Management Recommendations for the Lychee Erinose Mite (LEM)

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The purpose of this document is to provide lychee growers with management recommendations for the Lychee Erinose Mite (LEM), *Aceria litchii*. This mite was found infesting lychee trees in Lee County in February 2018 and has now been found in several other Florida counties, including Miami-Dade.

Please notify FDACS-Division of Plant Industry at 1-888-397-1517 and Jeff Wasielewski, Commercial Tropical Fruit Crops Agent, UF-IFAS-Miami-Dade County Extension at 305-248-3311 x 227 if you suspect your trees are infested with LEM.

Disclaimer: None of the acaricides labeled for lychee have been field tested against LEM. In the absence of data, the following strategies are our best recommendations based on literature reports regarding LEM management in other countries and U.S. states where this mite is present.

Damage due to LEM infestations

LEM infestations are generally not lethal to mature trees. However, LEM infestations may result in an 80% reduction in fruit production. We do not know what effect a LEM infestation has on the leaf canopy. Most likely, it causes some reduction in photosynthetic capacity and shortens the life-span of the leaves – thus stressing the tree.

Scouting for LEM

Frequent and regular monitoring of trees should be conducted to detect LEM infestations. LEM infests immature leaves and forms small blisters (Figure 1) with silver-white colored hairs, also
known as "erinea". As LEM populations grow, a reddish-brown hairy mass develops on the underside of the leaf, which may cause leaves to become distorted or curled (Figure 2). Erinea may also develop on other plant parts as the LEM population grows. The mites migrate to new shoots (flush) and feed upon petioles, leaves, stems, panicles, flower buds, and fruit (Figures 3 and 4). Monitoring for the presence of LEM requires regular inspections of the foliage to detect symptoms, especially around the time when trees are expected to flush or are actively flushing. If LEM is detected, management of this mite relies on coordinated pruning of infested plant parts followed by timed applications of acaricides to protect the new flush. Frequent scouting for LEM should continue after management tactics are implemented to gauge the effectiveness of the control measures and detect new infestations. Anytime your trees flush (vegetative or reproductive) trees are at risk of infestation.

Cultural practices

Pruning is the most important cultural practice against the LEM infestation. However, the timing and intensity of the pruning have not been investigated and may be critical for effective LEM suppression. LEM primarily attacks new leaf growth and severe pruning, especially when done before a major growth flush, may stimulate vigorous new vegetative growth and aggravate the spread of LEM. We recommend different pruning practices depending on the distribution of the mite infestation.

If the infestation is localized and restricted to a few trees within the grove we recommend selective pruning of only infested plant parts. If the infestation is widely or randomly distributed throughout the grove we recommend hedging and topping the trees back 2-3 feet from the perimeter of the canopy to remove the youngest growth. Sanitation pruning can be conducted during the post-harvest period (i.e., usually after June) before the trees become "dormant" during fall and winter. Prune to remove all the infested plant parts including foliage, young stems and or/ branches and do not move infested material off the property. If permitted bury or burn this material (call the local Florida Forest Service Office for permission to burn at 954-453-2800; https://www.fdacs.gov/Divisions-Offices/Florida-Forest-Service/Wildland-Fire/Burn-Authorizations) – it is important to call for a burn permit and follow the regulations prior to burning.

All tools (e.g., clippers, loppers, hand saws, and chain saws) and equipment (e.g., hedgers, toppers) used for pruning infested trees should be washed with a 10% bleach solution (nine-parts water to one-part bleach) before being used on other trees. Since bleach is corrosive to metal, rinse with water after bleach treatment. After pruning and/or handling infested plant material, all clothing and gloves worn during the pruning and disposal operation should be changed and washed because of the potential to move the mite to non-infested sections of the canopy and/or to additional non-infested trees.

Treatments to protect new flush

After removing and destroying infested branches, sulfur should be applied to protect the new leaf flush as it emerges and develops (grows). LEM attacks primarily new leaf growth but also appear to hide on the bark and therefore sulfur applications should aim for complete coverage of the foliage, branches and the main trunk. One application should be made after removing the infested plant parts. However, trees are more susceptible to LEM when they are about to
flush and while new flushes emerge and expand (develop). Once the new growth is fully expanded and mature it is less susceptible to LEM. This critical growth period can last approximately 90 days and application of sulfur should be made biweekly.

**Sulfur:**

The Florida Department of Agriculture has made available a Special Local Needs (SLN) label for the use of MICROTHIOL DISPERSS® in lychee. This is the only sulfur product approved for use on lychee at this time. MICROTHIOL DISPERSS® is also approved for use in organic production (OMRI approved). Use this product only in accordance with its label. The the SLN label for MICROTHIOL DISPERSS® can be found at [https://www.fdacs.gov/Agriculture-Industry/Pests-and-Diseases/Plant-Pests-and-Diseases/Lychee-Erinose-Mite](https://www.fdacs.gov/Agriculture-Industry/Pests-and-Diseases/Plant-Pests-and-Diseases/Lychee-Erinose-Mite). Sulfur should be applied to all the parts of the tree, including the trunk. The first sulfur application with MICROTHIOL DISPERSS® (at 20 lbs per 100 gallons of water) should be made at the time of pruning. Thereafter, applications must be repeated every 15 days from bud break until all leaves harden (approximately three-months and 8 applications in total) using the same rate. Retreatment at less than 15 days interval may be necessary if substantial rainfall occurs.

