

Pest Management News

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Letter #4

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Mosquitoes in Arkansas: the Top Five

John D. Hopkins

Mosquitoes represent a significant biting nuisance for the majority of Arkansans. To the unlucky few, mosquitoes can also vector a myriad of potentially serious diseases. Arkansas is home to some 62 mosquito species (Darsie & Ward, 1981; Lancaster, Barnes, & Roberts, 1968; McNeel & Ferguson, 1954) with most having little or no impact of man. The top five mosquitoes in Arkansas (Meisch, personal communication) include: *Psorophora columbiae* (Dyar & Knab) – dark ricefield mosquito; *Anopheles quadrimaculatus* Say – common malaria mosquito; *Aedes vexans* (Meigen) – floodwater mosquito; *Aedes albopictus* (Skuse) – Asian tiger mosquito; and *Culex quinquefasciatus* Say – southern house mosquito.

Dark Ricefield Mosquito (Meisch, 1994)

In Arkansas, this mosquito reaches its greatest abundance in the rice growing areas of the state. In rice country, it is the most troublesome mosquito through June (population diminishes with the heat of summer). This mosquito when attacking in large numbers, has been reported to kill livestock. Other studies have shown severe losses in weight gain and milk production resulting from the bloodfeeding activity of this mosquito. *Psorophora columbiae* also causes extreme annoyance to people. The mosquito is an important vector of Venezuelan equine encephalitis and anaplasmosis in cattle. Eggs are deposited on moist soil which is subject to flooding by water from rainfall or irrigation. Larvae develop in temporary shallow freshwater pools and puddles where there is vegetation. The incubation period is about 3-5 days in the rice growing areas of Arkansas. Larvae mature rapidly during the hot summer, often developing from first instar to pupae in as few as 3.5 days. The normal flight range of this mosquito is at least 6-8 miles; however, much longer distances have been

Dark Ricefield Mosquito, *Psorophora columbiae* (Dyar & Knab)



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recorded. The mosquito is readily attracted to light. Females are furious biters in day or night. Hosts include any warm blooded animal; however bovine blood seems to be preferred.

Common Malaria Mosquito (Kaiser, 1994)

In rice country, from June until frost, the most troublesome mosquito would be the common malaria mosquito, *Anopheles quadrimaculatus*. This mosquito was the most important vector of malaria in the southeastern United States and today is a major host of the nematode that causes dog heartworm. Large populations are found in rice fields, reservoirs, lakes and rivers which makes this mosquito a significant pest of man and livestock. In Arkansas, this mosquito breeds in large bodies of water such as rice fields, reservoirs, lakes and canals that have established surface vegetation or emergent vegetation. Additional breeding areas include permanent-water swamps that have filtered sunlight and limited aquatic fauna. Females deposit eggs 3-4 days post feeding and eggs hatch within 36-48 hours after being deposited on the surface of the water. Larvae are surface feeders that ingest microorganisms and detritus. They associate themselves with aquatic vegetation or floatage to avoid predation. They also change color to mimic that of their breeding habitat. Females typically fly less than 1 mile for a blood meal but can range farther.

Common Malaria Mosquito, *Anopheles quadrimaculatus* Say



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Foodwater Mosquito (O'Malley, 1990)

Along the Mississippi River in the eastern part of Arkansas, a dominant mosquito species would be *Aedes vexans*, which is also one of the most widespread pest mosquitoes in the world. *Aedes vexans* overwinters in the egg stage. Eggs are laid singly on moist soil in sites subject to inundation by rain water, overflow, seepage, etc. Also, preferred oviposition sites are characterized by dense cover (detritus, piles of twigs and low herbal canopy) over the soil. Eggs of the floodwater mosquito hatch when inundation of the oviposition site occurs; however, they do not all hatch at one time. Also, eggs must go through a period of drying before flooding, in order for hatching to take place. Most of the eggs of one laying will hatch after the first flooding, but some remain for the second and subsequent floodings. Larval development varies according to the time of year when eggs hatch. During the summer months, a six- to eight-day period is require for larval development. *Aedes vexans*

Floodwater Mosquito, *Aedes vexans* (Meigen)



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larvae feed by grazing and filtering, and probably live on a variety of materials. Larvae develop normally in a relatively dispersed state, but are often greatly concentrated as result of receding water. The pupal stage, as with larvae, varies in length according to temperature, but usually lasts two to three days during the summer. This mosquito is a serious nuisance pest and will readily bite. Females will feed in shady places during the day; however, they are very active at dusk and vigorously seek blood meals at this time. *Aedes vexans* is a mosquito which disperses for considerable distances from its breeding sites (five to fifteen miles). This mosquito has also been implicated in the transmission of several important diseases. It is a primary vector of dog heartworm. It has also demonstrated the ability to vector western equine encephalitis (WEE), St. Louis encephalitis (SLE), and eastern equine encephalitis (EEE).

