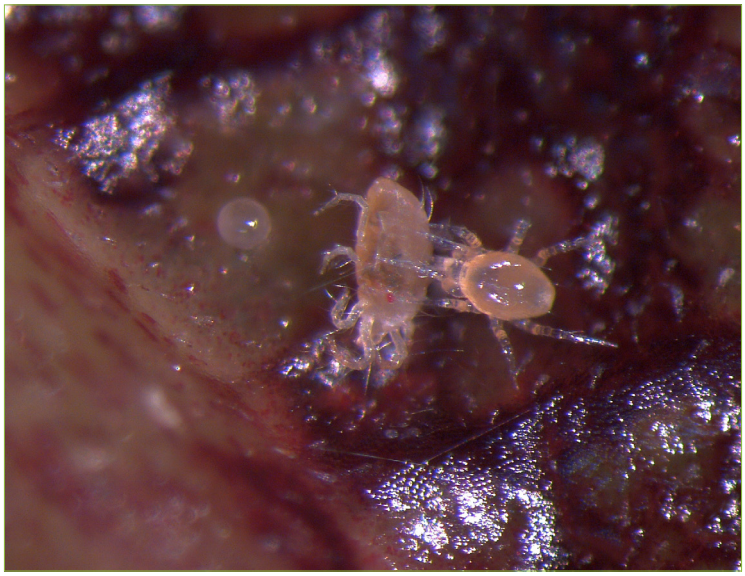
It is important that the foliage is hit against the tray, not the tray against the foliage. The beating tray should be a single colour; white or black is preferable as this will allow moving organisms to be more visible. Beating plants is a relatively efficient way of monitoring for any insect or mite that can be easily dislodged from the foliage and is visible to the naked eye.

CULTURAL CONTROL

The following actions will reduce the likelihood that spider mites will infest/reinfest your crop and reduce damage. Put in place as many of these cultural practices as possible.

1. Always inspect incoming stock for pests and diseases, including mites. Ideally, hold new stock in a separate area for 1–2 weeks (depending on the crop and practical constraints) before incorporating with other nursery stock.
2. Only propagate from clean plant material. Before cuttings will be taken, regularly monitor mother stock plants to ensure they are pest free.
3. Remove foliage that is heavily infested (if practically feasible) and ensure the material is bagged and placed in a covered bin to reduce the chance of reinfestation.
4. Discard plants that are unsalable; highly infested plants that remain in the growing area increase the likelihood that they will spread to other plants. Remove all discarded material from the growing area promptly and do not discard plants onto a compost pile on site. Do this prior to pesticide applications.
5. Proactively manage weeds within and around the nursery as they can be alternative hosts for spider mites and other pests.
6. Quarantine or place a buffer around infested plants to reduce their spread to other susceptible lines.
7. Reduce staff movements to areas of the nursery with known mite infestations. Visit these areas last in a day and do not re-enter ‘clean’ areas.

8. Whenever possible, grow resistant/tolerant varieties and avoid growing very susceptible crops.
9. Conserve natural enemies by only spraying pesticides when monitoring indicates that numbers will reach damaging levels. Where possible, apply low-risk products that are less harsh towards predators and avoid applying highly residual, broad-spectrum products (e.g. organophosphates, synthetic pyrethroids, neonicotinoid and similar products).
10. If pesticides are required, apply to hot-spot areas. Blanket sprays across the nursery will kill predators and increase likelihood of pesticide resistance.



Phytoseiulus persimilis nymph feeding on a spider mite

BIOLOGICAL CONTROL

Managing spider mites with predators can be very effective, but success requires synthesis of more information than using pesticides. For this reason, it is recommended to refer to the factsheet on managing predator populations for a more detailed discussion. Below is a brief summary.

Successful biological control requires knowledge of the pest group and sometimes the species present in the crop. Some species of pests may not be well controlled by all of the predators available to manage spider mites. Multiple species of spider mites in the nursery may require release of multiple predators.

Environmental conditions can also influence predator survival, with hot or cold conditions reducing predator efficacy. Periods of low humidity can also influence some predators. Refer to table 1 for a summary of environmental conditions that best suit each predator.

Pesticides applied in the nursery can reduce predator efficacy greatly, particularly if water is recycled. If pesticides must be applied, avoid broad spectrum products; apply low risk products with low residual activity to hot spot areas.

It is critical to monitor for pests regularly and apply predators when pest populations are low. This will give the best chance of controlling spider mites without economic damage. Without monitoring, pest populations are likely to go unnoticed and lead to crop damage.

