

Elephant mosquitos, *Toxorhynchites rutilius*, and their potential use as a biological control

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What are elephant mosquitos, *Toxorhynchites rutilius* (Coquillet)?

Toxorhynchites rutilius, commonly known as elephant mosquito or tree hole predatory mosquitos, are commonly found in the eastern United States within deciduous forest. They are visually much different than their blood sucking counterparts that most consider pests. These mosquitos can have a wingspan up to nearly 1/2 inch and are very colorful. This species has vibrant colors of metallic, blue, yellow, and purple scales along their bodies and legs. People describe these mosquitos as quite beautiful, and they are considered the most colorful species of mosquito in the United States (Weissmann, 2021). This species of mosquito does not feed on blood! The adults are known to feed

primarily on sugary substances such as flower nectar. While the adults pose no threat to humans, the larvae of this species feed primarily on other mosquito larvae. Feeding by the larvae of *T. rutilius* provides natural biological control to those mosquitos we consider pests and disease vectors across the world.

Taxonomy

Toxorhynchites rutilius are described as very large, with a wingspan ~1/2 inch and body length ~1/4 inch. The body is covered with shiny metallic blue and yellow scales (Figure 1). The proboscis is very prominent (Figure 2) and is curved upwards. This is where the common name “elephant mosquitos” is derived. Males and females can be distinguished by the antennae. Males have very plumose antenna (Figure 2) and

females have only a few short hairs (Figure 3). Larvae are slender, brown, and are found in aquatic environments. They have sharp mandibles that are used to feed primarily on other mosquito larvae (Figure 4). Pupae resemble the larvae; however, they lack mandibles and now have a capsule-like head (Figure 5).



Figure 1. An adult elephant mosquito, *Toxorhynchites rutilus*, distinguishable by large body size and long curved proboscis. They have blue and yellow scales that are found along the body and legs. Photo by Aubree Morrison.



Figure 2. An Adult Male Elephant Mosquito, *Toxorhynchites rutilus*, close-up of the large plumose antennae and long curved proboscis. Photo by Aubree Morrison



Figure 3. An adult female elephant mosquito, *Toxorhynchites rutilus*, close-up of the antenna with only a few short hairs and a long-curved proboscis. Photo by Aubree Morrison



Figure 3. Larvae form of an elephant mosquito, *Toxorhynchites rutilus*. Photo by Aubree Morrison.



Figure 4. Pupae form on an Elephant Mosquito, *Toxorhynchites rutilus*. Photo by Aubree Morrison.

Habitat and Range

Adult mosquitoes are known to live in deciduous and other forest types. They are widely distributed throughout the southeastern USA, as far north as the Great Lakes, and west into Kansas, Oklahoma, and

Texas (Weissmann, 2016). Larvae and pupae can be found in tree holes, artificial containers and/or in the cupped leaves of bromeliads where water pools and prey are found. In the southern most states these mosquitoes can be found year-round, while in the colder climates they overwinter as larvae.

Prey

The larval stage of *T. rutilus* is known to feed upon larvae of other mosquito species such as *Aedes* species, which are known to spread diseases among humans. It is documented a single *T. rutilus* larva can consume up to 5,000 prey larvae before it matures (Ricciuti, 2022).



Figure 5. Larval *Toxorhynchites rutilus* mosquito voraciously hunt and gorge on the larvae of other mosquitoes sharing the same water. Here a *Toxorhynchites rutilus*, consumes a *Culex* sp. larva. (Ricciuti, 2022) (Image originally published in Schiller et al 2019, Journal of Insect Science)

Use as a biological control?

There is a need to develop safe, sustainable, and environmentally friendly control strategies to manage the spread of mosquito borne diseases (Campos et al. 2020). Studies have been conducted to see if this species of mosquito can be used as a biological control agent. Due to the difficulty of rearing these mosquitoes in mass quantities and identifying the proper timing of release, results on the efficacy of these mosquitoes as an augmentative biological control tool have been mixed. The release of these

mosquitoes in proper habitats at proper times could lead to season long control. However, the lack of knowledge on predator-prey interactions, ephemeral nature of natural breeding sites, and the investment needed in both time and money to create this type of biological control are all limiting factors to implementation at this time. While these mosquitoes have potential as a biological control agent for pest mosquito species, more research is needed before they can be incorporated into mosquito integrated management plans.

For additional information, contact your local nursery specialist at:

Tennessee State University, Otis L. Floyd Nursery Research Center

472 Cadillac Lane McMinnville, TN 37110

<http://www.tnstate.edu/agriculture/nrc/>

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