Pest e-alerts

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We're Back! Oak Gall Midges Appearing

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A unique gall-making insect has again reappeared in central Oklahoma landscapes this spring - an oak gall midge likely belonging to the genus, *Contarinia*. These insects were first reported in 2011 infesting live oaks in Texas, and a year later they made their way into Oklahoma where they caused significant leaf distortion in red oaks. We did not receive any reports of the gall midges in 2013 but did find sporadic damage in 2014. The original Texas report mentioned that tiny, white maggots were seen dropping to the ground, which is typical behavior for larvae of several economically important *Contarinia* species (Gagné and Beavers, 1984; Hara and Niino-Duponte, 2002). We have seen this same behavior in samples shipped to the lab, where the tiny larvae were observed crawling inside Ziploc bags of leaf galls!

There isn't much information about the oak gall midge because it isn't common and hasn't been described scientifically (i.e., no species name has been assigned to this creature). Also, unlike some close relatives like the sorghum midge and blossom midge, oak gall midges do not

appear to cause significant harm to their hosts nor does galling activity result in economic loss. The galls may be unsightly, but affected trees will not suffer and die from an infestation of oak gall midge. While not much is known about the life cycle of oak gall midge, larvae likely feed on sap from the developing oak flowers (Texas Agri-Life Extension, 2011). This feeding behavior causes gall formation. Adult flies emerge from the soil and lay their eggs on flower buds before catkins open. Upon hatching, larvae feed and develop rapidly and reach their full size of 1.5 mm prior to dropping to the ground. Once on the ground, larvae remain in a restful state (called diapause) until pupating the following spring. The circle of life then continues with adults emerging from their pupae and laying eggs on the host tree (Texas Agri-Life Extension, 2011).

While some folks may find the galls ugly, there is no need to treat affected oak trees. In fact, gall-making insects are difficult to manage with insecticides because they are well protected within the gall. Adults can be targeted with contact insecticides, but timing is critical because adults only emerge for a short time. Adults are also tiny so they are difficult to detect. Also, affected trees often are too large to achieve adequate spray coverage. Galls can be removed with pruning shears and destroyed, which will help reduce the abundance of future fly generations if done before larvae drop to the ground. Again, removing every gall is impractical for large trees.

Instead of trying to get rid of these fascinating insects, it would be best to sit back and appreciate one of nature's coolest little quirks, the plant gall. After all, oak gall midges are rarely seen and their ability to sense the short availability of food is simply amazing!

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Wheat Disease Update

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This past week has been wet and cool across most of Oklahoma, which has greatly helped the wheat but also should lead to more foliar diseases – especially stripe and leaf rust. Around Stillwater, we have not seen a big increase in stripe rust yet, but can find many leaves beneath the flag leaf on which there are actively sporulating pustules (Fig 1). There also are leaves on which the black spore structure stage of stripe rust (called the telial stage – Fig 2) has appeared. Typically this indicates the disease is "shutting down," which it was prior to this week. However, with the cool and wet weather since Monday, there likely will be a "reactivation" of stripe rust – especially given that cool and wet weather is forecast for the next 5-10 days as well!

Fig 1. Stripe rust with active, sporulating pustules

Fig 2. Telial stage of stripe rust (note some pustules are still actively sporulating as indicated by orangish-yellow color.

I get the impression from talking to Aaron Henson (County Educator; Tillman County) as well as other growers and consultants around the state that this is similar to what they are seeing. Wheat seems to range from boot to heads emerging, so if you are contemplating applying a fungicide to protect a promising wheat yield, I suggest it be done soon. Remember, GS 10.5 (heads fully emerged but not yet flowering) is the cut-off for applying fungicides for wheat foliar diseases. That point likely is not far away for much of southern and central Oklahoma. It likely is a bit farther away for northern and northwestern Oklahoma, but it is much better to apply a fungicide a little early rather than after the flag leaf is infected.

Most of the samples that came into the Diagnostic lab last week tested positive for wheat streak mosaic (WSM), including three from the panhandle. However, there is nothing that can be done about WSM at this point. I would refer you to EPP-7328 "Wheat Streak Mosaic, High Plains Disease, and Triticum Mosaic: Three Virus Diseases of Wheat in Oklahoma", available at http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-8987/EPP-7328.pdf for more information on these mite-transmitted viruses.

Colorado: Dr. Scott Haley (Professor & Wheat Breeder, Colorado State University) 16-Apr-2015: "FYI, stripe rust was confirmed for a field site near the Denver International Airport in

Colorado this week. Infection was moderate but cool wet weather we are experiencing now could cause this to increase. This is pretty early for stripe rust sightings in eastern Colorado."

