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Management Recommendations for the Lychee Erinose Mite (LEM)

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The purpose of this document is to provide commercial 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 at least 11 other Florida counties, including Miami-Dade.

Disclaimer: None of the acaricides labeled for lychee have been field-tested against LEM in Florida. The following strategies are our best recommendations based on literature reports and preliminary testing 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. LEM infests immature leaves and initially forms small blisters (Figure 1) with silver-white colored hairs, also known as “erinea”. As LEM populations grow, the erinea becomes reddish-brown and leaves become distorted or curled (Figure 1). Erinea may also develop on petioles, leaves, stems, panicles, flower buds, and fruit (Figures 2). LEM infestation may result in an 80% reduction in fruit production.

Figure 1. LEM infests immature lychee leaves and initially forms small blisters with silver-white colored hairs, also known as “erinea”. The erineum is a reddish-brown hairy mass that, in some instances, can cover entire leaves, which may become distorted or curled. Erinea can also develop on stems. Photos from trees on Pine Island, Lee County, FL, Feb. 2018.



Figure 2. LEM also feeds upon petioles, stems, panicles, flower buds, and fruit. Consequently, erinea may also develop on fruit. Photos from trees in South Miami, Miami-Dade County, FL, Feb-April 2021.



Scouting for LEM

Frequent and regular monitoring of trees should be conducted to detect LEM infestations. Any shoots with emerging stems and leaves and/or panicles are especially susceptible to LEM. Monitoring for the presence of LEM requires regular and careful inspections of the foliage to detect symptoms, especially around the time when trees are expected to flush or are actively flushing or when panicles emerging.

Typically, new shoot growth is initiated:

1. In response to clipping the shoots to remove fruit.

2. In response to pruning (by hand or mechanically).
3. In response to over fertilization, especially with nitrogen containing fertilizers.
4. In response to rainfall and/or irrigation during warm weather conditions.
5. In response to cool winter/early spring temperatures preceding moderately warm temperatures. These weather conditions may trigger panicle emergence. Sometimes emerging panicles have new leaves and flowers.

Anytime your trees flush (vegetative or reproductive), they are at risk of LEM infestation.

Pruning

Pruning is the most important cultural practice against LEM. Pruning must be followed by sulfur applications to protect the new flush (see below). **Pruning without supplementary sulfur applications may aggravate LEM's spread.** We recommend different pruning practices depending on the distribution of the mite infestation.

When large sections of the tree canopy are removed and exposed to full-sun paint the major branches and trunk with a 50% white latex paint: 50% water mix prior to or immediately after pruning. This will prevent damage to the living tissue (cambium) under the bark and allow the tree to regrow new shoots and leaves.

Localized/limited infestation

If the infestation is localized and restricted to a few trees within the grove, we recommend **selective pruning of only infested plant parts** (i.e., those shoots with leaves and stems showing “erinea” symptoms).

Widespread infestation

If the infestation is widely distributed (scattered) throughout the grove, we recommend hedging and topping the trees back 2-4 feet from the perimeter of the canopy to remove the youngest growth.

Disposal options: do not move infested material off the property.

1. 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/Forest-Wildfire/Wildland-Fire/Burn-Authorizations> – it is important to call for a burn permit and follow the regulations prior to burning).
2. Chipping all pruned infested plant parts immediately.
3. If neither disposal option is available, double bag the infested material and expose the bags to sunlight for a minimum of three days, which will solarize (overheat) the bagged material, killing the mites.

Tool and clothing sanitation

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.

Care for trees after pruning

Watering – irrigation

1. If only a few selected shoots are removed maintain normal watering regime. If 20% or more of the canopy is removed, reduce irrigation accordingly (i.e., reduce the amount by 20%) until the new growth is about halfway developed.

Fertilizer – nutrients

1. If only a few selected shoots are removed maintain normal fertilizer rates. If 20% or more of the canopy is removed, reduce the fertilizer rate accordingly until the new growth is about halfway grown.

A word on nitrogen. Lychee trees are highly stimulated to grow in response to nitrogen fertilization. In fact, application of too much nitrogen may lead to repeated cycles of new flush (shoots and leaves) which is undesirable. Every new flush would need to be protected from LEM. Therefore, applications of minor element (manganese, zinc, and iron) and secondary element (magnesium) and potassium fertilization should be emphasized.

