Myakka bug, *Ischnodemus variegatus* (Signoret) (Insecta: Hemiptera: Blissidae)¹

Cecil O. Montemayor, Rodrigo Diaz, William A. Overholt and Amanda Hodges²

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**Introduction**

West Indian marsh grass, *Hymenachne amplexicaulis* (Rudge) Nees (Poaceae), is a robust, stoloniferous, semi-aquatic, perennial grass native to the Neotropics (tropical Central and South America). This perennial grass is considered valuable forage in its native range (Tejos 1978, Enríquez-Quiróz et al. 2006). It reproduces from stolons or seeds in areas with fluctuating water levels and can survive long periods of flooding, but only persists along the edges of permanent deep water (Tejos 1980). West Indian marsh grass is especially adapted to low lying fresh water wetlands and flood plains containing high nutrient and sediment influx (Csurhes et al. 1999).


In 2000, the “Myakka bug,” *Ischnodemus variegatus* (Signoret) (Hemiptera: Blissidae), was first reported causing severe damage to *Hymenachne amplexicaulis* at Myakka River State Park, Sarasota County, Florida (Brambila and Santana 2004). *Ischnodemus variegatus* was identified as a new record for the continental United States by the Florida Department of Agriculture and Consumer Services (FDACS) (Halbert 2000). Research was conducted by University of Florida scientists on the biology, host specificity, and potential impact for this newly introduced, exotic insect species.

**Synonymy**

The taxonomic status of this species was reviewed by Slater (1987) who raised *Ischnodemus variegatus* (Signoret) from synonymy with *Ischnodemus oblongus* Fabricius.

**Distribution**

The native distribution of *Ischnodemus variegatus* includes Central and South America. Collection records indicate *Hymenachne amplexicaulis* may be the only host (Baranowski 1979, Slater 1987).
As mentioned above, both *Ischnodemus variegatus* and *Hymenachne amplexicaulis* now occur in Florida.

In 1988, *Hymenachne amplexicaulis* was released in Queensland for use as “ponded pasture” (Csurhes 1999).

**Description**

Members of the genus *Ischnodemus* are characterized by elongate, parallel sided bodies, closed fore coxal cavities, terete (cylindrical) antennae, a straight apical (tip) margin, and a forewing membrane with a distinctive morphological texture (i.e. the clause and corium are well differentiated) (Slater and Wilcox 1969). Slater (1976) classified this genus as a ‘Type I’ body shape which includes species with elongate, slender body shape that is usually slightly flattened. The ‘Type I’ body shape is advantageous for insects living on the stems of grasses.

Laboratory and field observations indicate the 1st through 4th instars are typically found in aggregations while 5th instars and adults are often observed exploring as individuals. If nymphs or adults are disturbed, they secrete a strong odor from the scent glands located in the thorax and abdomen (Diaz et al. 2008).

![Figure 1. Scent gland of an adult Myakka bug, *Ischnodemus variegatus* (Signoret). Photograph by: Rodrigo Diaz, University of Florida](image1)

**Adults:** Females (7.23 mm in length, ± 0.56, n=28) are larger than males (6.05 mm in length, ± 0.22, n=49) and both genders have a distinctive “M” pattern at the base of the hemelytra. Female sclerites (hardened plates) at the ventral, or top side, tip of the abdomen are triangular in shape. The last sclerites of males are more rounded.

![Figure 2. Adult female Myakka bug, *Ischnodemus variegatus* (Signoret). Photograph by: Rodrigo Diaz, University of Florida](image2)

**Eggs:** The egg length is approximately 3 mm (0.1 inches). Eggs are laid in masses (averaging 12 eggs per mass, with a range of 1 to 38) between the leaf sheath and the culm (or stem of the plant), preferentially near the node. Newly deposited eggs are white and older eggs turn bright red (Diaz et al. 2008).

![Figure 3. Differences between the ventral sclerites at the tip of the abdomen of adult Myakka bugs, *Ischnodemus variegatus* (Signoret). Female sclerites (left); male sclerites(right). Photographs by: Rodrigo Diaz, University of Florida](image3)
Nymphs: *Ischnodemus variegatus* has five nymphal instars. Instars initially remain aggregated near the site of oviposition, or egg laying. Later nymphal instars migrate to tightly appressed spaces between leaves and stems. Fourth and 5th instars are darker in color than early instars.

Figure 4. Egg mass of the Myakka bug, *Ischnodemus variegatus* (Signoret), on culm of the West Indian marsh grass *Hymenachne amplexicaulis*. The eggs are 2.97 mm in length (± 0.13, n=25).

