

Managing Eastern Tent Caterpillar to Minimize MRLS

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Problem:

Wandering larvae of the Eastern tent caterpillar (ETC) ingested by pregnant mares may cause premature birth and abortion (MRLS).

Mitigation of problem:

Short term solution:

1. Immediate removal of pregnant mares from paddocks containing or within 100 yards of any Prunus spp. tree (Cherry, plum) as well as apple and crabapple. Feed horses hay in areas distant from trees.
2. If wandering caterpillars are of concern, ground application of approved pesticides using the barrier approach. Apply a 6 ft wide band of a registered pesticide along fence lines. If possible, keep mares from the treated area. Consuming dead caterpillars also may result in MRLS.

Longer term solution:

1. Remove all Prunus spp. trees from paddocks and, if possible, adjacent areas.
2. Monitor trees for presence of caterpillars.
If webs are present, reduce caterpillar numbers by application of approved pesticides to trees. In Gainesville, this is approximately March 1st.

Other caterpillars of concern: (see table, page 2)






Primarily the Walnut caterpillar – some evidence of MRLS association.

Other Florida caterpillars: Forest tent caterpillar

Fall webworm (tent builder)

Tussock moth

Outbreaks: ETC populations fluctuate through 10 year cycles. High populations tend to be followed by population crashes. These are often localized in distribution. Walnut caterpillars were observed at very high levels in 2005. Status in 2006 is yet unknown.

| Insect | Life cycle and time of year | Hosts | Description | |
|--|--|---|---|--|
| Eastern tent caterpillar, <i>Malacosoma americanum</i> | Hatch Feb. 1 Larvae 4-6 wks Pupae 2 wks Adult moths, late March, early April | Cherry, Plum, Apple, Crabapple Rarely others | Full-grown larvae 2-2.5 inches long Black heads, long light brown body hairs. Back has solid light stripe, bordered with yellow-brown and black wavy lines Tents around branch do not contain foliage. Image: woodypests.cas.psu.edu/Insects/EastTentCat/EasternTentCaterpillarLarva.jpg |  |
| Forest tent caterpillar, <i>Malacosoma disstria</i> | Hatch late February Larvae 4-6 wks Pupae 2 wks Adult moths, April | Oak, Tupelo gum | Larvae 2 inches, with pale bluish lines on sides of brownish body. Row of keyhole shaped white spots down middle of back. Produces silk, no tent formed. Image: www3.gov.ab.ca/srd/forests/_larvae.html |  |
| Walnut caterpillar, <i>Datana integerrima</i> | 2-3 generations/yr Late summer (2 nd) generation, generally most abundant. | Walnut, Pecan, Hickory | Larvae 1-2 inches long. Mature larvae nearly black with white hairs. 4 dorsal tussocks. Image: eny3541.ifas.ufl.edu/ |  |
| Tussock moth, <i>Orgyia detrita</i> (2 other FL species) | Hatch: March 1 Larvae 4-6 wks Pupae 2 wks Adult moths, May | Oak Incidental on many other plants | Dark, red head, 2 black hair pencils look like antennae Image: eny3541.ifas.ufl.edu/ |  |
| Fall webworm, <i>Hyphantria cunea</i> | Multiple generations from early spring to late summer. Most numerous August - September | Pecan, Hickory, Persimmon, Sweet gum, Many others | Larvae 1-1.25 inches long, covered with silky hairs. Color varies pale yellow to green, black stripe on back, yellow stripe on each side. Construct tents that enclose foliage. Image: www.fs.fed.us/r8/foresthealth/idotis/insects/ |  |

What is Mare Reproductive Loss Syndrome (MRLS)

- MRLS appeared in 2001/2002 in Kentucky
 - Rapid appearance - within 3 wks
 - 1/3 of Kentucky's foal crop was lost in 2001
 - In total, 3,600 Thoroughbred and 1,000 Paint and Quarter horse foals lost
 - 60 cases of pericarditis, ~ 55 cases of eye loss and 3 encephalitis cases
 - ~ \$500 million in losses
 - Mares showed few signs of illness
 - Non-specific bacterial infections of fetuses

The 2001 Mystery

- Following numerous "spontaneous" abortions, researchers of all types were enlisted
 - Epidemic of the Eastern tent caterpillar noted
 - Numerous toxins, including cyanide, ruled out
 - A return of caterpillars in 2002 resulted in losses
 - Bacterial infections
 - Fetus/Fetal membrane infections noted
 - Barbed setal fragments – a link???
 - Hairs (setae) from caterpillars proposed as a factor

