

Spider Mites in Cotton---Summer, 2011

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At least two different species of spider mites have shown up this summer in cotton planted in south-central New Mexico---two-spotted (*Tetranychus urticae*) and carmine mites (*Tetranychus cinnabarinus* or *T. telarius*, depending on identifying specialist). If you haven't seen these mites---yet---they are worth the extra effort to scout for them; control might be necessary.

Foliage of infested cotton plants may appear dry or a dull olive green; some damaged leaves may look yellowish or even reddish. Closer examination may reveal very tiny white dots---or 'stipples'---on the upper side of the leaf. Damage is subtle initially but becomes very eye-catching when infested leaves curl, wither and drop. Early infestations of spider mites are often spotty, both within a field and around the edges of fields; they may develop first near weedy field margins, along the edges of dusty roads or in cotton rows next to other potential host crops. Leaf damage and loss not only slows plant growth but also reduces the amount of carbohydrates available to developing squares and bolls. Without these essential nutrients, the struggling plant will lose part or all of its crop and you'll see fallen squares and bolls between the rows. Unchecked, spider mites can totally defoliate and kill plants in heavily infested areas of a cotton field. Pima cotton is supposed to be less susceptible to spider mites than upland varieties, but don't count on it---keep an open mind and scout.

How do spider mites do this damage? Each free-living life stage of the spider mite has a pair of needle-like mouthparts so tiny they can penetrate individual cells in the leaf, popping each one like a nutritious water balloon, sucking up the contents. This damage is permanent and cumulative, producing the symptoms you'll notice.

What would you see if you looked even closer at some of these leaves? Spider mites usually colonize the protected underside of cotton leaves, so use your 10x (or better) magnifying lens there. The largest spider mites will be about 0.3mm long---small enough to fit inside this O. Their bodies will be oval, off-white with a dark gray blotch on either side for two-spots and dark reddish purple for carmine mites. They crawl slowly on 4 pairs of short legs---one feature that probably earns them the 'spider' part of their common name. The head is not well defined but it includes another shorter pair of leg-like palps immediately adjacent to the minute mouthparts. If the mites have been on the leaf for 'awhile,' you may expect to see not only the shiny, nearly transparent spherical eggs (almost as large as the mites) but also the delicate, whitish transparent cast skins, left behind by the younger mites after they molt. Both species will produce strands of very thin silk throughout and over their colonies---another feature associated with 'spiders.' The silk may aid the mite colony in orientation or communication as well as provide physical protection of their micro-environment. When spider mite numbers are high on a severely damaged or dying plant, the pests often surge to the top of the canopy which they cover with silk webbing. When the winds blow, the minute spider mites are whisked away from exposed areas on the webbing to any of a number of other plants where they may establish new colonies. Spider mites are well known to have very broad host ranges; those associated with cotton may feed on any of several

hundred different dicot species, wild or cultivated, weeds, crops, or landscape plants, as well as some monocots.

During the growing season spider mites are almost always present in weeds and crops, gardens and landscapes, but not necessarily in damaging numbers. Their populations are held in check by a variety of environmental factors (e.g. cold, rain) as well as natural enemies including (but not limited to) predatory mites, small lady beetles, big-eyed bugs, minute pirate bugs---and even Western Flower Thrips! However, spider mites are terrific and prolific competitors, able to take advantage of even the smallest breaks. Our persistent hot, dry summer weather not only favors spider mite survival and reproduction over that of their natural enemies, but also stresses host plants---again, good nutritionally for the spider mites. Knock on wood, we are free of pink bollworms and boll weevils, but some producers may have made insecticide applications for other pests earlier this season; depending on their choice of active ingredient and frequency of treatment, various predators in the cotton field may have been knocked out temporarily by these treatments while having little or no impact on the spider mites already there. By the time natural enemies start to re-invade the field, the resident spider mites may have already surged in numbers, completing a generation or two with little pressure from the environment or predators. In the heat of summer, spider mites can complete a generation in less than a week, hatching from those pearl-like eggs to 6-legged 'larvae.' Larvae soon molt through two 8-legged 'nymph' stages to finally become 8-legged, reproductively active adults---that's 5 life stages in under 7 days. Blazing fast development in blazing summer temperatures.

So, what can a cotton producer do about damaging spider mites? If the problem is discovered early, it's possible that field margins are more severely infested than the rest of a given field. Use your scouting skills and damage estimates to determine if treatment of just the field margin may be justified. Realize that a good rain (or more) can physically wash many of these pests off plants, ending what may seem to be a run-away pest problem; however, one cannot count on rain---or a generous amount of it---when it is most needed. 'Plan B'---selecting some miticide options---will test your SKILLS AT READING DETAILED PESTICIDE LABELS. Be prepared to take notes comparing products for their active ingredients, modes of action (resistance management), and advisories based on temperature, potential for drift, phytotoxicity, re-entry intervals, personal protective equipment, re-entry intervals, pre-harvest intervals, maximum numbers of treatments per season and maximum amounts of active ingredient applied per season. Most labels will advise thorough coverage of foliage, a necessity due to the small sizes of the pests, silk production and their habits of colonizing the undersides of leaves, plus cracks and crevices in buds and around bolls. Generally, the use of pyrethrins, pyrethroids or organophosphates is not recommended for spider mites. While short-term mite control may occur with these products, there can be a rapid RESURGENCE of the pests that can quickly exceed pre-treatment levels of spider mites.

