THE IMPACT OF MULTICOLORED ASIAN LADY BEETLE PREDATION UPON SOYBEAN APHID POPULATION SIZE

B.A. Ellingson[1] and D.B. Hogg[1]

Introduction

The multicolored Asian lady beetle (MALB) is a generalist predator native to many of the same regions of the eastern hemisphere as the soybean aphid. In some of these areas of soybean production the beetle is considered to be the most important predator of the soybean aphid. Both the larval and adult stages of the beetle are predaceous on aphids and other soft-bodied insects, which they may consume at a rate of over 100 per day. In the past two decades the MALB has become established in the United States, most likely due to intentional biological control introductions. When the soybean aphid was discovered in Wisconsin in 2000, large numbers of MALB larvae and adults were commonly seen feeding on the aphids. We sought to measure the impact this predation may have upon soybean aphid abundance.

Generalist predators such as the MALB tend to be most effective at locating and attacking pest insects when such prey is numerous. These predators seem less willing or less able to locate and/or remain where prey items are less abundant. In an agricultural setting, for instance, generalist predators may play a considerable role in reducing pest populations when such pests reach high levels. Often, however, economic damage is incurred before these beneficial insects can arrive and provide this effect. This scenario is especially likely with a pest such as the soybean aphid, whose populations can grow explosively on early growth-stage soybean plants. Were the same predators present during critical early-season periods, they may play a more profound and lasting role in pest insect suppression. We investigated this possibility by exposing soybean aphids to four different levels of MALB predation during the early population growth phase of the aphid.

Materials and Methods

Field cages of aphid-resistant nylon mesh were used to enclose soybean plots in which soybean aphid colonization had begun. Cages measured 6 x 6 x 6 ft and were erected on July 20, 2001 when plants were in late vegetative stages. At this time MALB larvae were placed within cages at densities of 0, 6, 15, or 24 per cage. Each predator density treatment was replicated three times (total of 12 cages). Uncaged plots 12 x 12 ft in area were similarly augmented with predator densities equal to those used in the cage study (0, 24, 60, or 96 larvae per plot) and replicated three times each. Aphid densities in both experiments were sampled twice weekly until August 13, when the majority of beetle larvae had entered the non-feeding pupal stage.

[1] Department of Entomology, University of Wisconsin-Madison

Results and Discussion

Soybean aphid levels remained low throughout the open-field study. Figure 1 shows aphid densities for each treatment over the course of the experiment. MALB predation had no noticeable impact upon soybean aphid population growth under these conditions of low aphid pressure.

Enclosing soybean plants within the field cages had the effect of creating an environment highly conducive to soybean aphid population growth. Aphids within the field cages increased at a markedly higher rate than did those in the open field plots. Thus, the impact of MALB predation under conditions resembling an aphid outbreak was measured. Figure 2 shows aphid densities for each treatment throughout the experiment. With the exception of the high-level predator treatment, aphid densities rose swiftly soon after the cages were put in place. In the high predator density treatment aphid levels remained substantially lower, possibly below economic levels.

Under the conditions of this experiment, sufficiently high MALB densities were able to suppress soybean aphid population growth. The high level of MALB predation in this study is equivalent to 29,000 larvae per acre. In a soybean field with a population of 200,000 plants/acre this equals 1 MALB larva per 7 plants. Caution should be exercised when considering insecticide application to fields with large MALB populations.

Acknowledgements

Our thanks to Wyatt Anderson, Chris Hogg, and Ed Steele for their assistance in conducting this study. Special thanks to Bob Jaynes and staff at the Rock county farm, Janesville, WI for their cooperation in providing and maintaining the experimental site.

