UNIVERSITY OF FLORIDA
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EENY-028

Deer Flies, Yellow Flies and Horse Flies, *Chrysops*, *Diachlorus*, and *Tabanus* spp.[1]

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Introduction

The family Tabanidae, commonly known as horse flies, and deer flies, contains pests of cattle, horses and humans. In Florida there are 35 species of Tabanidae that are classed as economically important. Horse flies are in the genus Tabanus, deer flies are in the genus Chrysops. The yellow fly, Diachlorus ferrugatus (Fabricius), is known as a fierce biter in Florida. Like mosquitoes, it is the female fly that is responsible for inflicting a bite. The males are mainly pollen and nectar feeders. Tabanids are most likely encountered in hot summer and early fall weather. They are active during daylight hours.

Distribution

Horse flies and deer flies are world-wide in distribution. They are, however, unreported in Hawaii, Greenland, and Iceland. In the United States, Florida produces a large population of tabanids because of the availability of suitable habitat. Florida's mild climate and large permanently wet and undeveloped areas provide good breeding areas.

Description

Eggs: Eggs are laid in masses ranging from 100 to 1000 eggs. Eggs are laid (Figure 1) in layers on a vertical surface such as overhanging foliage, projecting rocks, sticks and aquatic vegetation. Aquatic vegetation is most preferred. A shiny or chalky secretion, which aids in water protection, often covers eggs. The vertical surfaces on which the eggs are deposited are always directly over water and wet ground favorable to the development of larvae. The female will not deposit egg masses on vegetation that is too dense (Figure 2). Eggs are initially a creamy white color but soon darken to gray and black (Figure 3). Eggs are cylindrical in shape and measure from 1 to 2.5 mm in length. Eggs hatch in five to seven days, depending upon ambient weather conditions, and the larvae fall to the moist soil and water below.

Larvae: Larvae use a hatching spine to break out of the egg case. The larvae are aquatic, semi-aquatic

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Figure 1. A deer fly, *Chrysops cincticornis*, laying eggs. Credits: Jerry Butler, University of Florida

Figure 2. Habitat for egg laying. Credits: John Capinera, University of Florida

or terrestrial. Chrysops spp. are termed "hydrobionts" and are found in areas with high water content. *Tabanus* spp. prefer dryer substrates and are "hemi-hydrobionts". The larvae taper at each end and are usually whitish in color, but also can be brownish or green depending on the species (Figure 4). Black bands are found around each segment of the body in many species. The larva breathes through a tracheal siphon located at their posterior end. The larva has a small head and 11 to 12 additional segments. Larvae pass through six to nine stadia. The time spent in the larval stage can last from a few months to a year. The larvae of Chrysops feed upon organic matter in the soil. *Tabanus* spp. feed upon insect larvae, crustaceans, and earthworms. Even though the *Tabanus* spp. are considered to be carnivorous and cannibalistic, reports of as many as 120 larvae per square yard have been found. The larva moves into the upper 2.5 to 5.0 cm of the soil, where it is drier,

Figure 3. Deer fly egg mass after darkening. Credits: Jerry Butler, University of Florida

when it is ready to pupate. Within two days after moving to the surface the pupal stage is reached.

Figure 4. Tabanid larva. Credits: Jason M. Squitier, University of Florida

Pupa: The pupae (Figure 5) are brown colored, rounded anteriorly, tapering posteriorly, and have leg and wing cases attached to the body. There is a row of spines encircling each abdominal segment. A pupal "aster" consisting of six pointed projections is located at the apex of the abdomen. The pupal stage generally lasts from two to three weeks.

Adult: The adult fly emerges from the pupal case via a slit located along the thorax of the case. In most species the males emerge before the females.

Figure 5. Tabanid pupa. Credits: Jason M. Squitier, University of Florida

After emergence of both sexes, the flies mate. Mating starts with the male pursuing the female. Mating is initiated in the air and completed on the ground. The female then deposits an egg mass and is ready to seek a host. Adult Tabanidae are large flies with broad bodies and bulging eyes. The males are easily differentiated from female flies because eyes are contiguous in the males and widely separated in the females. The antennae are three segmented. The thorax and abdomen are covered with fine hairs. Deer flies (Figure 6) range in length from 7 to 10 mm while horse flies are from 10 to 25 mm. The deer flies are yellow to black, have stripes on the abdomen, and possess mottled wings with dark patches. Yellow flies (Figure 7) are yellowish with the same body shape of deer flies, but have dark purple to black eyes marked with florescent green lines. Horse flies (Figure 8) are black to dark brown with green or black eyes. Adult deer flies have apical spurs on the hind tibiae that are not present in horse flies.

