W1379

The Asian Needle Ant: A Medically and Ecologically Important Emerging Pest

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Figure 1: *The Asian needle ant,* Brachyponera chinensis *(Emery). Photo Credit: April Nobile, CASENT0104104738* antweb.org/bigPicture.do?name=casent0104738&shot=p&number=1. *Modified by K. Vail*

The Asian needle ant, *Brachyponera chinensis* (Emery), is an invasive, stinging ant pest. Many Tennesseans may assume any stinging ant in the state is a fire ant, but that is not true. Because the Asian needle ant causes painful, irritating and sometimes long-lasting sting reactions and displaces forest seed dispersers, it's time to become more familiar with this pest ant.

Identification

The Asian needle ant workers are dark brown with lighter brown or orange-brown mandibles and legs (Figure 1). They are 4.5 to 5.0 mm long, which is larger than the similarly colored *Tapinoma sessile* (Say), the odorous house ant (2.4 to 3.3 mm). When viewed from above and without magnification, the Asian needle ant appears long and thin with the pointed gaster (abdomen) having narrow, nearly parallel sides that are slightly wider than the mesosoma (thorax). The gaster of the odorous house ant (OHA) is more rounded and wider than the distal mesosoma (Figure 2). The OHA's node or bump on the petiole (waist) is barely visible, and the one-segmented waist is hidden by the gaster, which lacks a sting. However, with sufficient magnification, the large, stout, singular petiolar node, which is taller than the mesosoma, a shiny mesopleuron (side of thorax), and a visible sting, easily distinguish Asian needle ants from other pest ants (Figure 1). The female alate or winged reproductive has similar coloration but is slightly larger, about 5 to 6 mm or nearly 1/4 inch. The lighter color of the male distinguishes it from the females, as does its smaller size (3.0 mm) (Figure 3). The black imported fire ant, *Solenopsis richteri*, and its hybrid are also dark, stinging ants, but they have a two-segmented waist and a two-segmented club located at the end of each antenna (Figure 4). These features can distinguish fire ants from Asian needle ants.

Figure 2. *Dorsal view of the Asian needle ant's narrow, pointed gaster (abdomen) (left) and odorous house ant's more rounded gaster (right). Note the waist is not visible in the odorous house ant. Photo credits: P. Caveney and K. Vail*

Figure 3. *Asian needle ant female alate (top), male alate (middle) and worker (bottom). Photo credit: E. Paysen.*

Figure 4. *Hybrid imported fire ants workers range in length from 1 to 6 mm, have a two-segmented waist and a two-segmented antennal club. Photo Credit: E. Bernard.*

Distribution

Originally from Japan and other areas of Asia, the Asian needle ant was first discovered in the US in 1932 in Decatur, Georgia. In a few years, the Asian needle ant could also be found in eastern North Carolina and Virginia. Unpublished reports placed it in Alabama, Florida and Tennessee around the 1950s. Little was heard about this ant until stinging events in North Carolina and South Carolina in the early 2000s. This ant was first submitted to the University of Tennessee Urban IPM Lab for identification in August 2004 and has been spreading throughout the state ever since. A 2023 visual survey found this ant in 43 percent of Knox County, Tennessee parks, and a 2020 survey found this ant from the Tennessee southern border of Marion to Polk counties, northeast to Sevier County and northwest to Cumberland, Morgan and Campbell counties (G. Edwards unpublished). Asian needle ants are commonly found in hardwood forests, which account for about half of the state's land area. We suspect its distribution is more widespread throughout the state than has been documented. The current US distribution of this ant includes much of the south-eastern United States, with its greatest abundance in northern Georgia, South Carolina and North Carolina. It is expanding into the Midsouth, Midwest, Mid-Atlantic and Northeast. Recent distribution models suggest a wide range expansion (74 percent) of the Asian needle ant is likely in the United States. The Asian needle ant's distribution as of January 18, 2020, is presented in Figure 5.