Asian Tiger Mosquito (Novak, 1992)

This mosquito is distributed statewide and is an aggressive daytime biter. *Aedes albopictus* was brought into the United States and other countries through the worldwide transport of used tires. This mosquito is associated with the transmission of dengue, eastern equine encephalitis and dog heartworm, and potentially with St. Louis and LaCrosse encephalitis viruses. The Asian tiger mosquito is a container-inhabiting species which lays its eggs in any water-containing receptacle in urban, suburban, rural and forested areas. The primary immature habitats of this species are artificial containers such as tires, flower pots, cemetery urns/vases, buckets, tin cans, rain

Asian tiger mosquito, *Aedes albopictus*
(Skuse)



Photo by J.L. Castner. University of Florida

gutters, ornamental ponds, drums, and natural containers such as treeholes, bamboo pots, and leaf axils. This mosquito prefers to lay its eggs above the water surface on dark rounded vertical surfaces. *Aedes albopictus* overwinters in the egg stage. When adult females experience long days, they produce non-overwintering eggs, during short days they produce eggs that will overwinter. Depending on temperature and the availability of food, this mosquito completes larval development between 5 and 10 days; the pupal stage in 2. The flight range of adults is limited, and they have not been observed to fly in strong winds. Its major means of dispersal is through the transport of used and waste tires. *Aedes albopictus* is a very aggressive daytime biter with peaks generally occurring during the early morning and late afternoon. It feeds on a number of hosts including man (indoors and outdoors), domestic and wild animals and birds. Its generalized feeding behavior contributes to its vector potential.

Southern House Mosquito (Savage and Miller, 1995)

This mosquito is another prevalent species with statewide distribution. The southern house mosquito is a primary disease vector in Arkansas and vectors encephalitis diseases and dog heartworm. Birds are preferred hosts but this species readily bites man. The southern house mosquito is also an important pest mosquito, particularly in urban areas and in association with feed lots and farms. Adults of the *Culex pipiens* complex are light brown mosquitoes that lack distinctive markings on the proboscis and legs, and are not readily separated from other *Culex* mosquitoes. This mosquito readily breeds in storm sewer catch basins, clean and polluted ground pools, ditches, animal waste lagoons,

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effluent from sewage treatment plants and other sites that are slightly to very eutrophic or polluted with organic wastes. *Culex quinquefasciatus* females typically lay a single raft of 140-340 eggs after each bloodmeal. Eggs hatch in 1-2 days. Development from egg to adult is temperature dependent; requiring 8 to 12 days in summer. After bloodfeeding, females may return to the same or nearby larval habitats to oviposit and are often considered non-migratory mosquitoes. However, females may travel considerable distances from resting sites to search for blood hosts, and marked females have been shown to travel up to 0.7 miles in a single night. In southern regions, *Culex quinquefasciatus* is active throughout the year, although larval growth rates may slow and adult populations may be reduced during cooler months.

In areas where winters are colder, this mosquito enters a facultative reproductive diapause and adult, inseminated females spend the winter in hibernacula, such as culverts and caves. Diapause is a genetically determined state of arrested development induced by environmental factors, primarily decreasing day length that allows adult females to overwinter in cold climates. The southern house mosquito will readily utilize birds as bloodmeal hosts; however, it will feed on mammals including humans and dogs when these hosts are abundant.

Southern House Mosquito, *Culex quinquefasciatus* Say



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Preventing Mosquito Bites

Personal protection from mosquito bites should be more than a passing consideration. To reduce your risk from nuisance mosquito bites and possible infection with mosquito-borne illnesses, you should practice avoidance when mosquitoes are most active. If you have to be outside, wear long-sleeved clothing and protect yourself with a good insect repellent. In addition, you should eliminate breeding sites on your property by draining any standing water. Things to consider:

- Dispose of tin cans, plastic containers, ceramic pots or similar water-holding containers.
- Remove all discarded tires from your property.
- Empty excess water from flowerpots.
- Drill holes in the bottoms of recycling containers that are kept outdoors.
- Make sure roof gutters drain properly and clean out clogged gutters.
- Turn over plastic wading pools and wheelbarrows when not in use.
- Change the water in birdbaths and pet bowls on a regular basis.
- Clean vegetation and debris from the edges of ponds.
- Clean and chlorinate swimming pools, outdoor saunas and hot tubs.
- Drain water from pool and boat covers.
- Use landscaping to eliminate stagnant water that collects on your property.
- Make sure all windows and doors have screens in good repair.
- Correct or report drainage problems in ditches along public or private roadways.