ORGANIC COTTON PRODUCERS must first exhaust their preventative, mechanical, physical and other pest management practices [section 205.206(e) of the National Organic Program] for spider mites or other pests on cotton before seeking approval from their Certifying Agent to use insecticides approved by the Organic Materials Review Institute. In New Mexico, these same products will be registered through the U.S. Environmental Protection Agency and New Mexico Department of Agriculture. Releasing predatory mites in the field is a possibility, but this practice can be expensive and may not be compatible with pesticide treatments if they are necessary later in the season. Sprays of certain insecticidal soaps (e.g. M-Pede), azadirachtin (e.g. Aza-Direct), and narrow-range oils (e.g. Saf-T-Side) are

potential treatments; Naturalis L (*Beauveria bassiana*) and Entrust (spinosad) are also labeled for mites on cotton. Note the temperature limitations, potential phytotoxicity and safety warnings on Kumulus (sulfur). Confirm the acceptability of all miticide products and treatments with your Organic Certifying Agent before making applications.

FOR COTTON PRODUCERS USING CONVENTIONAL MITICIDES, READ LABELS FOR CANDIDATE MITICIDES CAREFULLY AND COMPLETELY as noted above. Strongly consider rotation of miticides as part of a RESISTANCE MANAGEMENT program for these pests. Spider mites in your area may be resistant to some products, and continued or frequent use of these active ingredients or others with the SAME MODE OF ACTION will only make your problems and losses worse. Pesticide resistance is an INHERITED characteristic of a pest population. Once you have a population with demonstrated resistance to a particular pesticide or group of pesticides, it is not likely to revert back to a susceptible status anytime soon. In California, cotton growers are urged to use a particular miticide (i.e. active ingredient) only once per season, and, if a second application is needed, switch to a different miticide (i.e. active ingredient). The following year, switch again to still another AI---if mite control is necessary---all again in the interests of reducing resistance to any one AI and slowing the development of miticide resistance in places where it is not yet a problem.

Currently, almost 200 insecticide/miticide products are labeled for ‘mites’ on ‘cotton’ in New Mexico. Early season use of pyrethroids (MoA = 3A) for various insect pests can aggravate spider mite populations since they may destroy important natural enemies. Most miticides, like many active ingredients or products listed below, are specific for mites and should not affect insect pests. The following notes, based on selected active ingredients rather than particular products, may be helpful.

Active Ingredient	Example(s)*	Mode of Action Group**	General/Restricted Use; Signal Word	General Notes
Abamectin	Nufarm Abamectin 0.15EC	6	R-Warning	Maximum of 16oz/A/application. Maximum of 2 applications/season, 21 days apart. Maximum of 32oz/A/season. PHI = 20 days. No grazing or feeding cotton field trash to livestock.
Etoxazole	Zeal	10C	G-Caution	Maximum 1 application/season. Maximum 1oz/A/season. PHI = 28 days.
Spiromesifen	Oberon	23	G-Caution	Best used in late season. PHI 30 days. Maximum applications/crop season = 3. Apply by ground or air. Also controls whitefly.
Fenproximate	Fujimite	21	G-Warning	Best used early to mid-season, before populations build. Maximum of 2pt/A/season. Maximum 2 applications/season. Do not apply through irrigation systems. Whiteflies on label.
Bifenazate	Acramite 4SC	25-Unknown	G-Caution	Maximum of 1 application/year. No chemigation. PHI = 60 days. Plant-back for rotational crops = 30 days.
Hexythiazox	Onager 4.5SC	10A	G-Caution	Apply before bolls open & before mites build up. Maximum of 1 application/year.

				Maximum of 20oz of formulated product/A/year
Propargite	Comite	12C	R-Danger	Apply before bolls open. Possible phytotoxicity to cotton <10" tall. No feeding of field trash to livestock. PHI = 50 days. Maximum of 64 fl.oz./A/year; maximum of 2 applications/year with 21-day interval between applications. Between REI and PHI, workers entering treated fields must wear long pants, long sleeves and gloves.
Aldicarb	Temik 15G Lock 'n Load	1A	R-Danger	Apply at planting. Do not graze or feed field trash to livestock. Maximum of 1 application at plant & 1 post-emergence application/crop.
Phorate	Thimet 20G Lock 'n Load	1B	R-Danger	Apply at planting; one application/season. Do not graze or feed field trash to livestock.
Sulfur	Sulfur 6L; Kumulus DF	Unknown; mineral	G-Caution	Use possible if temperatures are less than 90F. Note label advisories on phytotoxicity to cotton & other sensitive crops. Do not allow drift into susceptible crops.

*Mention of a trade name is for example purposes only and does not indicate product endorsement by NMSU-Cooperative Extension Service. Pesticide labels do change; READ ALL PESTICIDE LABELS CAREFULLY.

**Mode of Action Group numbers are assigned by the Insecticide Resistance Action Committee (IRAC). Each group relates to a specific biochemical pathway by which an active ingredient kills or suppresses a target pest; resistant pests can disable or otherwise by-pass this biochemical pathway. For additional information, see their Web Site at <http://www.iraac-online.org/>. For resistance management, rotate chemicals with a different mode of action group number; do not use products with the same group number more than twice/season to delay or help prevent development of resistance. Monitor pest populations regularly and throughout the production season.



Spider mites eggs skins



Spider mites on webbing



Carmine mite