Life Cycle and Biology

Average total development time from egg to adult is 40 days. Eggs take an average of 12 days to hatch at 30.5°C (86.9°F). The nymphal stage reaches adulthood in an average of 29 days at 30.5°C (86.9°F). The preoviposition period is about seven days at 28°C (82.4°F) (Diaz et al. 2008). Females lay their eggs in tight spaces between the leaf sheath and the stem. When the eggs hatch, the 1st instar nymph remains together near the site of emergence (Diaz et al. 2008).

Scientists developed a temperature-dependent development model to predict the number of generations that *Ischnodemus variegatus* could complete per year at different locations in Florida. In North Florida, the model predicts that *Ischnodemus variegatus* can complete two to three
generations per year. In South Florida, the predicted number of generations increases to four to five per year (Diaz et al. 2008).

The optimal temperature range for development and survival is between 28°C (82.4°F) and 33°C (91.4°F). These ideal conditions for *Ischnodemus variegatus* development match with the weather conditions in central Florida from April to October (Diaz et al. 2008).

Development time and survival of eggs as well as immature stages are affected by temperature. When *Ischnodemus variegatus* is exposed to low temperatures from 8°C (46.4°F) to 18°C (64.4°F) and to a high temperature of 38°C (100.4°F), low survivorship occurs. Nymphs died within a few days at higher temperatures of 38°C (100.4°F) and after weeks at lower extreme temperatures, suggesting that *Ischnodemus variegatus* has a broader lower temperature threshold compared to the upper threshold.

**Hosts**

Due to economic and ecological importance of grasses, scientists at the University of Florida studied the host range of *Ischnodemus variegatus*. They found that *Hymenachne amplexicaulis* is the preferred host of *Ischnodemus variegatus* in laboratory and field conditions. In laboratory conditions, developmental host range of *Ischnodemus variegatus* was examined on 57 plant species across seven plant families. Complete development was obtained from *Hymenachne amplexicaulis* (23.4%), compared to water paspalum, *Paspalum repens* (0.4%); beaked panicgrass, *Panicum anceps* (2.2%); and fire flag, *Thalia geniculata* (0.3%). In field experiments, *Hymenachne amplexicaulis* had higher densities of *Ischnodemus variegatus* than other species (Diaz et al. 2009).

The seasonal cycle of *Hymenachne amplexicaulis* in Florida begins in spring during seed germination and new shoot growth. Increases in the water level as well as favorable day-length and temperature in the summer allow the grass to grow aggressively. Maximum biomass for *Hymenachne amplexicaulis* is reached by late summer. Later in the fall, short days trigger flower production (Tropical Weeds Research Centre 2006). During winter, some parts of the grass die, but the stolons and seeds remain dormant underwater until spring. Based on herbarium specimens collected in the native range, a predictive model of the potential distribution of *Hymenachne amplexicaulis* in Florida was created suggests that its northern limit in Florida will be Alachua County.

**Damage**

Damaged leaves turn dark red, due to the accumulation of anthocyanins (a type of pigment in the host plant). Persistent infestations eventually result in leaves turning brown and dying. Feeding effects of *Ischnodemus variegatus* diminish carbon dioxide assimilation, growth rate, photosynthetic capacity and biomass of *Hymenachne amplexicaulis* (Overholt et al. 2004). Greenhouse experiments
demonstrated that Ischnodemus variegatus feeding damage negatively affected growth of Hymenachne amplexicaulis seedlings (Diaz 2008).

Economic Importance
Population outbreaks of Ischnodemus variegatus during the summer produce a major stress on West Indian marsh grass plants growing in poor conditions (shallow canals). However, plants growing in resource rich environments (deep floodplains, high nutrients runoff) can sustain some damage by Ischnodemus variegatus without impact on the plant’s reproductive output (Diaz 2008).

Natural Enemies
Ischnodemus variegatus has two natural enemies in Florida: the egg parasitoid Eumicrosoma sp. (Hymenoptera: Scelionidae) and the entomopathogen Beauveria bassiana (Balsamo) Vuillemin (Deuteromycotina: Hyphomycetes). The egg parasitoid was identified as a potentially accidentally introduced, non-native species for North America (T. Nuhn 2005, personal communication). It attacks young and old eggs, and parasitized eggs turn black. Field sampling in Florida demonstrated that the impact of these natural enemies is minimal to Ischnodemus variegatus populations.

Selected References