If spider mites are known to occur on certain crops or areas of the nursery on a regular basis or at a certain time of year, it is recommended to release predators just prior to the high-risk period. This will improve control.

There are several commercially available predatory mites that mainly feed on spider mites, including persimilis, californicus and occidentalis (Table 1). Some are only effective if applied against moderately low populations.

Note that spider mites may be consumed incidentally by cucumeris (*Neoseiulus cucumeris*) and montdorensis (*Typhlodromips montdorensis*), but these biological control agents are unlikely to effectively reduce damaging populations of spider mites.

Californicus feeding on spider mite egg

TABLE 1. COMMERCIALLY AVAILABLE PREDATORY MITES THAT CAN BE USED AGAINST SPIDER MITES.

COMMON NAME	CALIFORNICUS	OCCIDENTALIS	PERSIMILIS
Scientific name	*Neoseiulus californicus*	*Typhlodromus occidentalis*	*Phytoseiulus persimilis*
Description	Tan-buff coloured, pear-shaped mite	Off-white, pear-shaped	Orange-red, tear-drop shaped mites
Primary mite groups managed	Spider mites and broad mite, cyclamen mite	Mainly two-spotted mites and closely related species	Spider mites (subfamily Tetranychinae only)
Other pests managed	Flat mites and eriophyid mites may be consumed incidentally	None	None
Environmental requirements	**Temperature:** Effective up to 35°C (but can survive short periods over 40°C and freezing temperatures) **Humidity:** Prefers high humidity (but effective at lower humidity)	**Temperature:** Prefers 20–32°C (but can survive well up to 40°C) **Humidity:** Over 40–50% (but lower humidity may be tolerated if prey is abundant)	**Temperature:** 20–30°C **Humidity:** Over 60%
Advantages	Can withstand extreme environmental conditions. If prey species are unavailable, it tends to remain in the crop feeding on pollen and alternative food sources (e.g. other pest mite species) until prey mites become available. Development time faster than many spider mite species.	Can withstand extreme environmental conditions (perhaps more so than any other commercially available predatory mite). Once populations establish in a crop, it can remain inactive during very low temperatures, then become active again once temps increase. If prey species are unavailable, it tends to remain in the crop relatively inactive until prey mites become available.	Complete their lifecycle very quickly (often faster than spider mites) and are voracious feeders, so they can eliminate spider mites from the crop. Most efficient of all commercially available spider mite predators and often the best and easiest predator to begin biological control in a production nursery setting.
Disadvantages		Development time slower than californicus, but still similar to many species of spider mites.	In the absence of food, they disperse or die out.
Commercial suppliers	Biological Services Bugs for Bugs	Biological Services	Biological Services BioWorks Bugs For Bugs

BIOLOGICAL CONTROL RECOMMENDATIONS

The recommendations provided here are general and unlikely to cover every possible situation. Therefore, follow the logic and modify the recommendations based on experience with spider mites at your business.

At **low-level infestations**, where spider mite populations are below damaging levels and in isolated areas, increase monitoring effort taking note of whether predators are already present. Ensure monitoring is sufficient to detect hot spots in other areas of the nursery. If sufficient naturally occurring predators are present, no action may be necessary. Small packs of persimilis are available from some suppliers and may be suitable even for infestations over a small area. Release one or more of persimilis, californicus or occidentalis at the recommended rates by your supplier for low levels pest populations. If a large portion of the nursery has low level spider mite numbers, consider releasing the normal rate of predators over the entire nursery.

At **medium-level infestations** economic damage is expected to occur if no action is taken. Release persimilis, californicus or occidentalis at a higher rate. However, if plants are highly susceptible to spider mite damage apply a low residual pesticide first, e.g. bifenazate or other low residual products in Tables 2 & 3. If possible, combine the low residual product with an oil product. Release persimilis, californicus or occidentalis 3–5 days after the pesticide application. Ensure monitoring of crops is sufficient to detect hot spots. Consider applying low rates of predators in areas of the nursery that have not yet had spider mites detected, but can sometimes receive economic damage. Continue to release predators at weekly intervals probably for 2–3 weeks in a row, or as required.

At **high-level infestations** economic damage has probably already occurred in at least some areas. Apply a suitable low-risk pesticide to hot spots. In 3–7 days, depending upon pest populations and environmental conditions, apply a

different product. Alternatively, follow pesticide resistance management strategy on the label if present. Monitor pest populations diligently and release predators at normal or high rates 3–5 days later, or when safe to do so, and when spider mite populations are at low levels. As per medium level infestations, apply predators to other areas of the nursery that can sometimes receive economic damage. Continue to release predators at weekly intervals probably for 2–3 weeks in a row, or as required.