Tent Caterpillars Spotted in Southern Oklahoma

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Reports of tent caterpillars are coming in from several counties in southern Oklahoma. Having driven to Bryan County last week, I have seen many roadside trees containing the characteristic webbing produced by eastern tent caterpillars. Interestingly, the Plant Disease and Insect Diagnostic Lab has logged reports of another species less common to Oklahoma, forest tent caterpillar. In this article, I will discuss the biology of several important species of tent caterpillars in the western/southwestern U.S. and offer management options for limiting their damage in production and ornamental landscapes.

Identification, Host Preference, and Life Cycle

Several closely related species of tent caterpillars occur in the western region of the United States, and all are native to North America. Common species include eastern tent caterpillar (*Malacosoma americanum*), forest tent caterpillar (*M. disstria*), western tent caterpillar (*M. californicum*), Sonoran tent caterpillar (*M. tigris*), southwestern tent caterpillar (*M. incurvum*), and Pacific tent caterpillar (*M. constrictum*). Tent caterpillars are generally hairy and reach about two inches in length when fully grown. Species are distinguished by coloration and markings on the body, size and shape of the tent, and occasionally by the host plant.

Two tent caterpillar species are of concern in Oklahoma: eastern tent caterpillar and forest tent caterpillar. Despite its common name, eastern tent caterpillar can be found as far west as the Rocky Mountains feeding on cherry, plum, crabapple, and occasionally non-fruit trees such as poplar, willow, and birch. Mature larvae are mostly black with a white stripe running down the middle of the back and several bluish-black spots on the sides (Fig. 1). Forest tent caterpillar is perhaps the most damaging tent caterpillar in North America because it is the most widespread and feeds on many hardwood species. Forest tent caterpillar is commonly encountered throughout the United States wherever hardwoods grow. Mature larvae are blue with a series of "keyhole"-shaped markings running down the middle of the back (Fig. 2). A third species of lesser importance, western tent caterpillar, occurs rarely in western Oklahoma. This species feeds primarily on wild hosts but will occasionally feed on plum, other fruit trees, willow, and several other deciduous woody plants. Western tent caterpillar is only slightly hairy (relative to other tent caterpillar species) and has a light brown coloration with powdery blue markings along the sides of the body and a blue head (Fig. 3).

Fig 1. Eastern tent caterpillar**.**

Fig 2. Forest tent caterpillar**.**

Fig 3. Western tent caterpillar**.**

In general, the life cycle of tent caterpillars is similar across species, although slight differences exist. Tent caterpillars overwinter as eggs that are laid together in small masses and "glued" to twigs and small branches of the host plant (Fig. 4). Egg masses are seen easily in winter when leaves are absent. Eggs hatch in early spring and larval emergence coincides with bud break of the host plant. Thus, tent caterpillars are finely tuned to the availability of a nitrogen-rich food source. In spring, tent caterpillars hatch and congregate with most species forming silken tents within the crotches of tree branches (Fig. 5). These tents afford the caterpillars shelter from most natural enemies (predators and parasites). Forest tent caterpillars are one exception to the rule—they do not form tents but instead weave lightly spun, silken mats on trunks and limbs in which they rest during the day. Tent caterpillars are most active at night, venturing out from their silk shelters to feed on foliage. Tent caterpillars develop through five instars (distinct growth stages separated by molts). Tents expand as the insects grow. Fully grown tent caterpillars eventually wander in search of a place to pupate. They may spin cocoons on natural or artificial structures; during outbreaks large numbers of caterpillars can be found crawling on homes and other buildings. Adult moths emerge in early to mid summer and mate at night. Adults are often attracted to lights at night. Mated females lay egg masses on host trees in mid to late summer. There is one generation per year.

Fig 4. Forest tent caterpillar egg masses. (Photo credit: Herbert A. 'Joe' Pase III, Texas Forest Service, Bugwood.org)

Fig 5. Eastern tent caterpillar nest (Photo credit: Tim Tigner, Virginia Department of Forestry, Bugwood.org)

Management

During outbreaks, eastern and forest tent caterpillars can defoliate wide swaths of forest habitat in a short time. Even in non-outbreak years tent caterpillars can cause enough damage to warrant control. Although several natural enemies attack tent caterpillars, predators and parasites cannot provide sufficient control of large caterpillar populations. Therefore, cultural and chemical control options are most often relied upon for management of tent caterpillars.

