GAINING CONTROL OVER **SPIDER MITES**

The Two Spotted Spider Mites

The spider mite, Tetranychus urticae, is a tiny, eight-legged pest related to the spider and tick. Spider mites are members of the arachnid class. The term "spider mite" comes from their behavior of spinning fine silk webs on infested leaves and new growth. Adults are normally green or yellow but turn red when day lengths shorten in the autumn. Adults have an oval body, with two red eye spots near the head end of the body. Females usually have a large dark blotch on each side and numerous bristles covering the legs and body. They look sort of like bristly black dots. Their eggs are visible too – they are very tiny, white and are laid closely grouped together.

Spider Mites attack plants by stabbing the underside of the leaves and sucking out the sap, causing the cells to collapse and die. As their numbers increase, the number of white speckles on the leaf increases and the leaf eventually dies. Once the spider mites begin reproduction, a distinctive `webbing' forms, usually under the leaf and then at the growing tip of the plant. The mites disperse from a plant of declining food quality on threads of webbing and drift or are blown on to other plants.

What makes this pest truly difficult to control is its rate of reproduction. Each female will lay up to 12 eggs per day. Mating is not required for egg production. At 70º F, these eggs will hatch in as few as three days and will develop into adults in only 14 days. Adult females also have the ability to go dormant for a time after the photo period (daily hours of light) shortens, then re-emerge to lay more eggs a few weeks after the photo period lengthens again. That's one reason Spider Mites keep reappearing crop after crop on indoor plants.

Life Cycle and Environment

In a given colony of two-spotted spider mites, both adult males and females are present, however females usually outnumber males three to one. This factor accounts for their high reproduction rate as a single female can lay on average over 100 eggs in her life time. Females normally lay eggs on the underside of leaves. The rate at which a two spotted spider mite develops from an egg to an adult is greatly dependent on environment. Their life cycle is accelerated at higher temperatures. This is one of the reasons that these mites are such large greenhouse pests. In the artificial environment of a warm lighted greenhouse or indoor grow space, the mites are able to reproduce quickly and to be active throughout most or all of the year.

Integrated Pest Management

We prefer a more holistic / organic method of controlling spider mites (or any pests for that matter). Predators, Neem Oil, Azamax, Plant Therapy, Athena IPM and organic sprays used in conjunction with each other is just as effective and less caustic to the environment and to your prized plants. Lower temperatures will also help. The ideal temperature for Spider Mites to thrive is 80 deg. F., so you will want to stay below this range if an infestation is found. It is also very important to keep the growing area clear of dead plant material. Dead leaves should be removed from growing areas as soon as possible, as they often contain mite colonies and clusters of eggs. Leaves showing large amounts of mite damage should also be removed as there are often large populations in these areas. Below we list a variety of management methods. Please feel free to ask us questions about any of these or any other methods / products that you have heard of and we will help you find the best solution to the problem. If all else fails we have also listed a harsher microbicide to kill these little buggers DEAD.

Preferred Methods of Treatment and Control:

- Plant Therapy
- Neem Oil (Cold Pressed)
- Azamax
- Athena IPM
- Predators
- Pyrethrin Bombs or Spray

Plant Therapy

Plant Therapy uses seven biodegradeable, food grade and cosmetic grade ingredients: Soy oil to coat and suffocate insects on contact. Peppermint essential oil as a natural bug repellent, plant-derived Citric Acid to eliminate powdery mildew spores on contact and adjust the pH of the leaf surface to repel mildew. Cosmetic-grade Isopropyl Alcohol to dehydrate target pests quickly as well as evaporate from leaf surfaces. A plant-based soap to emulsify ingredients, help spread contents over leaf surfaces and disrupt insect cell membranes to further assist in dehydration of pests. Sodium Citrate to buffer pH of leaf surface and keep powdery mildew from entering plant tissue. Finally, purified reverse osmosis water to emulsify and thin out ingredients.

Insects eliminated by *Plant Therapy* include spider mite, broad mite, russet mite, fungus gnats, white flies, thrips, aphids, root knot nematodes, ants, ear wigs, and more.

Quart Size Foliar Application: In a quart, mix 7.5ml of *Plant Therapy* and a few drops of wetting agent (such as Heavy Foliar) with distilled or RO water. Shake and apply. Wait 2-3 days and reapply by increasing dose to 15ml of Plant Therapy with wetting agent and water. If spraying indoors, we recommend raising the lights or spraying while the lights are off (for at least a 3 hour period.) Outdoors spray either early in the morning or at dusk. For best results use within 24 hours.

Gallon Size Foliar Application: In a gallon, mix 1 oz of *Plant Therapy* + a wetting agent (such as *Coco-Wet*) with RO water. Shake and apply. Wait 2-3 days and then re-apply with 2 oz per Gallon + a wetting agent with RO water. If spraying indoors we recommend raising the lights or spraying while the lights are off (For at least a 3 hour period.) Outdoors, spray either early in the morning or at dusk. For best results use within 24 hours.

Athena IPM

Athena IPM is a complete pest management formula that kills many soft-bodied insects and mildew on contact. When used as directed *Athena IPM* penetrates plant crevices and leaf surfaces where unwanted biotic diseases seek to colonize. Athena IPM is an effective treatment against many soft-bodied insects such as white flies, spider mites, and aphids. Will treat adults, nymphs, larvae and eggs. Kills on contact. Also effective in treating common fungal infections such as powdery mildew.