CHEMICAL CONTROL

There are many pesticide products available for use against spider mites in production nurseries (Table 2&3). The use of chemicals against spider mites in production nurseries is likely to be unavoidable, at least on limited occasions. Pesticides are recommended for use under the following circumstances:

- When applying to a hot spot.
- When pest numbers are very high and economic damage has or is likely to occur.
- Under environmental conditions that are not conducive to the success of predators (e.g. very hot or cold conditions).
- When broad-spectrum or long residual products have been applied recently that would kill predators or reduce their efficacy. The exact timeframe depends on the product, but many organophosphates and synthetic pyrethroids can affect predator populations 3 months after they were applied. In this case, low residual products should be used until biological control agents can be released.
- When an infestations occurs just prior to the sale of a product. However, predators may still be suitable depending upon the nursery location, the length of time taken for predators to arrive, when the stock will be shipped, the level of infestation present, the level of damage the crop can withstand and customer considerations.
- In cases where other pests can only be managed by broad-spectrum and long residual products.

It is not recommended to rely solely on pesticides to manage spider mites as some species can develop pesticide resistance rapidly, e.g. two-spotted mite. Rotate between mode of action groups after each application or as recommended by any pesticide resistance management plan. Rotating between at least three modes of action drastically reduces risk of incurring pesticide resistance.

Nurseries that recycle their water may have pesticides present in their irrigation water at rates that could negatively impact predators, but not pests. For this reason, use of high residual and broad spectrum products anywhere in a nursery can have a negative impact on biological control, even if the products were not applied where predators were released.

It is also important to understand that the rate and frequency of pesticide applications influences the impact on beneficial insects. Repeated use of many pesticides, including low risk products, can increase the impact on predators. Oil products in particular can have quite a high impact towards predators when they are applied regularly. Some formulations of oils and sulfur-based products may have a greater impact on predators than others.

Pesticides applied at higher dosages have a greater negative effect on predators. It is therefore recommended to use the lowest rate of product that can effectively manage the pest being targeted. In other words, use a high rate if it is required to manage the pest. If a lower rate can be used to manage the pest, use the lower rate.

Tetranychus gloveri females

PESTICIDE-BASED MANAGEMENT RECOMMENDATIONS

In situations where predators cannot be released, as per above, it is recommended to rotate between products of different modes of action. If the product label has a resistance management strategy follow those recommendations. It is recommended to avoid use of broad spectrum and high residual products anywhere in the nursery; use low risk products whenever possible. Use Tables 2 and 3 to generate a list of products that you can use, ensuring that you change the mode of action group next time you spray. Keep in mind that pesticides applied against other pests can still impact your rotation schedule.

One possible rotation schedule for low risk situations includes sequential applications of acequinocyl, bifenazate, cyflumetofen and azadirachtin. Adding oil products to these applications will increase efficacy, but also increase risk towards predators. Depending on the number of predators already in the crop, it would be possible to apply a high risk, short residual product followed by applications of low risk products and or predators.

Very high infestation of spider mites on strawberry

TABLE 2. PESTICIDE ACTIVE INGREDIENTS FOR USE AGAINST SPIDER MITES IN PRODUCTION NURSERIES THAT HAVE SPLIT INTO THOSE THAT HAVE SHORT AND LONG RESIDUAL ACTION AND LOW AND HIGH RISK TOWARDS SPIDER MITE NATURAL ENEMIES. WHERE PRODUCTS HAVE UNKNOWN TOXICITY TO PREDATORS THEY HAVE NOT BEEN INCLUDED IN THE TABLE. THE NUMBER REFERS TO THE MODE OF ACTION GROUP OF THE ACTIVE.

	SHORT RESIDUAL ACTIVITY	LONG RESIDUAL ACTIVITY
Low risk (relatively low impact on spider mite predators)	» Clofentezine (10A) » Hexythiazox (10A) » Acequinocyl (20B) » Bifenazate (20D) » Tebufenpyrad (21A) » Cyflumetofen (25A) » Azadirachtin (UN) » Elemental and wettable sulfur** » Oil products**	» Granular applications of phorate* (1B)
High risk (moderate to high impact on spider mite predators)	» Emamectin (6) » Abamectin (6) » Abamectin + chlorantraniliprole (6+28) » Diafenthiuron (12A) » Propargite (12C) » Cyantraniliprole + Diafenthiuron (28+12A) » Elemental and wettable sulfur** » Oil products** » Potassium salts of fatty acids	» All 1B products (organophosphates) applied as a spray, e.g. dimethoate, malathion, omethoate » All 3A products, e.g. bifenthrin, tau-fluvalinate » Etoxazole (10B)

* May have high impact towards soil predators, but relatively low impact on foliar predators.
** These products may have low or high impact depending on formulation, rate applied and frequency of applications.

