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Commercial Grower Control Recommendations for the Lychee Erinose Mite (LEM)

Daniel Carrillo, Entomologist – Tropical Fruit Crops, UF/IFAS TREC, Jonathan H. Crane, Tropical Fruit Crop Specialist; Jeff Wasielewski, Tropical Fruit Crops Extension Agent, UF/IFAS Extension Miami-Dade County

The invasive Lychee Erinose Mite (LEM), *Aceria litchii* has the potential to debilitate lychee trees and decrease lychee yields by 80%. It was recently detected in Lee County infesting lychee trees. However, it may be in other counties as well; this is under investigation. The purpose of this document is to provide lychee and longan growers with control recommendations for the Lychee Erinose Mite (LEM), *Aceria litchii*. If you spot lychee trees with symptoms of the erinose mite infestation, please notify FDACS – DPI at 1-888-397-1517 or DPIHelpline@FreshFromFlorida.com immediately.

Scouting for this pest

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. As LEM populations grow, a reddish-brown hairy mass develops on the underside of the leaves may become distorted or curled (Figure 2). This damage, called “erineum” (velvety hairs), may also develop on other plant parts as the LEM population grows. The mites migrate to new shoots and feed upon petioles, 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 that the trees are expected to flush and when actively flushing.

Removal of infested branches

Pruning is the most important cultural practice against the LEM and the most efficient way to remove infestations. Prior to pruning, applications of whitewash (50:50 mix of white latex paint:

water) should be made to all limbs and trunks from the height at which trees will be cut to the ground. This will protect them from sunburn when exposed to full sun.



Fig. 1. Trunk and major limbs whitewashed to height of pruning.

For eradication purposes, mature trees infested with LEM should be severely pruned back (hatracked) or stumped to remove all the foliage. When pruning trees be sure to make clean cuts. This may be done by making an under-cut partway through the underside of a limb, then an over-cut on the top of the limb, which will allow the limb to be cut off without tearing of the bark (Fig. 2).



Fig. 2. Three-cut limb removal method steps: undercut, overcut, limb-fall, stump removal and final.

All removed branches should be burned on site. Burn permits may be required, prior to conducting any burns, please contact your local Florida Forest Service office. Miami-Dade growers please call 305-257-0875 or 954-475-4120 to obtain a burn permit.

Regular management during the non-fruiting period and particularly during the post-harvest period, includes cutting and burning all infested branches. Young lychee trees and severely cut-back mature trees are more susceptible to LEM infestations because of their frequent shoot and leaf flushing. Mature trees typically flush in response to harvesting when the fruit clusters are cut from terminal of stems. All infested flushes should be removed and burned. New flushes should be protected with approved acaricides (miticides) as described below.

All tools 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.

Acaricide treatments to protect new flush

LEM primarily attack new leaf growth. After pruning, removing and destroying infested branches, acaricides should be used to protect new leaf flushes as they emerge and develop

(grow). Sprays applied at times other than flushing provide poor control because of the protection provided to the mites by the erineum (velvety hairs).

Timed applications of acaricides targeted to protect the new leaf flush have proven effective for controlling LEM. The critical time for treatment is after removing the infested branches when the pruned trees are about to flush; this includes after harvesting fruit. The first spray should be applied to infested trees and neighboring trees as the new flush begins to emerge. Additional sprays should be applied when the new flushes have fully emerged and just before the leaves start to expand. The last spray should be applied after the new leaves have fully expanded but have not hardened. Additional sprays may be warranted depending upon shoot and leaf growth rates.

Recommendation sequence for control of LEM infested trees:

1. For all commercial growers.
 - a. Obtain permission to burn plant material debris.
 - b. Prune LEM infested trees to remove all foliage.
 - c. Burn all stems and leaves on-site (i.e., do not move this material to a new area).
2. For conventional growers (i.e., non-organic):
 - a. When trees begin to flush, (i.e., new shoots and leaves emerge) apply Agri-Mek mixed with horticultural oil to affected trees and adjacent trees.
 - b. When new flush has fully emerged but before leaves expand, apply azadirachtin at a 7-day interval (this may be 2-3 additional sprays).
 - c. When the new leaves have fully expanded but **not hardened** off apply Agri-Mek mixed with horticultural oil.
3. For commercial organic growers:
 - a. When trees begin to flush, (i.e., new shoots and leaves emerge) apply azadirachtin mixed with horticultural oil to affected trees and adjacent trees.
 - b. Continue to apply azadirachtin mixed with horticultural oil as leaves expand, at a 7-day interval (this may be 2-3 additional sprays).
 - c. Continue azadirachtin mixed with horticultural oil applications when the new leaves have fully expanded but not hardened off.

Among the acaricides registered for use in lychee in Florida, the only conventional pesticide (i.e., non-organic) registered acaricide proven to work against LEM in other parts of the world is Agri-Mek (abamectin). Agri-Mek is the only formulation of abamectin registered for lychee. The residual activity of Agri-Mek is increased when combined with horticultural oil (Table 1) or a surfactant because these products assist with translaminar movement and protect the active ingredient from photodegradation. Agri-Mek is toxic to honey bees and should not be sprayed onto flowering trees. Agri-Mek is a restricted use pesticide (you must have your pesticide license to use this material) and has a restriction of a maximum two applications per year on lychee. Caution: crop oils may cause plant/fruit damage when used under high temperatures and/or dry conditions. DO NOT apply any sulfur products within two weeks before or after an oil spray.

Of the other insecticides known to have activity against LEM, 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 additional insecticide are being explored. Azadirachtin brand names include Aza-Direct, AzaGuard, Azatrol EC, and Trilogy (Table 1). Although wettable sulfur has also proven efficacious against this mite, it is not registered for use on lychee at this time.

Since only two Agri-Mek applications are allowed per year per acre any additional tree flushing will need to be protected by use of a sequence of azadirachtin plus horticultural oil applications only.

Table 1. Horticultural (refined) oils and brand names of azadirachtin.

Examples of oils (there may be others)	Azadirachtin brand names
Brandt – Ecotec Plus*	Aza-Direct*
Brandt – Sidekick*	AzaGuard*
Captiva*	Azatrol EC*
Captiva Prime*	Molt-X
Clarion	Trilogy*
CMR Organic Oil	Neemix*
Dyne-Amic	Ecozin Plus 1.2ME*
SuffOil-X*	Azera*
TriTek*	
* approved for organic production	

Trees currently with fruit: Infested harvested fruit (and leaves/stems) can move the LEM to new lychee trees, locations and regions of the State. Ideally, all fruit, leaves, and stems of infested trees should be removed and burned immediately. FDACS-DPI is conducting on-going surveys of groves and nurseries and has not made any determination and recommendation on the movement of fruit from infested groves.

Movement of the pest

LEM can be moved or disseminated by the movement of infested plants (i.e., leaves, stems, and fruit), especially when plants are propagated as air layers from infested parent trees. The mite may also be moved by touching the symptomatic leaves transferring live mites to additional leaves and trees. Please do not move these mites by moving infested plant material to new locations. Remember to burn infested plant material on site.



Figure 1. LEM infests immature lychee leaves and forms small blisters.



Figure 2. The erinea 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.