Cultural control techniques include the physical removal and destruction of egg masses or larvae. During winter, trees can be inspected for the presence of egg masses, which should be pruned out or otherwise destroyed before egg hatch. While impractical for large trees, removal of egg masses can be highly effective for protecting small landscape or nursery trees. Similarly, tents containing caterpillars can be removed and destroyed by hand. For tents located in upper branches, use a long pole with nails protruding from the end to remove and destroy the tent. For safety considerations and health of the tree, I strongly discourage the use of fire to destroy tents within a tree (yes, people have done this!).

Chemical control efforts must target the larvae. A variety of insecticides are available for tent caterpillar control, including some over-the-counter products for homeowner use (Table 1). Always read the label before applying any pesticide because some host plants may be susceptible to certain products. Some insecticides labeled for caterpillar control contain "reduced risk" materials such as *Bacillus thuringiensis* subsp. *kurstaki* (Btk) or spinosad. Both active ingredients occur in nature - Btk is a bacterium that produces a toxin specifically active against caterpillars and spinosad is derived from the fermentation product of another bacterial species. These active ingredients are considered reduced risk because they are generally safe to handle and cause minimal harm to non-target organisms if applied according to the label. However, Btk and spinosad are only effective against small larvae, so the application must be correctly timed with peak populations of young caterpillars. Thus, host trees breaking bud in March should be inspected for small caterpillars and tents, especially at sites with a history of these pests. Both Btk and spinosad must be ingested and do not provide quick knockdown of caterpillars like most contact insecticides. Thus, patience is the key! Larger larvae can be controlled with old standbys like carbaryl (Sevin) or lambda cyhalothrin (Bonide Caterpillar Killer). A new product, Acelepryn, has recently become available to commercial applicators and is labeled for caterpillar control. The active ingredient, chlorantraniliprole, offers a novel mode of action and is also categorized as reduced risk. In fact, EPA does not require a signal word on the label! Although expensive, I've seen a small amount of Acelepryn go a long way for managing many caterpillar pests including tent caterpillars.

Table 1. Homeowner products available for tent caterpillar control in Oklahoma.

Active Ingredient	Trade Name (ex.)	Comments
Acephate	Bonide Systemic Insect Control	Do not use acephate products on American elm, crabapple, red or sugar maple, cottonwood, redbud, or weigelia.
***Bacillus thuringiensis* var. *kurstaki* (Btk)**	Bonide Thuricide Bt **or** Ferti-lome Dipel Dust	Apply Btk early while caterpillars are still small. Less effective for large larvae. Btk stops larvae from feeding, but has a delayed killing action. Btk does NOT control sawflies.
Carbaryl	GardenTech Sevin Concentrate Bug Killer	Read label carefully for restrictions.
Esfenvalerate	Ortho Bug-B-Gone Max Garden and Landscape Insect Killer Concentrate	
Insecticidal soap	Garden Safe Brand Insecticidal Soap Insect Killer	Read label carefully for phytotoxicity information.
Lambda cyhalothrin	Bonide Caterpillar Killer	
Malathion	Gordon's Malathion 50% Spray **or** Hi-Yield 55% Malathion Spray	Read label carefully for phytotoxicity information.
Petroleum (horticultural) oil	Bonide All Seasons Horticultural & Dormant Spray Oil Concentrate	Do not apply dormant oil concentrations to actively growing plants nor to broadleaf evergreens, maple, mountain ash, or beech.
Spinosad	Ferti-Lome Borer, Bagworm, Tent Caterpillar & Leafminer Spray	Apply spinosad early while caterpillars are still small. Less effective for large larvae.

The pesticide information presented in this publication was current with federal and state regulations at the time of printing. The user is responsible for determining that the intended use is consistent with the label of the product being used. Use pesticides safely. Read and follow label directions. The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Cooperative Extension Service is implied.

Nursery stock and newly established landscape trees will need protection from tent caterpillars to retain marketability and reduce stress, respectively. In other situations, however, control is not always warranted. Small populations of tent caterpillar can be tolerated in some ornamental or natural landscapes. Unlike exotic, invasive tree pests that rightfully garner a lot of media attention, tent caterpillars are native to North America and, thus, are part of the natural forest cycle. Complete defoliation isn't common under non-outbreak conditions and deciduous trees, if healthy, are remarkably resilient to repeat defoliation events. If trees weren't adapted to leaf-feeding insects like tent caterpillars, you can sure bet there'd be a lot fewer of them around today!

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