BIOSECURITY

There are many species of spider mites that are not present in Australia and could cause additional economic loss if they were to become established. Various species of *Oligonychus* are considered a high priority pests for the nursery industry because of the wide range of species they can damage. *Tetranychus pacificus* is a quarantine pest that has a very wide host range and has widespread pesticide resistance, similar to two-spotted mite. Other species of spider mites can be a high risk pest for individual crops. For example, *Oligonychus perseae* is a serious pest of avocado that is not present in Australia.

If you believe you are experiencing damage from a spider mite that is not reported in Australia, contact the Exotic Plant Pest Hotline 1800 084 881. Keep in mind that spider mites cannot be identified to species without a sample being sent to a specialist diagnostician.

FURTHER READING

- Nursery pesticide application best practice manual
- Managing predator populations
- Nursery minor use permits
- Insecticide resistance nursery paper and webinar
- CropLife Australia

TABLE 3.
PRODUCTS AVAILABLE FOR USE AGAINST SPIDER MITES IN AUSTRALIAN PRODUCTION NURSERIES (AS AT OCTOBER 2024). NOT ALL PRODUCTS WILL BE SUITABLE FOR USE BY ALL BUSINESSES AND PRODUCTS WITH OTHER ACTIVE INGREDIENTS MAY BE AVAILABLE FOR SPECIFIC CROP PLANTS THAT HAVE NOT BEEN INCLUDED HERE, E.G. CITRUS (PER13059), SPECIFIC VEGETABLE CROPS, CERTAIN ORGANOPHOSPHATE PRODUCTS ALSO NOT INCLUDED. CHECK EACH LABEL OR MINOR USE PERMIT TO ENSURE THAT IT COVERS YOUR SITUATION. ACTION: C = CONTACT, S = SYSTEMIC, T = TRANSLAMINAR, I = BY INGESTION OF PLANT MATERIAL WITH PRODUCT ON THE LEAF. QUESTION MARKS (?) INDICATE THAT RESEARCH IS LIMITED OR UNCERTAIN. TOXICITY INFORMATION IS LARGELY BASED ON KOPPERT AND BIOBEST SIDE EFFECTS INFORMATION.

MODE OF ACTION GROUP	ACTIVE INGREDIENT	EXAMPLE PRODUCT NAME	REGISTRATION INFORMATION	SELECTED APPLICATION INFORMATION	ACTION	TOXICITY TO BENEFICIALS
1B	Dimethoate	Accensi	Spider mites on ornamentals (excluding selected plants)		C, S	High toxicity, 8 weeks residual
1B	Phorate granular insecticide	Zeemet	Woody ornamentals and selected shrubs against Two-spotted mite	Apply granules evenly to surface.	S	Unknown, possibly low toxicity to predators on foliage
1B	Malathion		Mites on flowers, ornamentals	Apply at first sign, repeat 7–10 days as required.	C, I	Moderate, 1–2 weeks residual
3A	Bifenthrin	Venom, Talstar	Two-spotted mite on ornamental plants.	Repeat as necessary at 10-14 day intervals.	C	High, 8–12 weeks
3A	Tau-Fluvalinate	Mavrik Aquaflow	Two-spotted mite on ornamentals.	Apply when mites first appear	C	High, 6 weeks
6	Emamectin	Proclaim Insecticide	Mites in non-food nursery stock and ornamentals. PER91810	Do not apply more than two applications per crop or within 7 days of initial treatment. No more than 4 applications per annual nursery production cycle. Other restraints apply.	C, T	High, 1 week
6	Abamectin	Vertimec	Two-spotted mite in ornamentals and specific mite species in certain specific crops. Registrations vary.	Do not use more than 2 times per season. Other restraints apply.	C, T	High, 1–2 weeks
6 + 28	Abamectin + Chlorantraniliprole	Voliam Targo Insecticide	Mites in non-food nursery stock and ornamentals. PER91810	Do not apply more than two applications per crop or within 10 days of initial treatment. Other restraints apply.	C, T, S	High, 1–2 weeks
10A	Clofentezine	Apollo	Two-spotted mite on ornamental plants.	This product primarily acts against eggs. Monitor carefully before use. Only apply once per year. Other restraints apply.	C	Very low, no residual
10A	Hexythiazox	Calibre	Two-spotted mite, European red mite on ornamentals	Apply against low populations only. It primarily acts against eggs, but will also act against larval and nymph stages	C, I	Very low, no residual
10B	Etoxazole (110 g/L)	Paramite Selective Miticide	Various specific mite species in non-food nursery stock and ornamentals. PER91810	Do not apply more than 1 application per year. Other restraints apply. Targets mite eggs, larvae and nymph stages	C	Moderate to high, 4–8 weeks
12A	Diafenthiuron	Pegasus	Mites in non-food nursery stock and ornamentals PER91806	Two applications per crop not repeated within 6 weeks. Other restraints apply.	C, T, I	Moderate to high, 1 week
12B	Fenbutatin oxide	Dumper	Two-spotted mite, European red mite on ornamentals	Apply against low populations only.	C, I	Very low to low, no residual
12C	Propargite	Omite	Two-spotted mite, European red mite on ornamentals	21+ day re-entry period. Apply when mites first appear.	C	Moderate to high, no residual
20B	Acequinocyl	Kanemite	Two-spotted mite on non-food nursery stock. PER93970	Only apply once per season.	C, I	Very low to low, 1 week