Theory: How It Worked

- Caterpillars consumed by horse
- In gut, hairs break off & lodge in stomach lining
 - Hairs carry small amounts of gut bacteria
 - Hairs are barbed, so they worked their way through the tissue, some are picked up by the bloodstream
 - These hairs are transported throughout the body
 - Hairs deposited in immuno-sensitive areas are most problematic, given uncontrolled bacterial growth

Afflicted Areas

- Several areas of the body have limited or no immune system. These include:
 - Eye
 - Pericardium (sac surrounding heart)
 - Brain/spinal column
 - Placenta/fetal membranes

Afflicted Areas

- Clues included:
 - Non-specific bacteria, very similar to that found in the horse gut
 - Sudden onset of bacterial sepsis
 - Eye and heart infections in males and non-pregnant females and fetal abortions
 - Mares not presenting as healthy

Follow-up: Non-Horse Studies

- Mathematical modeling for the following year matched what occurred the following year
- Using ETC-dosed pigs, researchers showed intestinal microgranuloma's (small sites of infection). All had a ETC setae
- Lack of adult horse blood infections – showed this was not an infection of the mare passed to fetus
- Eye infections allowed for calculation of circulating setae levels of 10 setae/day

Follow-up: Horse Studies

- Four Studies
 - Study 1: Mares exposed to pasture grass with ETC:
 - 18 of 29 mares aborted with MRLS symptoms
 - Study 2: Is it the caterpillar or the feces?
 - 3 of 7 mares fed whole ETC aborted
 - No losses in control or ETC feces fed groups



Follow-up: Horse Studies

- Four Studies
 - Study 3: Are they carrying anything?
 - 3 of 5 mares fed frozen ETC aborted
 - No mares fed sterilized ETC or frozen gypsy moth caterpillars aborted
 - Study 4: What is the responsible component of ETC?
 - Abortions occurred in whole and exoskeleton-containing treatments
 - No abortions with caterpillar gut or filtered components



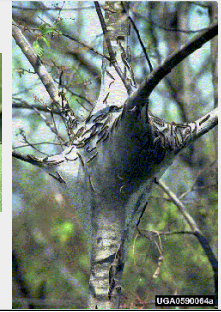
Eastern Tent Caterpillar

- ETC is a cyclic insect
- The outbreak experienced by KY was of exceedingly large size.
- Black cherry trees were quite abundant
- These trees are one of several hosts for the caterpillar



Photograph courtesy of H. Q. Murphy

Eastern Tent Caterpillar



UGA0909044

Black Cherry – *Prunus serotina*



So, What Happens

- Why would my horse eat these caterpillars?
 - The caterpillars themselves are not toxic
 - As observed in KY, the outbreak was very large
 - Essentially, the caterpillars were so numerous, when they were crawling from trees to find places to pupate or turn into a cocoon, they were eaten by the horses
 - This phenomenon had never been associated with spontaneous abortions and horse owners were caught unaware.

Is Florida at Risk?

- In 2006 a small occurrence was observed in Florida
- Florida horses may be at risk, however, a KY-like outbreak is not likely. In fact, ETC levels have not occurred in KY to the level seen in 2001.
- Reasons **in favor** of a FL outbreak
 - We have the same caterpillar, appropriate host trees and a large horse population
- Reasons **against** a FL outbreak
 - Our ETC season is much earlier, perhaps lowering the risk to fetuses. Many *Prunus* trees have been removed and we are aware of the situation and owners can address these proactively.

ETC Management

- Remove all *Prunus* species trees from your pastures and adjacent areas under your control
 - Although black cherry trees are the most common, this is a very large group of tree species that includes **apple, plum, pear, plum and crabapple**
 - If infestations are found, there are chemical treatments, however, the size of most trees usually requires a professional applicator
 - Work with neighbors to remove or treat their trees, if of concern

ETC Management

- Put reminders on calendars. ETC emergence is tied very closely to tree dormancy breaking
 - In FL, ETC eggs hatch around Feb. 01 (latitude dependent) and develop for 4-6 weeks
 - When fully developed, many larvae will leave the tree to find a pupation site. **This is when they are a risk to horses**
 - So, watch for large caterpillars moving down tree trunks or on grass during early- to mid-March
 - Remove animals from pastures with active infestations

Recommendations

- ETC produces one generation per year
 - Natural enemies keep them in control most years
 - Remove egg masses in winter (esp. ornamentals)
- Insecticide applications
 - Microbial: *Bacillus thuringiensis* var *kurstaki* for young caterpillars
 - Other insecticides: See UF/IFAS EDIS <http://edis.ifas.ufl.edu/in628>
 - Larvae in tents are protected beneath webbing & are difficult to kill



