Southern red mite, a potential production nursery pest

Southern red mite (SRM — Oligonychus ilicis*, pronounced 'Oh-lig-oh-nick-us illa-sis') is a spider mite that has been recorded on a wide range of plants overseas, most notably, camellia, rhododendron and holly. It is also a major pest of coffee in Brazil. Damage is reasonably typical of spider mites, but individuals tend to inhabit the upper leaf. Predators that are typically used to manage two-spotted mite (e.g. persimilis and californicus) are not effective against SRM and pesticide resistance has been suggested overseas.*

SRM was described from the USA but probably originated from Asia. The current distribution of SRM includes much of the northern hemisphere including Italy, Japan, Korea, The Netherlands and the USA. It is also present in South America including Brazil and Paraguay.

SRM was detected in two nurseries in northwestern Sydney in the late 1990s. It was reportedly eradicated and has not been reported since then.

Damage caused by southern red mite, *Oligonychus ilicis* on cherry laurel. Red mites are just visible to the naked eye. Photo by Frank A. Hale, University of Tennessee, Bugwood.org.

PEST DESCRIPTION

SRM is a similar size to two-spotted mite (‹0.5mm) and are reddish brown to deep purplish-red in colour. Adults often have a pale patch in the centre of their back and have lighter coloured legs. They are more translucent towards the front end of the body. They are similar in appearance to the red, overwintering form of two-spotted mite and other red *Tetranychus* species. However, many *Tetranychus* (including two-spotted mite) have cream or white eggs. SRM are also very similar to other species in the genus *Oligonychus* and requires expert examination of slide-mounted specimens and may require molecular testing to confirm the identification.

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Females are slightly larger than males and have a more rounded body shape posteriorly; males have a relatively slender abdomen posteriorly and are slightly paler than females. Eggs are reddish brown and spherical and are normally laid on the upper leaf surface. However, overwintering eggs are mainly laid on the lower leaf surface (though may sometimes be laid on the upper leaf surface). Eggs hatch into larvae that have six legs and are relatively pale, but otherwise appear very similar to adults. There are two nymphal stages that have eight legs and become progressively darker and larger.

LIFE CYCLE AND POPULATION DYNAMICS

SRM has a lifecycle similar to many other spider mites. Numerous, overlapping generations occur each year. Populations peak during spring and autumn, particularly in moderate temperatures (between about 15–30°C) and dry conditions. Regardless of the season, populations will persist and increase under favourable climatic conditions. Under good conditions SRM can complete their lifecycle in 7 days. Temperatures above 30°C reduce longevity and survival dramatically.

If present in a relatively cool climate (where winter temperatures never go above about 14°C), large numbers of overwintering eggs can be laid on the undersides of leaves, and perhaps the bark of stems. This can lead to high populations of SRM by late spring and summer. High rainfall has been reported to reduce populations significantly and may preclude the need for any management actions.

SRM eggs, immature stages (right) and adult. Photo by Jim Baker, North Carolina State University, Bugwood.org

Overwintering eggs of SRM on lower leaves. Photo by Jim Baker, North Carolina State University, Bugwood.org

DISPERSAL

SRM is wind-borne with mixed reports of whether they balloon on silk threads. It is best to assume that individuals may dangle from silk threads to spread between plants in at least some conditions.

Like all spider mites, individuals can easily hitch-hike on people and equipment and will spread to neighbouring plants if leaves are touching. It is recommended to avoid staff moving through and working with nursery crops infested with any spider mites. This will reduce the extent to which they are spread to the rest of the nursery.

HOST RANGE

SRM feeds on many woody ornamental species, mainly on foliage. There appears to be geographic variation in plant species damaged by SRM. This may be as a result of the species being part of a complex that is not well understood. In other words, there may be multiple species that are virtually identical in appearance that feed on different plants. Alternatively, geographic differences and the frequency of hosts grown in these regions may be involved or some other unknown factor. Regardless, in eastern USA it has been noted as a pest of azalea, camellia, holly, cranberries and conifers. In California it has been noted as a pest of walnuts and sycamore. In Brazil it is a pest of coffee and in Japan as a pest of tea, rice laurel, holly and boxwood. If SRM is found in Australia then assume some plants may not be damaged while other plants not present in the table may be damaged.

PLANT SPECIES REPORTED AS HOSTS OF SRM

COMMON NAME	SCIENTIFIC NAME
Azalea	*Rhododendron* spp.
Camellia	*Camellia japonica*
American sycamore	*Platanus occidentalis*
Boxwood	*Buxus* spp.
Camphor tree	*Cinnamonum camphora*
Coffee	*Coffea arabica*
Cotoneaster	*Cotoneaster* sp.
Cranberry	*Vaccinium macrocarpon*
Deer grass/meadow beauty	*Rhexia* sp.
Doghobble	*Leucothoe* sp.
Elaeagnus/silverthorn	*Elaeagnus pungens*
English walnut	*Juglans regia*
Eucalyptus	*Eucalyptus* spp.
Guava	*Psidium guajava*
Holly	*Ilex* spp.
Hibiscus	*Hibiscus* spp.
Juniper	*Juniperus* sp.
Laurel or bay leaf	*Laurus nobilis*
Loquat	*Eriobtrya japonica*
Oak	*Quercus* sp.
Pear	*Pyrus communis*
Pecan	*Carya illinoensis*
Photinia/red tip	*Photinia* spp.
Pyracantha	*Pyracantha coccinea*
Rose apple	*Syzygium jambos = Eugenia*
Silky oak	*Grevillea robusta*
Spruce	*Picea* sp.
Summersweet/sweet pepperbush	*Clethra alnifolia*
Strawberry	*Fragaria* x *ananassa*
Tea	*Camellia sinensis*
Viburnum	*Viburnum* spp.
Oxalis	*Oxalis*
Sheep laurel	*Kalmia angustifolia*
Chokeberry	*Prunus virginiana*
Leatherleaf	*Chamaedaphne calyculata*
Walnut	*Juglans regia*
Rice	*Oryza* sativa

DAMAGE AND SYMPTOMS

Most studies indicate that SRM is usually present on the upper leaf surface and moves to the lower leaf as populations increase. Like all spider mites, SRM feeds on chlorophyll and other cell contents causing mesophyll collapse, graying and stippling. SRM feeding also can reduce photosynthetic rate, particularly under high populations.