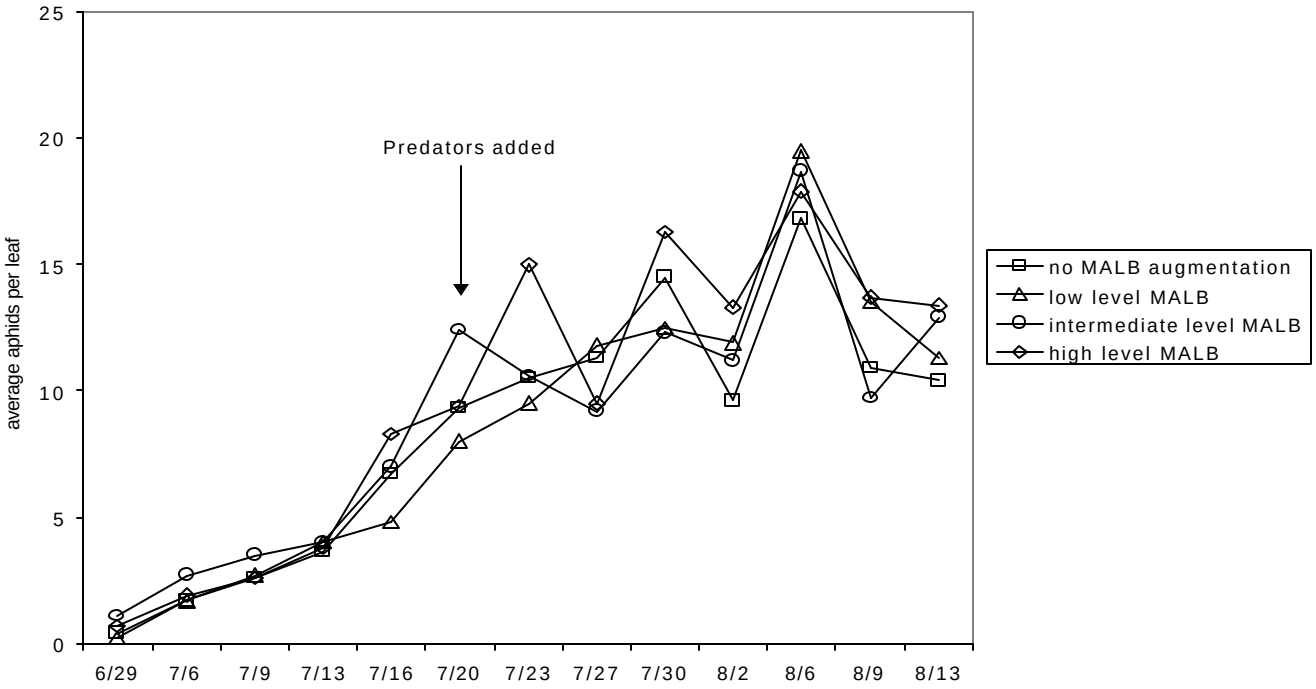

Figure 1. Number of soybean aphids per leaf at four levels of predation by multicolored Asian lady beetle (MALB) larvae in 12x12 ft open field plots.

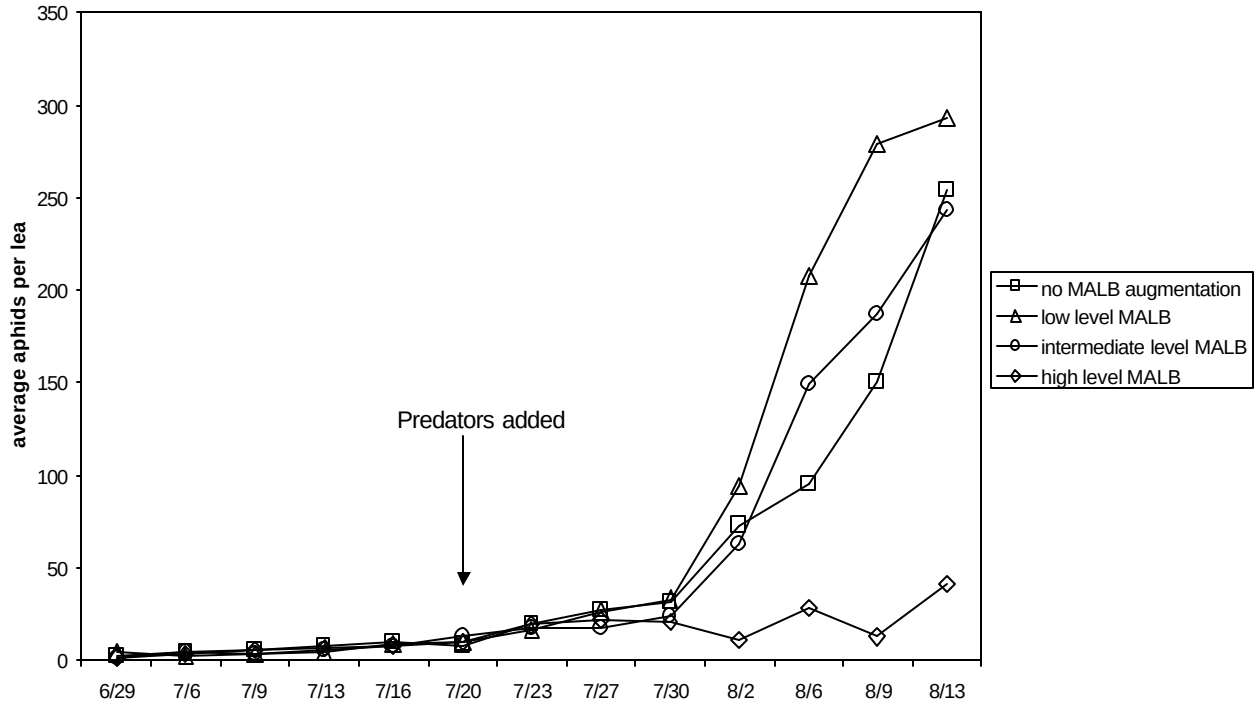

Figure 2. Number of soybean aphids per leaf at four levels of predation by multicolored Asian lady beetle (MALB) larvae in 6x6x6 ft field cages.