- Complete powdery mildew management: Control, Kill & Cure
- No artificial pesticides or fungicides
- Derieved from inputs grown in the USA
- Can be used from seeding to harvest
- EPA 25(b) Exempt product with minimal risk ingredients

Quart Size Foliar Application: In a quart, mix 20ml-30ml/gal of IPM with distilled or RO water. Shake and apply. Spray with lights off or in early morning sun. Start with a lower dose then increase if problem persists. At least 3 applications spaced 3 days apart are required to treat most pests. Spray tops and underside of all leaves and stems to completely saturate the plant.

Gallon Size Foliar Application: In a gallon, mix 90-120ml/gal of IPM with distilled or RO water. Shake and apply. Spray with lights off or in early morning sun. Start with a lower dose then increase if problem persists. At least 3 applications spaced 3 days apart are required to treat most pests. Spray tops and underside of all leaves and stems to completely saturate the plant.

Monterey 70% Neem Oil

Monterey Neem Oil is an organic liquid pest control spray derived from the seeds of the Azadirachta indica (Indian Neem Tree). It is best used as a preventative, meaning that you should apply it before the problem begins as opposed to after it is already there. Mix neem oil with a wetting agent (such as Coco-Wet) to thin out the spray and cause it to adhere to the leaves better. As an insecticide and miticide it works as an antifeedant, as a growth regulator/hormone disruptorant as a smotherant. Spray every three days, starting with the lowest concentration listed on the bottle and increasing the concentration every 3 days until the highest concentration is reached; at which point continue to spray at the highest concentration - every 3 days. Soon you will see a dark leaf sheen or waxy coating develop on the leaves. This is a good thing. Neem will not hurt plants, it will only hurt the bugs.

Quart Size Foliar Application: Mix 7.5ml per quart of warm water with a wetting agent (such as Coco-Wet) and apply as a foliar spray. Spray at this concentration for 2 applications (2 days apart from each other). Next up dosage to 15ml/quart with Coco Wet. Again, Spray for 2 diff. applications (2 days apart from each other) and raise dosage to 22ml/quart (plus Coco-Wet). After 2 more applications, Raise to 30ml/quart. For best results use within 24 hours.

Gallon Size Foliar Application: Mix 30ml/gal. of warm water with a couple drops of a wetting agent (such as Coco-Wet) and apply as a foliar spray. Spray at this concentration for 2 applications (2 days apart from each other). Next up dosage to 60ml/gal. with Coco Wet. Again, Spray for 2 diff. applications(2 days apart from each other) and raise dosage to 3oz/gal (plus CocoWet). After 2 more applications, Raise to 4oz/gal. For best results use within 24 hours.

Predators

Spider Mite Predators not only feed on Spider Mites and their eggs, they also breed twice as fast. Each Spider Mite Predator sucks the juice out of about 5 Spider Mites a day, or 20 of their eggs. Used as directed, predators should noticeably begin to gain control within 4 weeks and then continue until the Spider Mites are nearly or completely wiped out. Predators disappear when the Spider Mites are gone.

Spider Mite Predator Types and Attributes

Phytoseiulus Persimilis

Wide Temp Range, Moderate Humidity
Temperature Range: 55 - 105+ F, Humidity Range 55 - 90%

Neoseiulus Californicus

Moderate Temp Range, High Humidity
Temperature Range: 55 - 90 F, Humidity Range 60 - 90%

Mesoseiulus Longipes

Widest Humidity and Temp Range
Temperature Range: 55 - 105+ F, Humidity Range 45 - 90%

Spider Mite Predators can be purchased as either a "Triple Threat" which includes all three species listed above, or as individual packages. Make sure to get enough Predators to kill your infestation. Please consult with us to find out how many Predators that will be!

Mite Destroyers eat all stages of Spider Mites, and find new infestation sites on their own by flying. But, it takes 4-6 weeks to really get these guys going, so use Predator Mites as well for more immediate control and for cleaning up small "trouble spots". Life cycle takes 18 days at 70 F. 100 Spider Mite Destroyers gets a colony started. Other Predators include Lacewings and Pirate Bugs (Pirate Bugs are great at eating up Thrips too!)

Also Note If using Predators make sure to stop spraying any pesticide before application begins. Every pesticide has a specific amount of time before it is rendered ineffective. Make sure to wait that amount of time.)

Pyrethrin Bombs and Sprays

Our least favorite way to deal with Mites. Pyrethrin bombs are good for getting an infested room between crops to help "sterilize the environment." They can cause burning on plants (especially if too much is applied). Make sure to turn off the lights when letting off a bomb. it is a good idea to raise them as well so that the next day when the lights come back on you will lessen the chance of burning occurring. Pyrethrin lasts for 24 hours before it degrades to 1/2 of its original amount. It is derived from chrysanthemum flowers and generally has a low toxicity for humans. That being said, we still think you should spray with a mask and gloves. Also note: Pyrethrins act only as a miticide and NOT an ovicide (they do not kill the eggs.) You should always follow up one spray or "Bombing" with another 3 days after the first to kill newly hatched mites before they mate again. As far as "bombs" go, Doktor Doom is softer on plants and should be used for mid-cycle applications. The Pyrethrum TR "Total Release" Fogger is good for sterilizing the space in between crops.

Other Methods of Control

Populations can also be reduced by spraying the underside of the leaves with a jet of water to break up the webs and wash the mites off. Soap sprays are also very effective at controlling spider mites. Lower temperatures will help. The ideal temperature for Spider Mites is 80 deg. F. It is also very important to keep the growing area clear of dead plant material. Dead leaves should be removed from growing areas as soon as possible, as they often contain mite colonies and clusters of eggs. Leaves showing large amounts of mite damage should also be removed as there are often large populations in these areas.