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Coptotermes formosanus, Formosan Subterranean Termite (Blattodea: Rhinotermitidae)

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Description

Coptotermes formosanus is a member of the subterranean termite family Rhinotermitidae, which includes both native and exotic species in Louisiana. Formosan subterranean termites live in social colonies divided into three main castes: reproductives (kings, queens and swarmers), soldiers and workers.

Reproductives are responsible for mating and laying eggs. They emerge as swarmers (alates) from their original nest. Swarmers have round, dark brown heads with compound eyes and antennae. They are larger than workers and soldiers, measuring just over one-third of an inch (9 mm) in body length. The body color is tan, and the thorax bears two pairs of equally sized wings that extend beyond the abdomen. At first, the kings and queens are similar in size, but mated queens develop drastically elongated abdomens as a result of egg development.

Soldiers are morphologically adapted to defend the colony. Their thoraxes and abdomens are white, and the heads are large, orange and teardrop shaped. They possess enlarged dark brown mandibles. Soldiers of all other subterranean termites in Louisiana possess rectangular heads, which is the easiest way to differentiate Formosans and others.

Workers have small, soft bodies and round, light brown heads. Eyes of workers and soldiers are either reduced or absent, though both have prominent antennae covered with taste and smell receptors.

Life Cycle

Many insects hatch from their eggs and grow through a series of molts until they become adults, which is usually indicated by wings and sexual maturity. Termites are unique, however, as most don't reach a final sexually mature stage. Only the kings and queens are reproductive. Most termites start as nymphs that will eventually molt into a worker. Many remain workers until they die, but some will molt further into soldiers. Additionally, some of the workers will also molt into a pre-reproductive caste that will differentiate into reproductive alates. These will leave the nest to start their own colony. Some also develop into secondary reproductives that stay in the nest and become replacement or supplementary kings and queens. Intracolony communication and caste regulation is almost entirely mediated by chemical hormonal and tactile interactions.

Formosan subterranean termite colonies develop through five main stages: incipient, immature, juvenile, mature and senescent colonies. Swarmers fly in large numbers during swarm season, which in Louisiana is late April to May, and are strongly attracted to artificial lights. They eventually shed their wings and find mates before establishing a nest and becoming the kings and queens of a new colony. Kings and queens are rarely seen as they spend all of their time protected inside the nest after initial establishment. The pair starts reproducing, initially producing workers and some soldiers. After a few years their colony can reach tens of thousands of individuals. Termite caste differentiation allows discrete division of labor among nonreproductive colony members, with soldiers defending and workers doing everything else, including husbandry; feeding and grooming reproductives, soldiers and eggs; constructing the nest; and foraging for food. Food consists entirely of wood or other cellulose-rich substances. Digestion is accomplished by a host of cellulose-metabolizing microbes that reside in the termites' digestive systems. The mature stage of the

Formosan subterranean termite workers and soldiers in disturbed mud tube. John Hartgerink, used with permission.

Formosan subterranean termite alates. Scott Bauer, USDA Agricultural Research Service, Bugwood.org.

colony is marked by the production of new reproductive individuals that either swarm and found new colonies or remain in the colony to replace or supplement the original king and queen. Larger colonies can contain over 1 million individuals.

The total lifespan of a Formosan subterranean colony is not known, but field observations have estimated some colonies existing at over 35 years of age. At this point, a colony will reach the senescence phase where reproductives die and fewer eggs are laid. There will be no production of new reproductives and surviving termites continue to forage until they die. Without any new brood to replace them, the colony slowly dwindles until there are no termites left.

Ecological Significance and Pest Status

Of approximately three-thousand species of termites, only 80 are considered serious pests of wood structures. Subterranean termites represent almost half of these serious pest species and are responsible for $32 billion in repair and control costs globally. The Formosan subterranean termite is one of the most economically significant because it is invasive to many regions around the world. Its distribution in the United States is limited to Hawaii and the southeast, from eastern Texas to Florida and north into Arkansas, Tennessee and North Carolina.

Formosan subterranean termites were introduced into the U.S. from their native eastern Asia via military cargo ships during the 1940s. Many of these ships came into New Orleans, resulting in the initial infestations occurring in southern Louisiana. In New Orleans alone, costs resulting from damage and control of these termites exceed $300 million annually.

Subterranean termite colonies are located underground near or under their food source. They dig tunnels to forage for food, which is their typical method of invading homes or other wooden structures. Native subterranean termites mainly feed on dead wood and are rarely found in live trees. Formosans, however, readily consume live wood, damaging living trees in forests and urban settings. Formosans can also damage underground cables as they are able to chew through insulation on wiring, potentially causing short circuits. Native subterranean termites do not do this.

Control

As the main point of entry to a structure is through the ground, many preventative chemical strategies target either yards or the perimeters of structures. These liquid termiticides are applied directly to the ground by a professional but are often ineffective on their own. Changes in soil, degradation of pesticides and the inability to treat 100% of the soil provide gaps that allow termites to pass through. Baits may help draw termites away from a structure while administering a poison, slowly killing the colony. Treated lumber can also help deter termite feeding, but this protection is temporary.

Simple tasks such as clearing dead branches from yards or removing dead trees will remove potential food sources that attract Formosan and other subterranean termites. Preventing excess moisture may also help because moist conditions favor termite colonies. Detection is important in diagnosing an infestation, but subterranean termites are cryptic and avoid light. Formosans sometimes create mud tunnels above ground on trees or other wood food sources, and these are often the most obvious evidence of termite infestation. If you see these tunnels, or any evidence of termite damage in nearby trees or inside your home, call a pest control professional to investigate further.

References

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Subterranean termite mud tube on magnolia tree. Joseph McCarthy, Louisiana State University.

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