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GYPSY MOTH (LEPIDOPTERA: LYMANTRIIDAE) FEEDING ON PURPLE LOOSESTRIFE (*LYTHRUM SALICARIA*) IN MICHIGAN

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ABSTRACT

Purple loosestrife, *Lythrum salicaria*, is an exotic invasive weed which is currently the target of a biological control effort using introduced leaf-feeding beetles. In 1997–1998 we observed larvae of the gypsy moth, *Lymantria dispar* feeding on *L. salicaria* at several locations in south central Michigan. In one-minute timed counts conducted over a six-week period in 1998, densities of 0 to 8 larvae per 1-m^2 quadrat were observed. Other observations indicated 23 *L. dispar* 2nd and 3rd instars on a single *L. salicaria* plant. Second and third instar *L. dispar* collected on *L. salicaria* in the field were successfully reared to the adult stage in the lab on a diet of *L. salicaria* foliage. This is the first report of *L. dispar* feeding and development on *L. salicaria*. In areas where they co-occur, distinguishing *L. dispar* damage from that of introduced natural enemies will be important so that estimates of biocontrol agent impact are not biased.

The gypsy moth, *Lymantria dispar* L. (Lepidoptera: Lymantriidae) is a well-known and serious pest of trees and shrubs in the United States. Introduced into eastern Massachusetts in 1869, this generalist herbivore is known to feed on 500+ species in the northeast United States (Liebhold et al. 1995). Most reports focus on feeding of *L. dispar* on woody species (Forbush and Fernald 1896, Mosher 1915, Barbosa and Greenblatt 1979, Lechowicz and Jobin 1983), with fewer noting herbaceous hosts (Forbush and Fernald 1896, Kamalay et al. 1997).

Purple loosestrife (*Lythrum salicaria*) was introduced into North America from Eurasia in the early 1800's (Thompson et al. 1987). *Lythrum salicaria* has become an invasive weed in North American wetlands, where mature plants can produce 2.5 million seeds per year and reproduce vegetatively from root crowns (Malecki et al. 1993, Thompson et al. 1993). Over time *L. salicaria* appears to displace wetland associates, reducing plant diversity with potentially adverse impacts on waterfowl and other wetland wildlife (Thompson et al. 1987). A program of importation biological control was implemented after other methods of control proved ineffective (Malecki et al. 1993). In 1994, the Michigan Department of Natural Resources released *Galerucella calmariensis* L. and *G. pusilla* (Duftschmidt) (Coleoptera: Chrysomelidae), natural enemies imported from Europe, for the control of *L. salicaria*. In 1997, The Purple Loosestrife Project at Michigan State University began conducting large-scale rearing and redistribution of *Galerucella*

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spp. and has released approximately 300,000 beetles in infested wetlands throughout the state.

While conducting releases of *Galerucella* spp., *L. dispar* larvae were observed feeding on *L. salicaria* foliage. In the spring of 1998, we conducted studies to estimate *L. dispar* larval density on *L. salicaria* and to determine the percent defoliation attributable to *L. dispar* feeding. We also determined if *L. dispar* was able to complete development on *L. salicaria*.

MATERIALS AND METHODS

Observations were made at Lake Lansing County Park-North in Meridian Township, Ingham County, MI. The park contains an approximately 16+ hectare wetland infested with *L. salicaria* and surrounded by an oak-dominated forest. Three transects were established 10 meters apart, each beginning at the tree-line and extending 15 m into the wetland. Each transect contained three 1-m^2 quadrats located 5, 10, and 15 m from the tree-line along the transect. One-minute timed counts of *L. dispar* larvae/m^2 quadrat were conducted on six different dates from 28 May to 30 June. On the last three sampling dates, the estimated larval instar and estimated percent defoliation were collected in addition to the number of larvae. Means (± SEM) were reported for each sample date based on a total sample of nine quadrats (n=9). Defoliation was estimated as the percent of total *L. salicaria* leaf area defoliated/m^2 and included feeding by *Galerucella* spp. Weather conditions were recorded on all sample dates. On 12 June, three 2nd or 3rd instars were collected and reared to adult on *L. salicaria* foliage in petri dishes incubated at 24°C and 16L: 8D.

RESULTS AND DISCUSSION

The number of *L. dispar* ranged from 0 to 8 in individual sample quadrats, although, while collecting data on another experiment, a single *L. salicaria* plant over 50m from the nearest tree-line was found to contain 23 2nd-3rd instar larvae during a one-minute observation. For the period 28 May to 30 June, on average, one *L. dispar* larva was observed in each quadrat and in association with *Galerucella* spp., accounted for 15-17% defoliation of *L. salicaria* (Table 1). We observed *L. dispar* larvae feeding from

Table 1. Total count of *Lymantria dispar* larvae observed on *Lythrum salicaria* in 1 m^2 quadrats (n = 9) per sample date. Study site was in Lake Lansing County Park-North, Ingham County, Michigan.

Sample Date	Weather	Number of *L. dispar*	Mean ± SEM[1] per m^2	Life Stage	% Defoliation
5/28/98	Clear	22	2.44 ± 0.77		
6/2/98	Pt. Cloudy	16	1.77 ± 0.49		
6/8/98	Pt. Cloudy	14	1.55 ± 0.44		
6/12/98	Clear	10	1.11 ± 0.39	2nd-4th	15 ± 5
6/16/98	Clear	11	1.22 ± 0.22	3rd-5th	17.44 ± 4.87
6/30/98	Lt. Rain	2	0.22 ± 0.22	Pupae	17.78 ± 5.12

[1] n=9

the margins of the leaf and progressing towards the midvein, leaving irregularly shaped areas of damage. In contrast, *Galerucella* spp. 2nd-3rd instars consume only upper or lower leaf surfaces, creating a "windowpane" effect while *Galerucella* adults chew many small holes through the leaf by feeding briefly at several sites per feeding bout (Blossey and Schroeder 1991). Of the *L. dispar* (n=3) reared on *L. salicaria* in the lab, all successfully eclosed as adults, resulting in two males and one female which oviposited about 100 eggs in a single mass.

To our knowledge, this is the first report of *L. dispar* feeding on *L. salicaria*. Additional sites where *L. dispar* were observed feeding on *L. salicaria* in 1998 occurred in Ingham, Washtenaw, Jackson and Hillsdale Counties, MI. The larvae of *L. dispar* present in *L. salicaria* likely represent survivors of 1st instar ballooning in the spring and thus, may be expected to occur on *L. salicaria* in many areas where *L. dispar* is abundant. At this site, the contribution of *L. dispar* to *L. salicaria* defoliation was small and would not be expected to significantly impact the plant. However, field workers should be trained to differentiate damage of *Galerucella* spp. from damage of generalist herbivores such as *L. dispar* so that estimates of biological control agent impact are not biased.

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