Figure 6. Adult deer fly, *Chrysops* sp. Credits: James Castner, University of Florida

Figure 7. Adult yellow fly, *Diachlorus ferrugatus* (Fabricius). Credits: Jerry Butler, University of Florida

Figure 8. Adult horse fly, *Tabanus* sp. Credits: James Castner, University of Florida

Life Cycle

Adult tabanids are encountered in Florida between the months of May and September. Most species overwinter in the larval stage and pupate during the spring and early summer. An egg mass has been found as early as May 5th and as late October 13th. Most have a year-long life cycle but some larger species may take two or three years. Adult life span is 30 to 60 days.

Damage

Tabanids lie in wait in shady areas under bushes and trees for a host to happen by. Sight is the main host finding mechanism, but carbon dioxide and odor also play a role. Moving objects, especially if dark colored, are most prone to attack. Attacks occur during daylight hours with a peak beginning at

sunrise and lasting three hours. A second peak is two hours before sunset and commences shortly after. Attack frequency is low on overcast days or at temperatures below 22 and above 32 degrees Celsius. On livestock, biting occurs on the abdomen, legs, and neck. Tabanids inflict deep wounds that cause a flow of blood. The mandibles and maxillae penetrate the skin in a scissor-like action. Anticoagulants in the saliva are pumped into the wound and the blood is ingested through the sponging labella. Pathogens may be transmitted from flies that are disturbed while feeding on one animal and begin feeding on another. It is known that deer flies can mechanically vector Tularemia and Loa loa, and horse flies transmit Anthrax. Fly attacks result in lowered gains and low milk production in livestock animals. In 1976, estimated losses in the United States were at 40 million dollars. One cattle ranch in Kentucky lost an average 100 lbs. per animal due to tabanids. It is not uncommon to see as many as 100 flies feeding on an animal at one time. Twenty to thirty flies feeding for six hours are capable of taking 100 cc of blood.

Biological Control

There are no effective biological control programs for controlling tabanids. There are native beneficial insects that target tabanids. Eggs are parasitizied by such Hymenoptera families as Trichogrammatidae, Scelionidae and Chalcididae. Diapriidae and Pteromalidae (Hymenoptera) and Bombyliidae and Tachinidae (Diptera) parasitize the larvae and pupa. Tabanid adults are used as provisions for nest building wasps. Cattle egrets and killdeer are also tabanid feeders.

Management

Currently there are no adequate means for managing populations. Traps are sometimes effective in control of small areas such as yards, camping sights, and swimming pools. Trapping of nuisance flies has reduced their numbers on the Atlantic Coast of the United States. Traps have been effective when used around cattle that are confined to manageable areas.

Some traps are spherical, black and shiny balls (Figure 9). The flies are attracted to these objects as the wind moves them. Malaise traps (Figure 10) can catch large numbers of flies by simply being in their flight paths or by the use of attractants (Figure 11), such as CO_2 and octenol. These traps are mostly useful for sampling. For personal protection, long sleeve shirts and pants in combination with a repellent containing diethyltoluamidae (DEET), citronella, or geraniol are affective. For livestock, pyrethroid pour-ons function as limited repellents. Self-applicating methods are not effective for horse flies. Ear tags and head collars impregnated with insecticides have had success in control. For removal trapping, recent research has shown that blue cylinders (inverted cups, for example) coated with sticky material and attached to slow moving (<7 mi/hr) objects (the front of a truck or riding lawnmower) or on top of a cap worn atop a person's head are effective at reducing the abundance of these flies (Figure 12). See Trolling Deer Fly Trap for more information.

Figure 9. Ball trap, black sphere. Credits: Jason Squitier, University of Florida

Figure 10. Malaise traps can catch large numbers of flies by simply being in their flight paths or by the use of attractants, such as CO_2 and octenol. Credits: R. F. Mizell, III, University of Florida

Figure 11. Attractant trap. Credits: Andy Rasmussen, Florida A&M University

Some large-scale methods such as manipulation of the habitat have been suggested. This could be done by removing unnecessary woody plants from residential areas or draining of wet areas to reduce suitable breeding habitat.

The use of insecticides is generally thought of as economically unfeasible. Granular insecticides were applied to the water in the 1950s but environmental effects were eventually considered. Spraying for the adults is also ineffective. Individual protection from adults can be obtained by using a repellent on exposed skin and clothing prior to exposure.

Insect Management Guide for Biting Flies

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Figure 12. A blue colored cylinder covered with sticky material makes an effective removal trap for deer flies and other tabanids when attached to a slow moving object (< 7 mi/hr). Credits: R. F. Mizell, III, University of Florida

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