With respect to mosquito repellents, use only products with active ingredients registered by the Environmental Protection Agency (EPA). The two products that have been shown to work better and

provide the longest lasting protection are DEET and Picaridin. Other active ingredients that will also provide a reasonable level of protection include Oil of Lemon Eucalyptus (PMD) and IR3535. As with any product, follow label directions carefully and use only in the manner described. If you believe you or your child is having an adverse reaction to a repellent, wash the treated area immediately and call your health care provider.

Chemical control measures primarily target adult mosquitoes. Outdoor foggers will keep mosquitoes away for several hours, but once the chemical dissipates, the mosquitoes return. Spraying thickets or shrubs along the perimeter of your yard helps reduce the population of mosquitoes that rest in these areas. Most insecticides that target adult mosquitoes are not selective, and may harm beneficial insects and other non-target organisms. The use of mosquito residual adulticides will provide only a temporary reduction in mosquito numbers. Modifying or eliminating breeding sites is the only long-term solution to severe mosquito problems **(BUT NOT ALWAYS POSSIBLE!!!)**.

Insecticides are also available for controlling mosquito larvae, but their application in either large bodies of water or small artificial breeding sites can be difficult and expensive, particularly for an individual homeowner. Homeowners wanting to treat small areas, such as bird baths, garden pools, and other water features in the landscape, might want to try bacterial insecticides that are available at many retail stores, garden centers and on-line garden suppliers. These "granules / briquettes / donuts" contain a bacterium known as *Bacillus thuringiensis israelensis* or "Bti." This bacterium kills mosquito larvae, but does not harm fish, birds or other wildlife.

Area wide mosquito control programs may be available in certain Arkansas municipalities. See the following link for more information:

<http://npic.orst.edu/mlrDetail.html?lang=en&to=VEC&state=AR#vectorControl>

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Eye Gnats

Kelly M. Loftin

Earlier this month I responded to a request to figure out what fly was swarming around a homeowner's head every time they ventured outdoors. We collected a few on a sticky trap and they were eye gnats. Eye gnats are non-biting pests that are attracted to secretions associated with the eyes, nose and ears of humans. These tiny flies are a severe nuisance and have been implicated in the transmission of pink eye. The most common species are in two genera; *Hippelates* and *Liohippelates* and belong in the family Chloropidae. They are also known by other common names such as grass flies and another name that I can't repeat here.

Large numbers of eye gnats are common in areas with moist, well-drained sandy soil containing organic matter such as cut grass or leaf litter. Disturbance such as clearing, digging, disking or etc. often increase abundance. The life cycle requires from 11 to 90 days depending on temperature and moisture. During the summer, development from egg to adult requires about three weeks. Often populations subside considerably during the driest part of the summer, but with a summer like this year, populations in some areas have remained high.

In addition to being associated with pink eye, the eye gnat has been implicated in animal diseases. For example, this fly may mechanically transmit bovine mastitis. It has also been implicated in the transmission of vesicular stomatitis, a viral disease of horses, cattle, goats and swine.

Effective area-wide eye gnat control is nearly impossible due to the difficulty of reaching the soil with insecticide applications. On a small scale, homeowners can reduce breeding sites by reducing the amount of organic matter incorporated into the soil. Reducing surface soil moisture can also reduce larval survival. Physical exclusion (screen porches) using insect screens or netting will also provide relief. Some homeowners have achieved relief from eye gnats using homemade traps baited with eggs. The use of insect repellents containing DEET or Picaridin can provide temporary relief.



Adult eye gnat. Photograph by Lyle J. Buss, University of Florida.



Trap for eye gnats. Photo by Bryan Vander Mey.

Bryan Vander Mey, UCCE San Diego County
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Fall Armyworm Update

Kelly M. Loftin

Within the last two weeks, fall armyworms have made their third major appearance in pastures and hay fields. We are seeing populations in many parts of the state well above the treatment threshold of three worms per square foot. In Miller County, an average of around twenty worms per square foot was observed just this week. In other areas it is not common to see six to fifteen worms per square foot and many have been dealing with them since June. Remember, fall armyworm infestations could be around into this fall.