Sulfur application to protect new flush

After removing and destroying all infested plant parts, sulfur should be applied to the trees to protect the new leaf flush as it emerges and develops (grows). The Florida Department of Agriculture and Consumer Services, Division of Plant Industry (FDACS-DPI) has made available a Special Local Needs (SLN) label for the use of MICROTHIOL DISPERSS® in lychee (see attachment document below). 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 SLN label for MICROTHIOL DISPERSS® is at the bottom of this document. 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. See table below for additional sulfur rates and water volumes for treating trees. Thereafter, applications must be repeated every 7-15 days from bud break until all leaves harden (up to three-months and 8 applications in total) using the same rate. Retreatment at less than a 15 day interval may be necessary if substantial rainfall occurs. Sulfur treatments during panicle emergence and flowering are critical as the mites appear more active at this stage. However, we recommend avoiding treatments during periods of high honeybee visitation to prevent adverse effects on this important pollinator.

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 the temperature is predicted to be above 90°F for three consecutive days following a

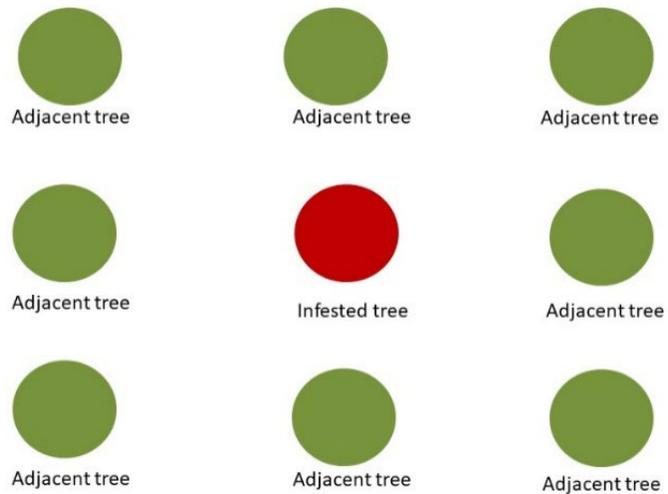
planned spray application. On days suitable for an application, we recommend application in the late afternoon when temperatures usually drop.

Notice: FDACS-DPI is providing the SLN label for MICROTHIOL DISPERSS® to all commercial and urban lychee producers for use in managing the LEM 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. The label is the law.
- Commercial growers should maintain spray records and spray logs when applying Microthiol Disperss® as required by their pesticide applicators license.

If the infestation is localized (i.e., a few branches on a tree are infested) and restricted to a few trees within the grove, we recommend repeatedly treating the entire affected tree and the adjacent trees with sulfur (Figure 3). However, if the LEM infestation is affecting scattered trees throughout the grove, then sulfur should be repeatedly applied to all trees.

Figure 3. Sulfur treatments targeting localized infestations. Sulfur should be applied to the affected tree and adjacent trees.



Rates and volumes of MICROTHIOL DISPERSS® are based on number of trees and tree size and the equipment used. In general, a greater volume of water and sulfur is needed if applying by a handgun and less if using an air-blast sprayer. Remember, good coverage of the leaves is the key to preventing LEM infestations. The amount of mix (sulfur plus water) needed will depend upon the size of the tree’s canopy and how many trees need treating.

Based on applying 20 lbs MICROTHIOL DISPERSS® in 100 gallons, consider:

- Small trees (≤5ft tall) could do ~200 trees or more.
- Medium-sized trees (6-10 ft tall) ~100 trees or more.
- Large-sized trees (11-18 ft tall) ~65 trees or less.
- Very large trees (>18 ft tall) ~50 trees or less.

Treating a small number of trees, consider:

- To treat 1 medium-sized tree, mix 3 oz sulfur in 1 gallon of water.
- To treat 1 large-sized tree, mix 5 oz sulfur in 1.5 to 2 gallons of water.
- To treat 1 very large tree, mix 6-7 oz sulfur in 2 or more gallons of water.

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 and then contacting/touching additional leaves and/or 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 pruning section above for instructions on how to sanitize tools and equipment.

Preventing a LEM infestation

There is no guarantee that LEM will not infest a grove that proactively applies sulfur when trees are about to and during a new vegetative flush (i.e., applications from the emergence of the new shoots and leaves through full maturity of the shoot and leaves). However, anecdotal evidence suggests this may reduce the chances of a LEM infestation, especially if LEM has been detected nearby.

(OD/ext/handouts/2022/UF-IFAS LEM commercial recommendations 11 2 2022.docx)

FIFRA Section 24(c) Special Local Need Label
FOR DISTRIBUTION AND USE ONLY WITHIN THE STATE OF FLORIDA

MICROTHIOL DISPERSS



06-17-20

EPA REG. 70506-187
EPA SLN NO. : FL-200003

For use for the control of exotic lychee erinose mite (Aceria litchi) infestations on lychee (Litchi chinensis). Growers may use to prevent lychee erinose mite infestations under the guidance of FDACS officials.