**Warning:** Sulfur products are not compatible with oil sprays. Do not use sulfur with oil or within 30 days of an oil spray treatment.

**Warning:** During periods of high temperatures sulfur may burn foliage and fruit. Use caution when making Sulfur applications at temperatures over 90°F, especially when temperature is predicted to be above 90°F for three consecutive days following a planned spray application. On days suitable for application, we recommend application in the late afternoon when temperatures usually drop.

Notice: FDACS is providing the SLN label for MICROTHIOL DISPERSS® to all commercial and urban lychee producers for use in eradicating the lychee erinose mite on affected lychee trees:
- Users of the label are not required to apply to FDACS for using Microthiol Disperss®.
- Lychee producers should follow the directions for use on the label.
- Commercial growers should maintain spray records and spray logs when applying the Microthiol Disperse® as required by their pesticide applicators license.

**Recommendation for Sulfur applications to protect new flush from LEM**

1. For all commercial growers:
   - a) Obtain permission to burn plant material debris.
   - b) Prune LEM infested trees to remove all infested plant parts.
   - c) Burn all stems and leaves on-site (i.e., do not move this material to a new area).
   - d) Apply MICROTHIOL DISPERSS® after removal of infested plant parts.
   - e) Apply MICROTHIOL DISPERSS® starting at bud break at a 15-day interval to protect the new flush until leaves are hardened off. This period may take
up to approximately 90 days and eight applications to protect new leaves from LEM attack.

Alternative acaricide treatments

The following two acaricides are suboptimal alternatives for LEM control when application of sulfur is not possible. Note: The use of these acaricides is generally incompatible with the use of sulfur.

Abamectin:

Recent tests by UF-IFAS in Florida showed that abamectin does not control LEM inside the erinea (i.e., reddish-brown felt-like covering found on the underside of infested leaves) and only partially protects the new flush from new infestations. Agri-Mek® is the only formulation of abamectin registered for lychee. The residual activity of Agri-Mek® is increased when combined with horticultural oil or a surfactant because these products assist with penetration and protect the active ingredient from photodegradation. Agri-Mek® is toxic to honeybees and should not be sprayed on flowering trees or near active bees. Agri-Mek® is a restricted use pesticide (you must have your pesticide license to use this material) and has a restriction of a maximum of two applications per year on lychee trees. Agri-Mek® could be used as an alternative to sulfur when temperatures are too high for sulfur applications and LEM infestations require control. However, Agr-Mek® plus horticultural oils may cause plant/fruit damage when used under high temperatures and/or dry conditions and potentially before or after a sulfur application. Therefore, mix the Agri-Mek® with a non-phytotoxic, non-ionic adjuvant wetting or spreading agent. Do not use oil or organosilicon (penetrating) type adjuvants.

Warning: Do not use Abamectin combined with a horticultural oil or a surfactant within 30 days of a sulfur spray treatment.

Azadirachtin:

Among the organic acaricides, azadirachtin, which is extracted from neem oil, provides suboptimal control of this mite. Azadirachtin is labeled for use on lychee and can be used as an alternative acaricide while labels for other acaricides are explored. Brand names include Aza-Direct®, AzaGuard™, Azatrol EC®, and Trilogy®. Azadirachtin could be used as an alternative to sulfur when temperatures are too high for sulfur applications and LEM infestations require control.

Warning: Oil based formulations of Azadiractin products are incompatible with Sulfur. Do not use Azadiractin within 30 days of a sulfur spray treatment.
Movement of the pest

LEM can be moved or disseminated by the movement of infested plants, especially when plants are propagated as air-layers from infested parent trees. The mite can also be moved by touching the symptomatic leaves transferring live mites to additional leaves and trees. Please do not move LEM by moving infested plant material to new locations. This mite may also be moved on clothing and equipment. After working with infested trees, clothes should be changed/washed and equipment should be sanitized before working with non-infested trees. See cultural practices section for instructions on how to sanitize tools and equipment.
Figure 1. LEM infests immature Lychee leaves and forms small blisters.

Figure 2. The erineum is a reddish-brown hairy mass that, in some instances, can cover the entire underside of the leaf, which may become distorted or curled.
Figure 3. LEM also feeds upon petioles, stems, panicles and flower buds. Photo credit: Leticia Azevedo, Brazil).

Figure 4. LEM also feeds upon fruit. Consequently, erinea may also develop on fruit. Photo credit: Leticia Azevedo, Brazil).