We need to continue to encourage forage producers to continue scouting for armyworm presence. Also, now is the time producers begin thinking about planting winter annuals. Newly emerged winter annuals are very vulnerable to fall armyworm damage. Worms can infest a developing stand of winter annuals which may result in complete loss.

Over that last couple of months, several fall armyworm control demonstrations comparing short verses longer residual products were conducted. In a couple of instances, re-infestation did occur allowing for the assessment of residual activity. Please stay tuned – by next month's newsletter we should have more data to share.

Insecticide application is warranted when three or more fall armyworms per square foot occur in a field. Per-acre insecticide cost will vary from as low as about \$3.00 up to over \$12.00. When calculating cost, always consider the cost per acre and not the cost per gallon of product. Also consider residual activity of the product, especially if you are seeing overlapping generations (all sizes of fall armyworm caterpillars) and heavy armyworm pressure. Pyrethroid insecticides such as Karate® (lambda-cyhalothrin), Mustang Max® (zeta-cypermethrin), and Baythroid XL (beta-cyfluthrin) have short-duration residual activity. In contrast, products such as Prevathon® (chlorantraniliprole), Besiege® (chlorantraniliprole plus lambda-cyhalothrin), and Intrepid® (methoxyfenozide) have longer-duration residual activity and can reduce the number of applications necessary to produce a hay crop. Also remember, if the grass is ready, cutting for hay will avoid an insecticide application. For additional information on armyworms see "Managing Armyworms in Pastures and Hayfields," available at: <http://www.uaex.edu/publications/PDF/FSA-7083.pdf> and the "Forages Section" of the "2017 Insecticide Recommendations for Arkansas" at:

<https://www.uaex.edu/publications/pdf/mp144/c-forages.pdf>.

Identifying Dangerous Snakes

Becky McPeake

Statewide in every county, a common question asked of a County Agriculture Agent is whether a particular dead snake in a picture or actual specimen is – or more correctly was – "poisonous." Often the specimen has colored blotches implying it might be venomous and is disfigured from fatal blows. For snakes native to Arkansas, this question can be answered fairly quickly using a few key traits, particularly if the specimen is available.

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Coloration. There are only six venomous snakes in Arkansas and each can be readily identified by their color patterns as found in the fact sheet “Encountering Native Snakes in Arkansas” (FSA9102). In southernmost Arkansas, the colorful Texas Coral Snake can be identified from mimics by memorizing the saying, “Red touch black, venom lack; red touch yellow, kill a fellow.” If the sequence of circular patterns is red, black, and white, it is either the scarlet or milk snake, which is not venomous. The remaining five snakes have distinctive color patterns, though sometimes variations occur, and smaller juveniles may be difficult to identify. An exception is a juvenile copperhead which not only has the same hour-glass pattern as an adult snake, but also a distinctive bright green or yellow tail. In many cases, the snake brought into a county office is a juvenile non-venomous snake, but its color pattern appears similar to venomous snakes, which raises an alarm.

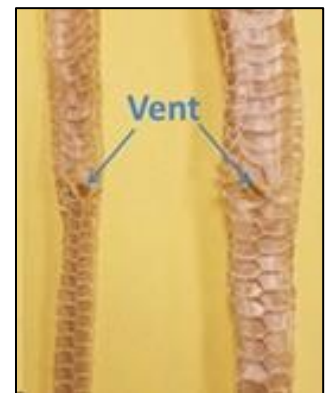
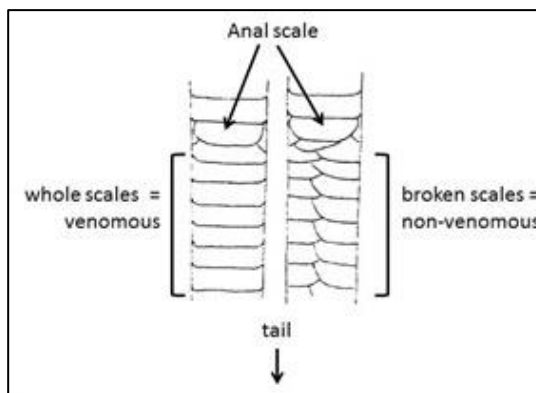
Rattles. Three venomous snakes have telltale rattles on their tail, which most people know. However, rattles are not fool proof as an indicator of a venomous snake. Very young snakes many not have rattles, and very old snakes may lose their rattles.

Subcaudal scales. Five of six venomous Arkansas snakes (the exception being the Texas Coral Snake) can be identified by viewing the subcaudal (under the tail) scales just past the vent, which is covered by a relatively large anal scale.