MODE OF ACTION GROUP	ACTIVE INGREDIENT	EXAMPLE PRODUCT NAME	REGISTRATION INFORMATION	SELECTED APPLICATION INFORMATION	ACTION	TOXICITY TO BENEFICIALS
20D	Bifenazate	Acramite	Two-spotted mite in non-food nursery stock and ornamentals. PER91810	Do not apply more than two applications per crop or within 21 days of initial treatment. Other restraints apply.	C	Very low to low, 1 week
21A	Tebufenpyrad	Sipcam pyranica	Two-spotted mite on ornamentals.	Apply when mites first appear	C, I	Very low to very high, 1 week
25A	Cyflumetofen	Danisaraba	Selected spider mites species on field and protected ornamentals.	Two applications per growing season only at 14 intervals. Other restraints apply.	C	Low, no residual
28 + 12A	Cyantraniliprole + Diafenthiuron	Minecto Forte	Two-spotted mite in non-food nursery stock PER92919	Two applications per crop not repeated within 28 days. Other restraints apply.	S, C, T, I	Unknown, probably low to moderate with 1 week residual
30	Isocycloseram	Simodis Plinazolin Technology	Two-spotted mite in non-food nursery stock PER94004	Two applications per season. Do not apply to stock destined for food production. Other restraints apply.	C, I	Unknown, possibly moderate based on effect against other predators. Unknown residual
UN	Azadirachtin A & B	Azamax	Two-spotted mite on ornamental plants.	Re-apply every 7 days while pests are present.	C, T?	Very low to low, no residual
UN	Beauveria bassiana strain PPRI 5339	Velifer	Suppression of two-spotted mite in protected vegetables and ornamentals.	Repeat applications 3–14 days, usually at least 3 weekly applications. This product is a fungal biopesticide and is likely to be negatively impacted by fungicides.	C	Probably low, based on testing of non-spider mite predators. Unknown residual.
UN	Elemental/wettable Sulphur	Sulfur	Two-spotted mite on ornamentals. Some labels only for home garden use.	Apply when mites first appear	C	Low to very high, no residual
UNE	Petroleum oil (multiple concentrations)	Pestoil, Sacoa Summer oil	Mites in non-food nursery stock and ornamentals. PER91810	Apply a maximum of 6 applications within a 7–14 day period.	C	Low to very high, no residual
UNE	Botanical oils	Eco-oil	Two-spotted mite on ornamental plants		C	Low to very high, no residual
UNE	Paraffinic oil	Sacoa biopest	Spider mites on woody ornamental and selected trees, shrubs, vegetable plants.		C	Low to very high, no residual
UNE	Potassium salts of fatty acids	Natrasoap	Spider mites on indoor and outdoor ornamentals, vegetables and herbs. Labels vary slightly in the wording.	Apply against low populations only.	C	Very high, no residual

This factsheet was written by Andrew Manners and Emily Lancaster (Queensland Government, Department of Agriculture and Fisheries — DAF) as part of the Hort Innovation, Nursery Levy and DAF funded project "Resourcing, supporting, and assessing biosecurity in nursery production (NY20000)" in 2024. It was originally written as part of a general mite pest management plan in 2015.