The Effect of Light Exposure on Chinese Rose Beetle, *Adoretus sinicus* Burmeister Feeding

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INTRODUCTION

The Chinese rose beetle, *Adoretus sinicus* Burmeister (Coleoptera: Scarabaeidae) is a pest known to cause significant feeding damage on over 500 plant species including taro, corn, and snap beans. It was first discovered during the late 1890’s in Honolulu, HI and can now be found on all major Hawaiian Islands (Riley & Howard 1893, Habeck 1964).

The nocturnal adult begins feeding and copulating on the leaves of host plants shortly after sunset (Hession 1994). The adult preferentially feeds on the non-structural carbohydrate rich (Arita et al. 1993) interveinal area of the host leaf resulting in a skeletonized structure. This type of feeding decreases the photosynthesis in the plant which can ultimately lead to a decrease in growth and fruit yield (Furutani et al. 1990). The larvae of *A. sinicus* feed and develop in the soil but unlike other scarab pest species, the larvae do not attack the root systems of plants rather they feed on humus and detritus (Williams, 1931).

Due to the potential economic loss associated with damage, various control methods have been used to control populations of this pest. Insecticides, such as carbaryl, methoxychlor, diazinon, and malathion, have been used to control *A. sinicus* however, most are broadspectrum insecticides that will also kill beneficial insects. Non-insecticidal techniques, such as chemical lures, trap cropping and microbial agents, have also been developed to control *A. sinicus*
populations but with limited success (Arita et al. 1994; Tsutsumi et al. 1993), thus the need for alternative methods to control this pest without detrimentally affecting the environment.

This study was conducted to determine the effect of light exposure on *A. sinicus* feeding for use as a potential deterrent method.

**MATERIALS AND METHODS**

Site

This study was conducted in the laboratory of the College of Agriculture, Forestry and Natural Resource Management (CAFNRM) Building on the University of Hawaii at Hilo campus. Adult beetles were captured by hand from the UHH Agriculture Farm Laboratory (Panaewa, HI) prior to the experiment.

Host plant

Snap beans, *Phaseolus vulgaris* L. ‘Hawaiian Wonder’, were used as the food source for this experiment since it is a preferential host plant of the Chinese rose beetle (Habeck, 1964). Snap beans were grown using standard planting methods with super soil media. Two seeds were planted added per 4 inch pot which was then placed onto a screened greenhouse bench with overhead daily watering. The plants were ready for use approximately two weeks after planting when the first set of trifoliate leaves appeared.

Experimental Design

The laboratory was maintained at a temperature of 24°C. Screened cages (77.5 x 86.4 x 36.8 cm.) were used for the experiment. Three cages were set up with one snap bean plant and eight (four female, four male) randomly selected beetles in each cage at 5:00 pm. Two of the cages were exposed to a light source of 5.7 watts/meter (measured from inside the cage prior to
the experiment). The third cage was covered with black cloth. At 10:00 pm, the plant from one of the cages exposed to light was removed. The next morning at 9:00 am, the plants from the cage exposed to light from 5:00 pm to 9:00 am and the plant from the cage covered from 5:00 pm – 9:00 am were removed. The leaves from each plant were measured using a leaf area meter (LI-300A; LICOR, Lincoln, NE).

The experiment was replicated ten times. The mean feeding damage (cm. sq.) with standard error was calculated for each treatment.

RESULTS AND DISCUSSION

The mean and SE for each treatment are shown in Table 1. The results show that the leaves from the plants that were exposed to light had less feeding damage than the leaves from plants with no light. The mean feeding damage was 2.908 cm² from leaves of plants with no light (5:00 pm-9:00 am) compared to 0.72 and no damage for the leaves of plants exposed to light from 5:00 pm -9:00 am and 5:00 pm-10:00 pm respectively. These results indicate that there appears to be a relationship between light during the early evening and decreased feeding. Though the results of this study show that light at 5.7 watts/meter did adversely affect feeding, further studies should be conducted to better quantify the relationship between light intensity and feeding.

ACKNOWLEDGEMENT

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Table 1. Mean (+/- SE) *A. sinicus* feeding damage and light exposure.

<table>
<thead>
<tr>
<th>Light Treatment</th>
<th>Mean Feeding Damage +/- SE (cm²)</th>
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<tbody>
<tr>
<td>No light, 5:00 pm – 9:00 am</td>
<td>2.908 +/- 1.18</td>
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<tr>
<td>Light, 5:00 pm – 9:00 am</td>
<td>0</td>
</tr>
<tr>
<td>Light, 5:00 pm – 10:00 pm</td>
<td>0.72 +/- 0.38</td>
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LITERATURE CITED


