THE EFFECTS OF ALKALOIDS ON THE FEEDING BEHAVIOR OF GYPSY MOTH LARVAE

Vonnie D.C. Shields, Kristen P. Smith, Taharah E. Shaw, Nicole S. Arnold, and Ineta M. Gordon

Biological Sciences Department, Towson University, Towson, MD 21252

ABSTRACT

Gypsy moth larvae (*Lymantria dispar (*L.)) are major pest defoliators in the United States and have been known to destroy millions of acres of trees annually. The larvae display a wide host plant preference, feeding on the foliage of hundreds of plants. They favor the leaves of deciduous hardwood trees, such as oak, sweet gum, and maple. Plants contain a variety of phytochemicals, some of which are insect feeding deterrents. These deterrents influence the food selection of many phytophagous insects including gypsy moth larvae. Deterrents, such as alkaloids, are generally not favored and are typically avoided by these larvae. In this study, we tested the effects of eight alkaloids using two-choice feeding bioassays. Each alkaloid was applied at biologically relevant concentrations to glass fiber disks and leaf disks from red oak trees (*Quercus rubra* L.), a plant species highly favored by these larvae. All eight alkaloids tested on glass fiber disks were deterrent to varying degrees. When these alkaloids were applied to leaf disks, however, only seven were still deterrent. Of these seven, five were less deterrent on leaf disks compared with glass fiber disks, indicating that their potency was dramatically reduced when they were applied to leaf disks. The reduction in deterrence may be attributed to the phagostimulatory effect of red oak leaves in suppressing the negative deterrent effect of these alkaloids, suggesting that individual alkaloids may confer context-dependent deterrent effects in plants in which they occur. We also tested the effects of these eight alkaloids at six concentrations spanning four logarithmetic steps to determine deterrent threshold effects. This study provides novel insights into the feeding behavioral responses of gypsy moth larvae to selected deterrent alkaloids. Our results may be potentially useful in designing crop protection strategies from insect pests and will help to improve our understanding of insect feeding behavior.

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