For Eradication & Control of Lychee Erinose Mites in Lychee Trees

ACTIVE INGREDIENT:

Sulfur 80.0%

OTHER INGREDIENTS: 20.0%

TOTAL: 100.0%

**KEEP OUT OF REACH OF CHILDREN
CAUTION**

ENVIRONMENTAL HAZARDS

DO NOT apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high-water mark. **DO NOT** contaminate water when disposing of rinsate or equipment washwaters. **DO NOT** apply when weather conditions favor drift from treated areas.

Notice: Read this entire label before using. Use only according to label directions

DIRECTIONS FOR USE

- It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Persons using this product must comply with all applicable direction, restrictions and precautions found on this labeling and that of the label of the federally registered product upon which this amendment is based.
- This Special Local Need (SLN) label and the federal label for this product must be in the possession of the user at the time of pesticide application.
- Follow all applicable directions, restrictions, Worker Protection Standard requirements, and precautions on the Microthiol Disperss® package label, EPA Reg. No. 70506-187, and this SLN label.
- **DO NOT** apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your state or tribe, consult the agency responsible for pesticide regulation.

General Instructions

To ensure that the public, program applicators and personnel as well as the environment and non-target species are protected from adverse impacts associated with the use of these products, observe the following conditions.

Notification of the Public

Prior to initiating an eradication program, FDACS/DPI is responsible for ensuring that the public is provided adequate notice about a planned treatment program. Residents whose property will be treated will be notified in writing 24 hours prior to treatment. Treatment may begin immediately in situations where residents grant permission to do so.

Spray Coverage

Foliage must be thoroughly covered with spray. The spray should be directed to the underside of leaves where most lychee erinose mite infestations begin. Dense leaf canopies can prevent adequate spray coverage. Due to the need for thorough spray coverage and sufficient spray volume required for control of lychee erinose mites, applications should be made by ground equipment.

Mixing Instructions

1. Ensure the spray tank is clean before use.
2. Fill the tank full of water.
3. Add the required amount of Microthiol Disperss® to the tank.
4. Start agitation and continue until spraying is completed.
5. After use, clean the spray tank.

If tank mixes are used, ensure that each product is pre-diluted first and added separately to the spray tank in the correct order. Do not mix with dinitro compounds, tetradifon or oils.

Application Sites and Methods

Formulation	Use Rate	Use Pattern	Restrictions
Microthiol Disperss®	5 - 90 lbs. Microthiol Disperss/Acre (4.0 - 72 lbs. AI/Acre)	Apply to all trees every 7 to 15 days from shoot initiation (bud break along the pruned limbs) until leaves have fully matured.	Do not apply more than 90 lbs. (72 lbs. A.I.) of Microthiol per acre per application. Do not apply more than 1,080 lbs. (864 lbs. A.I.) of Microthiol per acre per year.

Directions for Use:

20-30 lbs. Microthiol Disperss/100 gallons of water

Tree Size	Dilution / Tree	Use Pattern
New plantings or resets less than 6 feet tall	1 gallon spray mix / tree	Allow 7 to 15 days between treatments
Trees 6 to 12 feet tall	3 gallons spray mix / tree	Allow 7 to 15 days between treatments
Trees > 12 feet tall	5 gallons spray mix / tree	Allow 7 to 15 days between treatments

Commercial Acreage/Nursery Stock

For eradication: Trees must be defoliated. Affected plant parts must be removed and destroyed or disposed of properly. Apply the first application of product after defoliation. Additional applications of product should occur at the initiation of new bud/leaf break and be repeated at 7 to 15-day intervals until the new shoots and leaves are hardened off (mature). Sprays should be directed to the underside of leaves where most lychee erinose mite infestations begin.

For prevention: Apply product when trees initiate additional new vegetative flushes and/or panicles (flowering shoots). The new growth needs to be sprayed every 7 to 15 days until leaves are hardened off (mature) or until flowering is completed and fruit is set. Sprays should be directed to the underside of leaves where most lychee erinose mite infestations begin.

Urban Areas

For eradication: Trees must be defoliated. Affected plant parts must be removed and destroyed or disposed of properly. Apply the first application of product after defoliation. Additional applications of product should occur at the initiation of new bud/leaf break and be repeated at 7 to 15-day intervals until the new shoots and leaves are hardened off (mature). Sprays should be directed to the underside of leaves where most lychee erinose mite infestations begin.

