

# Post-Harvest Control of Two-Spotted Spider Mites in Cherry

[Nikki Rothwell](#), District Fruit IPM Educator  
John Wise, Trevor Nichols Research Complex  
Dave Epstein, MSU IPM Program

Two-spotted spider mites (TSSM) can be a complex problem on cherry in hot, dry years. Cherry growers are often faced with the crucial decision of applying a miticide before or after harvest. If growers intend to spray for mites before cherry harvest, the pre-harvest intervals (PHI's) of most miticides are 14 days or longer, which is an important factor in the decision making process. Another confounding factor of pre-harvest mite control is that often the mite count is low early in the season, and the numbers may not warrant a miticide at that time. Because of these issues, many cherry growers apply a miticide after harvest when the mite numbers are higher and when PHI's are no longer a concern.

**Life Cycle.** Two-spotted spider mites are pests of many plants, but in Michigan, they attack commercial fruit crops such as apple, cherry, peach, pear, nectarine, plum, and apricot. Orange colored adult females and some immature mites overwinter under bark scales on the trunks of the trees or in protected areas on the ground. In spring, the mites move down from the tree and begin to feed on weeds and grasses. The first eggs are laid on the groundcover vegetation around the time of cherry bloom. Under warm conditions, the eggs hatch in five to eight days. One mite generation is completed in approximately three weeks. Depending on summer conditions, mites can complete five to nine generations each season.

Under typical droughty summer conditions, the groundcover vegetation becomes a poor food source for the mites, and they move up into the cherry trees in mid- to late-summer. In a hot, dry year such as this one, the mites move up into the tree sooner than in a year under normal moisture conditions. Older, inner spur leaves are often first infested as the females move to those locations first. However, with warm dry weather, mite populations can increase dramatically in a short time, and the mites will move off these older leaves to all parts of the tree canopy.

**Identification.** Although TSSM are very small, they can be seen with a 10X hand lens. Females are larger than males, and they reach 0.42mm in length when they are full grown. Adult female TSSM range in color from light yellow to brown to green with two distinct black spots; irregular dark splotches may appear after feeding. Male TSSM are more variable in color than females, and they have a distinctly pointed abdomen. When comparing TSSM to European red mite (ERM), ERM tends to be rounded and not quite as long as TSSM. TSSM also have fewer "bristles" than ERM and obvious black spots. ERM are often red, but color differences are not always as dramatic as both species can have greenish colored stages. TSSM infestations are often accompanied by silk webbing on the leaf surface.

**Damage and Injury.** Bronzing of leaves is a visual sign of damage caused by high populations of TSSM; this phenomenon can cause a reduction in photosynthesis and fruit bud initiation. Leaf bronzing caused by TSSM is often more gray in color than bronzing by ERM. Although bronzing presents an obvious challenge, one of the biggest threats of mites in cherry in a hot, dry year is 'firing.' Firing results directly from increased temperatures and droughty conditions, most often in combination with high mite populations. Firing results in a collapse of a portion of the tree; this malformed segment can be a branch, a terminal, or a whole section of the tree. The leaves of a fired part of a tree turn brown very quickly, with no prior wilting, and the overall effect is similar to fireblight in apple. Although firing

may occur with low mite populations, it is found most commonly where mite numbers are high. At one time, firing was reported only to occur with plum nursery mite infestations, but more recent observations suggest TSSM play the major role in firing.

**Monitoring and Thresholds.** Scouting for mites can begin as early as mid-May and continue through August. In orchards with high mite populations the previous summer, an early start to mite monitoring can alert growers to population increases requiring pre-harvest treatment with enough time to avoid conflicts with a miticide's PHI. In a droughty year, a good practice is to begin monitoring earlier than usual. One method of monitoring TSSM motile populations consists of sampling 25 leaves at each of 3-5 sites within a block, using 50% spur leaves and 50% shoot leaves.

Treatment for TSSM should be based on the following thresholds (double the treatment thresholds for TSSM in tart cherry):

- 2-3 mites/leaf from mid-May to mid-June
- 5-7 mites/leaf from mid-June through July
- 10-15 mites/leaf in August

Presence of predaceous mites (>1/leaf) may justify delaying a treatment and repeating the cycle the following week.

**Biological control.** Conservation of predator mites in a cherry system is critical to control plant parasitic TSSM. The three predaceous mites commonly found in Michigan are *Amblyseius fallacis* (Phytoseiidae), *Agistemus fleschneri* (Stigmaeidae), and *Zetzellia mali* (Stigmaeidae). Predaceous mites are even smaller than TSSM, but these predators can be detected with a hand lens. Predaceous mites also move very quickly across the leaf surface. All three mite predators are sensitive to the lethal toxicity of carbamate and pyrethroid insecticides. These chemistries should be avoided if an orchard has an elevated TSSM population. Phytoseiid mites (*A. fallacis*) respond more quickly (reproductively) to increasing populations of TSSM, but stigmaeid mites (*Z. mali*) can survive and are more effective predators at lower TSSM population densities. Herbicide sprays also affect the number of predator mites within a cherry orchard. Clean, weed-free areas under the trees in fall and early spring eliminate optimal overwintering habitat for predaceous mites, and when predator mites are not present early in the season, TSSM populations can grow unchecked if conditions are favorable.

**Chemical control.** Two-spotted spider mite infestations may be controlled with a post-harvest miticide. When using chemical control, good coverage of all tree surfaces is critical. Some miticides are active on eggs (ovicides) and should be applied before egg-hatch; Apollo and Savey are miticides with ovicidal properties. Savey also works on mite larvae. An early application of superior oil does not work well for TSSM as it does with ERM populations because first generation TSSM eggs are laid in the ground vegetation rather than in the tree. Other miticides are only active on motiles (adulticides) and should be applied after populations start to build: Nexter, Omite-CR (post-harvest only), and Vendex. Field evidence suggests Nexter is not as effective on TSSM as it is on ERM. Envidor is newly registered for mite control in cherries and is active by contact to all life stages. The active ingredient, spirodiclofen, controls mites by inhibiting lipid synthesis, and is active by contact to all life stages. Envidor has a novel mode of action and is not known to have risk of cross-resistance with other currently registered miticides. Envidor 2SC has a rate range of 16 - 18 fluid oz per acre, 7-day pre-harvest interval for pome and stone fruits (14 days in grapes) and is restricted to one application per acre per season for all labeled fruit crops. With so many control materials from which to choose, and because of concerns with the development of mite resistance to miticides, no miticide should be applied more than once per year (the one exception is superior oil). We are currently testing the effectiveness of a summer oil for control of TSSM in tart cherries; however, at this time, the

repercussions of oil use are not yet known. Please see the table below for more information on miticides.

Compound Trade Name	Life-stage Activity	Mite Species Controlled**	Residual Activity
Savey	egg/larvae	TSSM, ERM	8-12 weeks
Apollo	egg	TSSM, ERM	8-12 weeks
Nexter	motiles*	TSSM, ERM, PNM	6-8 weeks
Omite-CR	motiles*	TSSM, ERM	6-8 weeks
Vendex	motiles*	TSSM, ERM	6-8 weeks
Envidor	eggs, larvae, adults	TSSM, ERM, PNM	8-12 weeks

\* Motile forms include mite larvae, nymph and adult stages.

\*\* TSSM - two spotted spider mite, ERM - European red mite, PNM - plum nursery mite.

**Please send any comments or suggestions regarding this site to:**

Bill Klein, [kleinw@msu.edu](mailto:kleinw@msu.edu)

Last Revised: 7-26-05