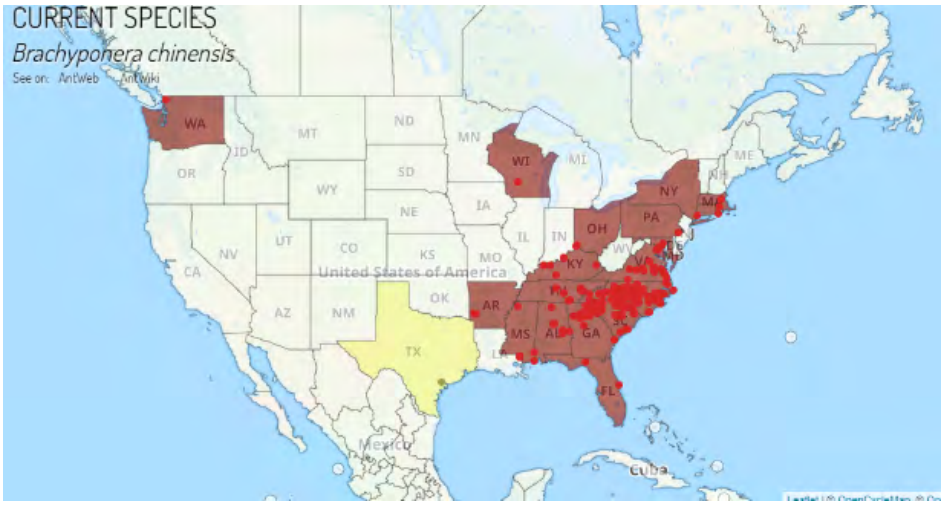

Figure 5. *Map showing the distribution of Asian needle ant as of January 18, 2020, as reported from antmaps.org. (Guenard et al. 2017, Janicki et al. 2016)*

Behavior and Biology

Behavioral differences may help differentiate the dark imported fire ants and odorous house ants from the Asian needle ant. Fire ant nests are often visible mounds in open lawns and pastures. In contrast, the Asian needle ant nests are often in logs, usually located in forested areas or shaded, moist urban sites (Fig. 6). Fire ants are typically found in sunny areas and Asian needle ants in shady areas. Asian needle ant nest sites are very similar to the odorous house ants' which are often found under objects in contact with the soil. These opportunistic nests can be under rocks, pavers, bricks, logs, railroad ties, stumps, pine needles, straw, leaves, mulch and other objects. Unlike fire ants, neither the Asian needle ant nor the odorous house ant builds mounds.

Figure 6. *Asian needle ant nests are often found in logs or under objects lying on the ground (left) and in moist, shaded urban areas or forests (right). Photo credit: J. Chandler. and M. Deinhart.*

Figure 7. *Asian needle ants displaying tandem carrying. Photo credit: P. Caveney.*

Imported fire ants (IFA) and odorous house ants (OHA) mass recruit to food sources. Long lines of IFA or OHA workers often follow guidelines and pheromone trails to food sources. But Asian needle ants don't mass recruit. If an Asian needle ant encounters a significant food source, a sister ant will be carried to the food source, a process called tandem carrying (Figure 7). When this is first noticed, the observer may think they are seeing a two-headed ant, but closer observation reveals there are actually two ants. Another difference between the Asian needle ant and other pest ants is its preference for termites. Although the Asian needle ant consumes a variety of insects, worms, dead reptiles, fish parts and rotten fruits, among other things, it prefers to feed on termites. It is not known to consume honeydew, the excretory product of sap-sucking insects, nor is it known to forage into plants or trees, as do other ants.

The stinging behavior also differs between fire ants and Asian needle ants. Fire ants sting in large numbers to protect their nest when disturbed, but the Asian needle ant is more likely to individually sting to defend itself when pressed against your skin and clothing. One thing Asian needle ants and fire ants have in common is facultative polygyny and polydomy. Sometimes, they have one queen (monogyny) in one nest (monodomy), and other times, they have multiple queens (polygyny) in multiple nests (polydomy). While Asian needle ants may have thousands of ants in a colony, imported fire ant colonies may have hundreds of thousands of ants. However, in the United States, large populations of the Asian needle ants have been observed mid-summer, and these ants are commonly seen on trails in urban woods.

South of Atlanta, Georgia, Asian needle ant foraging peaks July through September, declines from September through November and little foraging is seen through March. Foraging activity is similar in Knoxville, Tennessee. Mating flights typically occur from May to July; however, winged females have been found in colonies from April to October, so the flight season may be longer. The behavioral traits of each species are compared in Table 1.

Table 1. A comparison of the Asian needle ant, odorous house ant and hybrid imported fire ant.

Traits	Asian Needle Ant	Odorous House Ant	Hybrid Imported Fire Ant
Workers sting	Yes	No	Yes
Winged females sting	Yes	No	No
Nest	Under objects	Under objects	In mound
Nests in heavy shade	Yes	Yes	Not frequently
Single queen colonies	Yes	Yes	Yes
Multiple queen colonies	Yes	Yes	Yes
Mass recruit	No	Yes	Yes
Tandem carry worker to food source	Yes	No	No
Size of mature colonies	1000s	100s to potentially millions	100,000s (mature colonies usually around 300,000)