For prevention: Apply product when trees initiate additional new vegetative flushes and/or panicles (flowering shoots). The new growth needs to be sprayed every 7 to 15 days until leaves are hardened off (mature) or until flowering is completed and fruit is set. Sprays should be directed to the underside of leaves where most lychee erinose mite infestations begin.

Restrictions and Precautions

- Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours.
- Retreatment at less than 15 days interval may be necessary if substantial rainfall occurs.
- Minimum retreatment interval is 7 days.
- Do not use sulfur with oil or within 30 days of an oil spray.
- For use under this SLN, do not apply this product through any type of irrigation system.
- **IMPORTANT:** During periods of high temperatures sulfur may burn foliage and fruit. Use caution when making sulfur applications at temperatures over 90°F.

Section 24(c) Registrant:

FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES
Division of Plant Industry
1911 SW 34th Street
Gainesville, FL 32608

This label expires on December 31, 2024

The Lychee Erinose Mite (LEM) (*Aceria litchii* Keifer)



Scouting for LEM:

- Frequent and regular monitoring of trees
- Search for shoots with emerging leaves and/or panicles
- Look for blisters and erinea (rust colored hair like structure)
- If you suspect your trees are infested with LEM, 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 305-679-0227

Cultural practices:

- Avoid overfertilization, especially with nitrogen (N)
- Selective pruning of infested plant parts (i.e., those shoots with leaves and stems showing symptoms), followed by sulfur (Microthiol Disperss) application
- Do NOT prune if you do not intend to apply sulfur
- Do not move infested material off the property. Burn (permit required), chip or double bag infested material and expose the bags to sunlight for a minimum of three days

How to apply sulfur to protect the new flush

- **Rate:** 20 lbs. Microthiol Disperss /Acre
- For single trees mix 2-3 oz sulfur in 2-4 gallons water (depending upon tree size) and spray

Application method and frequency:

- Apply sulfur to all the parts of the tree, including the trunk
- First sulfur application should be made at the time of pruning
- Subsequent applications must be repeated every 15 days from bud break until all leaves harden (approx. 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: Do not use sulfur with oil or within 30 days of an oil spray treatment.

Warning: Use caution when making sulfur applications at temperatures over 90°F.

Remember the label is the law! Do not exceed recommended application rates.

El ácaro Lychee Erinose (LEM) (*Aceria litchii* Keifer)



Inspeccionando en busca de LEM:

- Monitorear de forma frecuente y regular los árboles
- Buscar brotes con hojas jóvenes y/o panículas.
- Buscar ampollas en las hojas y erinea (estructura con vellosidades de color óxido)
- Si sospecha que sus árboles están infestados con LEM, notifique a **FDACS-División de Industria Vegetal al 1-888-397-1517** y a Jeff Wasielewski, agente comercial de cultivos de frutas tropicales, UF/IFAS-Miami-Dade County Ext. 305-679-0227

Prácticas Culturales:

- Evite la fertilización excesiva, especialmente con nitrógeno (N)
- Realice poda selectiva de las partes infestadas de la planta (brotes con tallos y hojas que presenten síntomas), posteriormente realice la aplicación de azufre (Microthiol Disperss®)
- NO pode si no tiene la intención de aplicar azufre
- NO mueva el material infestado fuera de la propiedad. Quémelo (se requiere permiso), disponga el material infestado en doble bolsa y expóngalo a la luz solar por un periodo de mínimo tres días

Cómo aplicar azufre para proteger los brotes emergentes

- **Proporción:** 20 lbs/Acre de Microthiol Disperss®
- Para árboles individuales mezcle 2-3 oz de azufre en 2-4 galones de agua (dependiendo del tamaño del árbol) y rocíe los árboles

Método de aplicación y frecuencia:

- Aplique el azufre en todas las partes del árbol, incluido el tronco
- La primera aplicación de azufre debe realizarse en el momento de la poda
- Las aplicaciones posteriores deben repetirse cada 15 días, desde la aparición de los primeros brotes hasta que todas las hojas se endurezcan (aproximadamente 3 meses y un total de 8 aplicaciones) utilizando la misma proporción.
- Puede ser necesario repetir la aplicación en un intervalo menor a 15 días si se presentan lluvias abundantes

Advertencia: No use azufre y aceite dentro de los 30 días posteriores a un tratamiento con aceite.

Advertencia: Tenga cuidado al realizar aplicaciones de azufre a temperaturas superiores a los 90°F.

¡Recuerde que la etiqueta es la ley! NO exceda las tasas de aplicación recomendadas.