First Report of an Egg Parasitoid Reared from Neomusotima conspurcatalis (Lepidoptera: Crambidae), A Biological Control Agent of Lygodium microphyllum (Schizaeales: Lygodiaceae)

Authors: Lake, Ellen C., Gates, Michael W., Smith, Melissa C., Witkus, Gloria L., and Pratt, Paul D.

Source: Florida Entomologist, 98(4) : 1244-1246

Published By: Florida Entomological Society

URL: https://doi.org/10.1653/024.098.0436
First report of an egg parasitoid reared from *Neomusotima conspurcatalis* (Lepidoptera: Crambidae), a biological control agent of *Lygodium microphyllum* (Schizaeales: Lygodiaceae)

Ellen C. Lake¹, *, Michael W. Gates², Melissa C. Smith³, Gloria L. Witkus, and Paul D. Pratt³

Native predators and parasitoids within the introduced range of a biological control agent often find and attack the agent, a novel resource (Hill & Hulley 1995; Paynter et al. 2010; Christensen et al. 2011). Biotic interference or resistance can decrease the efficacy of a biological control agent, and may even prevent biological control agents from establishing in the introduced range (Goeden & Louda 1976; Van Driesche et al. 2008 and references therein; Paynter et al. 2010). For example, predation by the generalist *Plagiognathus politis* Uhler (Hemiptera: Miridae) decreased the effectiveness of *Galerucella calmariensis* L. (Coleoptera: Chrysomelidae), on *Lythrum salicaria* L. (Myrtales: Lythraceae), purple loosestrife, and predation by spiders, fire ants, and birds contributed to the failure of *Spodoptera pectinicornis* Hampson (Lepidoptera: Noctuidae) to establish on *Pistia stratiotes* L. (Alismatales: Araceae), waterlettuce (Dray et al. 2001; Hunt-Joshi & Blossey 2005). Old World climbing fern, *Lygodium microphyllum* (Cavanilles) R. Brown (Schizaeales: Lygodiaceae), is native to tropical and subtropical regions of the Old World (Pemberton 1998; Smith et al. 2006). It escaped cultivation in Florida and was first reported as naturalized in 1965 (Becker 1968; Pemberton & Ferriter 1998). *Lygodium microphyllum* is now widespread in wetland and mesic habitats in south and central Florida, with several isolated populations in north Florida (ED-Maps 2015). This aggressive indeterminate vine can climb 20 m or more into trees and can extend horizontally, smothering native vegetation and reducing plant diversity and ecosystem services (Gordon 1998; Pemberton & Ferriter 1998). *Lygodium microphyllum* produces vast numbers of spores that are windborne and opportunistically self-compatible (Lott et al. 2003; Volin et al. 2004).

The rapid spread of *L. microphyllum*, its impact on native communities, and the lack of effective long-term control using conventional management techniques prompted the start of a classical biological control program in 1997 (Goolsby et al. 2003; Hutchinson et al. 2006). The ongoing search for potential biological control agents has focused on Asia and Australia (Pemberton 1998; Goolsby et al. 2003).

The moth *Neomusotima conspurcatalis* Warren (Lepidoptera: Crambidae) was approved for release as a biological control agent of *L. microphyllum* in 2007 (Boughton & Pemberton 2009). Field releases began in 2008 and large populations developed quickly at some sites causing “brown out” events where heavy defoliation by the larvae caused large areas of *L. microphyllum* to turn brown (Boughton & Pemberton 2009). Field collections of *N. conspurcatalis* larvae to check for parasitism began approximately 8 mo after the first release (Boughton et al. 2012). In total, 1,100 *N. conspurcatalis* larvae were collected from Jonathan Dickinson State Park, Hobe Sound, Florida, USA, between 2008 and 2010 (Boughton et al. 2012). Four species of hymenopteran and one species of dipteran parasitoids were reared from these larvae (Kula et al. 2010; Boughton et al. 2012).

Here we report the first egg parasitoid reared from *N. conspurcatalis* in its introduced range. This is the first recorded egg parasitoid for *Neomusotima* at the generic level (Noyes 2015). *Neomusotima conspurcatalis* females lay eggs singly or in clutches of 20 or more eggs, usually on the underside of *L. microphyllum* foliage (Solis et al. 2004; Boughton & Pemberton 2012; personal observation). The eggs are relatively flat, may overlap like shingles, and are translucent pale yellow in color (Solis et al. 2004; Boughton & Pemberton 2012; personal observation). The egg turns more yellow as the larva develops, and the dark head capsule becomes visible before the 2 mm long larva emerges. Healthy egg masses are difficult to see with the naked eye due to their color and small size. In contrast, parasitized egg masses are more visible because the chorion of parasitized eggs turns a grayish color with black spots, making these egg masses stand out against the *L. microphyllum* foliage. In Mar 2013, a dark *N. conspurcatalis* egg mass was observed on *L. microphyllum* collected from a field site in Martin County, Florida, USA. This egg mass was held in the laboratory and microhymenopterans emerged.

Parasitized egg masses have since been recovered at multiple sites located up to 125 km apart in southeast Florida. These egg masses were found by observers searching foliage in the field or were detected in the laboratory on field-collected *L. microphyllum* that was examined visually prior to use in the *N. conspurcatalis* mass rearing operation. Individual parasitized egg masses were left in situ on foliage of *L. microphyllum* and held in a plastic vial (Thorton Plastics CO, Salt Lake City, Utah, USA) at approximately 24 °C until parasitoids emerged. The microhymenopterans and remains of the egg mass were then preserved in 95% ethanol and sent to the U.S. Department of Agriculture, Agricultural Research Service, Systematic Entomology Labora-

---

¹USDA-ARS Invasive Plant Research Laboratory, 3225 College Avenue, Fort Lauderdale, Florida 33314, USA
²USDA-ARS Systematic Entomology Laboratory, P.O. Box 37012, c/o National Museum of Natural History, MRC 168, Washington, District of Columbia 20013-7012, USA
³USDA-ARS Exotic and Invasive Weeds Research Unit, 800 Buchanan Street, Albany, California 94710, USA
*Corresponding author; E-mail: Ellen.Lake@ars.usda.gov
Neomesotima conspurcatalis Warren (Lepidoptera: Crambidae) was first released in Florida, USA, as a biological control agent of Lygodium microphyllum (Cavallin) R. Brown (Schizaeaceae: Lygodiaceae), an invasive weed in Florida. The parasitoid is widely distributed in Florida, where its egg mass parasitism rates can reach 100%.

Key Words: egg parasitoid; Trichogramma; Old World climbing fern; weed biological control


Platner GR, Velten RK, Plante Moneta M, Pinto JD. 1999. Slide-mounting techniques for Trichogramma (Trichogrammatidae) and other minute parasitic Hymenoptera. Entomological News 110: 56-64.