Medical Importance

Allergic responses to the Asian needle ant's sting are common. Workers and winged females can sting. Worker ants are often encountered when gardening or handling firewood. Stings are common when these winged ants land on individuals and get trapped between the skin and clothing. At a South Carolina zoo, most sting victims (80 percent) experienced moderate symptoms, including intermittent pain, swelling at the sting site (< 5 cm), redness and hives, with symptoms persisting from two hours to five days. A smaller percentage (8 percent) of victims experienced more severe local symptoms with swelling of more than 5 cm, extreme hives, redness and recurring pain lasting three days to two weeks. A severe localized reaction is seen in Figure 8. Minor symptoms were experienced by 12 percent of sting victims, and these lasted less than an hour. In Asia, Asian needle ant stings are responsible for many cases of anaphylaxis, a life-threatening condition that causes difficulty in breathing, hives, low blood pressure and other symptoms that can lead to death if the allergic response is not treated. In the native range of the Asian needle ant, 2.1 percent of people stung exhibited anaphylaxis. People who are hypersensitive to other stinging insects may be at increased risk of anaphylaxis from Asian needle ant stings and should be cautious.

Figure 8: *A severe response (red and raised welt more than 3 inches in length) to an Asian needle ant sting in Oak Ridge, Tennessee. Photo credit: L. Russo*

Ecological Importance

The Asian needle ant is a serious pest. Not only is it a medical concern, but it can displace other ant species, altering the ecosystem services they provide. Native ant abundance and diversity are reduced in areas where Asian needle ants have established, and it even displaces other invasive ants such as the Argentine ant, *Linepthima humile*. Asian needle ants may lead to the elimination of native ant species in their natural habitat, resulting in negative impacts on various other taxa, ranging from soil microbes to small mammals. Of great concern is the ability of this ant to displace ants that are critical seed dispersers, which carry seeds away from mother plants, ensuring proper dispersal of the plant species. Substantial decreases in seed dispersal have been documented where Asian needle ants have invaded forests, resulting in dramatic, long-term negative effects on the forest understory. Furthermore, the proliferation of Asian needle ants has resulted in its infestation of public parks and private homes.

Management

Available research provides the following guidance to suppress this stinging pest:

Application of granular ant baits: Research from the University of Georgia suggests that Asian needle ants do not vigorously forage until summer (July and August); therefore, treating during this time may be more effective. In a University of Tennessee study using 1/8-acre wooded plots, Maxforce Complete Insect Granular Bait (1 percent hydramethylnon), Extinguish Plus (0.365 percent hydramethylnon, 0.25 percent s-methoprene) both broadcast at a rate of 1.5 lbs per acre, and Advion Insect Granular Bait (0.22 percent indoxacarb) at 2.3 lbs per 1000 sq. ft. caused >90 percent suppression of Asian needle ant foraging activity for nine weeks in Knoxville, Tennessee, when applied in early August. Baits were broadcast using an EarthWay Nylon Bag Seeder and Spreader. The Advion Insect Granular Bait, applied at a mid-level rate of 2.3 lbs per 1,000 sq. ft, remained visible in the treated area for more than one week, indicating that this rate may be excessive. Advion Insect Granular Bait, applied at 0.38 lbs per 1000 sq. ft, only provided greater than 80 percent reduction in the number of Asian needle ants foraging for three weeks. Thus, it appears that the optimal rate for Advion Insect Granular Bait lies between the two rates evaluated.

Results from Georgia using Advion Insect Granular Bait at 1.15 lb per 1,000 sq. ft. provided at least six weeks of excellent reduction; however, foraging activity naturally declined in October, so the full effect of the insecticide could not be determined. Broadcasting bait appears to be an efficient way to manage Asian needle ants in wooded plots and should limit bait effects on nontarget species compared to the application of contact granular or sprayed residual insecticides.

Other treatment options around homes and other structures include removing potential nest site substrates and objects that the ants nest under. Colonies can also be treated with appropriately labeled insecticide by moving items that protect the nests and directly spraying the ants. Ensuring window and door screens are in good repair before swarm season helps prevent winged ants from entering buildings and stinging people indoors. To help avoid stings, wearing gloves and clothing that covers bare skin is essential when managing this species and working in the landscape. Future research on Asian needle ants should improve management strategies for these insects.

Online Resources

UT Extension publication PB1303 Managing Pests Around the Home for residents: **tiny.utk.edu/managinghomepests**

UT Extension publication W658 A Quick Reference Guide to Pesticides for Pest Management Professionals Working in and Around Structures for pest management professionals: **tiny.utk.edu/PestMgmtforPMPs**

Asthma and Allergy Foundation of America anaphylaxis resources/knowledge and a complete list of signs of anaphylaxis, what you should do if the situation arises, and who may be at higher risk than others: **aafa.org/allergies/allergy-symptoms/anaphylaxis-severe-allergic-reaction/**

Local Extension Offices and where to submit specimens needing identification: **utextension.tennessee.edu/office-locations-departments-centers/**

iNaturalist. Be a citizen scientist. Using this website or app you can enter the locations where you find *B. chinensis* and any other species you've accurately identified and photographed: **inaturalist.org/**

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