If these scales are undivided and whole, similar to those in front of the vent toward the head, the snake is venomous. If scales just past the vent are broken into two rows, the snake is non-venomous.

This can be remembered by non-venomous being two words, like the

scales of non-venomous snakes being broken in two. Be sure to look at the scales immediately after the vent, because subcaudal scales near the tip of the tail are sometimes divided even in venomous snakes.



This same method can be used for determining if a snake shed is from a venomous or non-venomous snake, at least for those found outside the Texas Coral Snake's range. Periodically snakes shed their skin to allow further growth and although delicate, occasionally sheds can be found intact. Along the tail of a shed, look for a hole called the vent. The scales below the vent can be seen as either whole or broken. In this photo of two snake sheds, the scales in both cases are broken past the vent, indicating both snakes were non-venomous.

Finally, it is illegal to kill a snake in Arkansas unless it is causing damage to your property or presents a safety risk, as a venomous snake found near a home or school yard. Snakes found in wilderness or remote areas should not be harmed, as some snake populations including venomous snakes are declining. For more information, see our fact sheet “Encountering Native Snakes in Arkansas”

(<https://www.uaex.edu/publications/PDF/FSA-9102.pdf>).

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Apple Diseases Currently Occurring in Arkansas

Sherrie E. Smith

Bitter rot is found wherever apples and pears are grown. Without fungicide protection, entire crops can be lost within a few weeks when environmental conditions favor the disease. *Colletotrichum gloeosporioides*, teleomorph *Glomerella cingulata* is the causal agent. Initial symptoms are tiny gray-brown flecks on the fruit. Lesions usually do not develop further until the fruit begins to ripen. Conidial type lesions are circular and become sunken as they enlarge. Acervuli, (fruiting bodies), are produced in concentric circles around the infection point. Perithecial type lesions are usually not sunken and are a darker brown color. Both types of lesions extend to the core in a cone shape. Some fruit mummify and remain attached to the tree throughout the winter while others drop. Leaf lesions begin as small red flecks that enlarge to irregular brown spots. Badly infected leaves drop prematurely.



Apple Bitter Rot-*Colletotrichum gloeosporioides*. Photos by Sherrie Smith.

Good sanitation is a key element in controlling Bitter rot. Remove all diseased fruit, leaves, and any cankered limbs from the orchard. No commercial cultivar is resistant, so fungicides should be applied at 10-14 day intervals, starting at green tip in the spring Captan, Pristine, Sovran, Adament, Topsin M, and Flint are labeled for control.

Flyspeck caused by *Schizothyrium pomi*, and Sooty Blotch caused by *Gloeodes pomigena* are two of the most common fungal diseases found on apple. These two diseases are commonly both found together on fruit. The fungi causing these diseases grow superficially on the surface of the apple causing the fruit to be unsightly and unmarketable. Most of the apple crop in the southeastern United States would be affected each year if not for the use of protective fungicides. Symptoms of flyspeck are groups of a few to 50 or more shiny black, superficial pseudothecia on the surface of the fruit. The colonies are usually 1-3cm in diameter or larger, and round to irregular in shape. Sooty Blotch appears as colonies of olive green on mature fruit. The colonies may be discrete circular to large blotches with diffuse margins, which are sooty in appearance. Fungicide sprays should be applied at 10-14 day intervals beginning at green tip in the spring to provide the best protection. Captan, Pristine, Sovran, Adament, Topsin M, and Flint are labeled for control. Cleanup of fallen fruit and leaves, along with proper pruning are also helpful.



Apple Flyspeck and Sooty Blotch Complex-*Schizothyrium pomi* and *Gloeodes pomigena*. Photo by Sherrie Smith.

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Name That Weed

Bob Scott

This month's weed is a member of the sunflower or Asteraceae family of plants. In the past (Before Roundup) it was a devastating weed in eastern Arkansas that had become resistant to the ALS chemistry, specifically Scepter or imazaquin. It's most readily identified by its unique burred reproductive structure. But as a weed scientist we need to identify it by its cotyledons (shown here). Be the first to email me at bscott@uaex.edu with the correctly spelled SCIENTIFIC OR LATIN name of this weed and win a prize!



To The Readers

Please offer any suggestions for Urban or Livestock Integrated Pest Management topics (insect pests, plant diseases, weed problems, wildlife control problems) that you would like to see – **OR** – feel free to submit an article that you have prepared. Kelly and I will be glad to include it (subject to editing). Send feedback to jhopkins@uaex.edu or kloftin@uaex.edu.

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