Individuals spin silk, laying it on the leaf surface. This causes dust, mite cast-off skins and other organic material to stick to the silk and accumulate on the leaf surface. The cast off skins can sometimes be more apparent than living mites. As a result, leaves lose luster and appear bronzed or dull in colour. The level of bronzing or colour loss is proportional with the amount of SRM feeding and can also vary across host plants. Bronzing is most likely to occur along the midrib of upper leaves first, then along veins and will eventually spread to the entire leaf.

On large trees, leaves relatively low in the canopy may be damaged first, compared to those higher up, though sometimes they are distributed evenly through the canopy. Large populations can result in severe leaf drop and unsalable nursery plants. It is noted that for an economic spider mite pest, plants can tolerate a relatively high amount of damage before leaf drop occurs. Damage is more likely to occur in dry weather and on water stressed plants and may be more likely to cause leaf abscission under those conditions. Damage can result in reductions of plant vigour and reduced growth.

Damage caused by SRM includes bronzing (e.g. holly above) and stippling (e.g. camellia below). Photos by John Ruter, University of Georgia and Chazz Hesselein, Alabama Cooperative Extension System, respectively both Bugwood.org.

PEST MANAGEMENT

DETECTION AND MONITORING

The two most important methods to detect SRM are direct visual observation (looking for the damage and cast-off skins) and plant beating. These same methods will detect other spider mites and other arthropod pests and predators.

Direct observation involves looking for damage, as described in the section above. Once damage has been observed a hand lens should be used to confirm the presence of spider mites. Where no discernable damage can be seen, plant beating can be used to detect very low populations of spider mites. Plant beating involves gently, but firmly hitting foliage against a beating tray (which can be a folder, bucket or plastic plate). 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 insects and mites that can be knocked from plants, including spider mites and predatory mites, aphids, thrips, lady beetles, small caterpillars, whiteflies and a variety of other insects. Cast-off skins may also be detected by observant inspectors.

Red spider mites found in the presence of red eggs on plant species known to host SRM should be treated with suspicion. If in doubt, send samples to a diagnostic laboratory for identification, check to make sure the laboratory has someone experienced in the identification of spider mites. Species level identifications cannot be made without male and female individuals.

CHEMICAL CONTROL

Management of SRM in the 1950s and more recent times has been based on relatively old generation pesticides. Early research indicated that long residual products applied early in the season (when populations were low) reduced populations for the entire season, compared to short residual products. Late applications applied after populations were relatively high were difficult to manage with pesticides. Little pesticide efficacy research has been published on relatively new and selective miticides against SRM.

Studies show that plants treated with certain pesticides can increase SRM populations compared to untreated plants. The mechanism for this population increase may vary with active ingredient. Research suggested that for some products it may have been predator suppression that caused SRM population increases, while for others (synthetic pyrethroids) the offspring of treated individuals laid significantly more eggs than those that went untreated.

Following the detection of SRM in the Sydney area, research was completed on potential insecticides for its control. Results indicated that aldicarb, bifenthrin, chlorpyrifos, dicofol, omethoate, propargite, tau-fluvalinate and tebufenpyrad controlled Australian SRM at the rate recommended for *Tetranychus urticae* (two-spotted mite). The active ingredients abamectin, chlorfenapyr, dimethoate, fenbutatin oxide and maldison did not kill all SRM and therefore may not be effective under field conditions. They concluded that Australian SRM detected in the 1990s probably had some pesticide resistance.

BIOLOGICAL CONTROL

Where predator populations are conserved, populations of SRM can be kept relatively low and may not cause economic loss or noticeable damage. A number of predators have been recorded feeding on SRM overseas, mainly mites from the family Phytoseiidae and beetles from the genus *Stethorus*. Most research has focused on phytoseiid predators to manage SRM. Results indicate that some predators are better able to feed on SRM in the presence of their webbing.

In the USA, biocontrol of SRM is generally with mite *Neoseiulus fallacis* and ladybeetle *Stethorus punctillum*. Most predators commercially available in Australia are not marketed as being predators of SRM in countries where it occurs. Those species that are considered effective overseas are not available in Australia. To our knowledge, the Australian commercial predators *Typhlodromips montdorensis* and *Typhlodromus occidentalis* have not been tested against SRM overseas. *Neoseiulus californicus* and *Phytoseiulus persimilis* are not recommended for control of SRM.

Beetles from the genus *Stethorus* are small (‹5mm), black spider mite predators, photo by DAF

CONCLUDING REMARKS

SRM is considered to be eradicated from Australia and has not been detected for about 20 years. However, it is likely to be present. If you detect red spider mites consistent with SRM that have red eggs on azaleas, camellias, holly or rhododendron contact your local department of agriculture or send a sample for diagnostic testing. Alternatively, call the Exotic Plant Hotline on 1800 084 881.

FURTHER READING:

Beard JJ (2018) Spider mites of Australia (including key exotic southeast Asian pest species), v1.0. Queensland Museum. https://keys.lucidcentral.org/keys/v3/spider_mites_australia/key/spider_mites_o_australia/Media/Html/entities/index.htm

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