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Report

Description of Damage by Larvae of the Spotted Cucumber Beetle, *Diabrotica undecimpunctata howardi* (Coleptera: Chrysomelidae) to Sweetpotato, *Ipomoea batatas* (L.) (Solanales: Convolvulaceae), Roots

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Abstract: The larvae of the spotted cucumber beetle (*Diabrotica undecimpunctata howardi* Barber [Coleoptera: Chrysomelidae]) are damaging pests of sweetpotato (*Ipomoea batatas* [L.] [Solanales: Convolvulaceae]) roots. Because this assumption was not documented, laboratory trials were conducted to determine if spotted cucumber beetle larvae can feed and develop on sweetpotato roots. Results showed that all stages of spotted cucumber beetle larvae could survive on sweetpotato roots when given no other food choice, and that root damage resembled that described for larvae of other coleopteran sweetpotato pests.

Key words: cucumber beetle, sweetpotato, *Systena,* damage

Introduction

Sweetpotato (*Ipomoea batatas* [L.]) root damage by spotted cucumber beetle larvae (*Diabrotica undecimpunctata howardi* Barber) has not previously been described, even though the insect has been considered a pest of sweetpotato for many years (Cuthbert and Reid 1965, Cuthbert 1967). It is listed as a pest in at least 50 damage-reporting insecticide evaluation trials on sweetpotato published in *Arthropod Management Tests* (previously *Insecticide and Acaracide Tests*) since 1993. However, every trial lists one or more additional insects whose larvae are reported to cause similar damage (wire worms, *Systena* flea beetles, or other *Diabrotica* beetles, primarily *D. balteata* LeConte, the banded cucumber beetle). Since *D. balteata* is a pest of sweetpotatoes, with description of damage by Cuthbert (Cuthbert 1967), similar damage by spotted cucumber beetle has apparently been assumed. The frequent association of *D. u. howardi* and *D. balteata* in insecticide evaluation trials might have contributed to the assumption that *D. u. howardi* is also a damaging pest of sweetpotatoes.

Because the spotted cucumber beetle is the primary *Diabrotica* beetle in the sweetpotato-growing area of Mississippi, a laboratory trial was conducted to verify the capability of larvae to damage sweetpotato roots.

Materials and Methods

Spotted cucumber beetle eggs and larvae for these experiments were reared at the Mississippi State University Insect Rearing Center, with adults collected from various host plants. Young Beauregard variety sweetpotato plants with small, swollen roots (approximately 1.5 cm diameter) were dug from the Mississippi State University Plant Science Research Farm, washed, and replanted in 16-oz plastic cups in a greenhouse (Fig. 1). Autoclaved soil from the same field was used to replant the sweetpotatoes. Holes of 2–3 mm were drilled in the base of each cup to allow water to absorb into the soil when the cups were placed in aluminum roasting pans that served as water reservoirs (Fig. 1). Cup exteriors were spray-painted black to prevent algal growth between the soil and the inside surface of the cup. The sweetpotato plants were infested with eggs or larvae the day after re-planting. After the plants were infested, small mesh cages were placed over the cups and attached to the cup by using a rubber band to keep foreign insects out (Fig. 1). Six treatments (nine eggs, sixteen eggs, twenty-five eggs, five one-day-old larvae, three five-day-old larvae, and three ten-day-old larvae) were replicated four times with four cups per replicate. A single un-infested cup was used for each replicate to verify that the sweetpotato roots were free of insects and damage. Eggs and larvae were transferred from a Petri dish to the soil near the base of the plants using a micro-spatula. The plants were evaluated for insect damage 15 to 25 days after infestation, depending on the larval stage at infestation. Larval damage to sweetpotato roots is described.

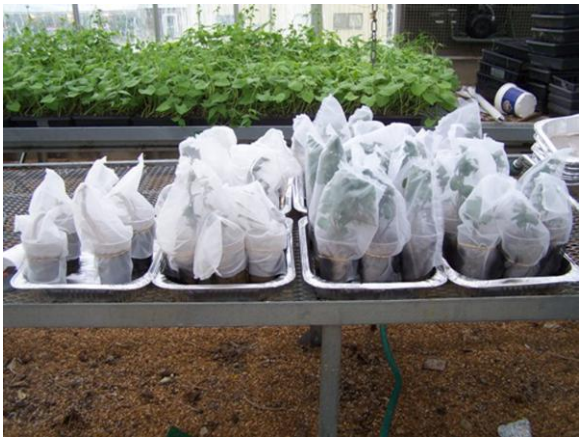

Figure 1. Sweetpotato plants covered with mesh cages in cups sitting in water reservoir pans. Cups on left are newly replanted, and cups on right were replanted approximately 10 d earlier.

Results and Discussion

None of the un-infested cups had any evidence of insect feeding or live insects. Overall insect survival in these experiments was 21.5%, with some survival to adult from infested eggs, and 1, 5 and 10 day old larvae, indicating that all stages can survive on sweetpotatoes. The percentage of roots damaged on infested plants by the larvae from all infestations was 49.5%. Statistical analysis to differentiate survival and damage between egg and larval stages was not completed because replicates and treatments could not all be conducted at the same time due to inadequate supply of eggs and larvae. However, these experiments confirm that in no-choice situations spotted cucumber beetle larvae are capable of developing on sweetpotato roots and causing damage (Fig. 2) similar to that of banded cucumber beetle larvae (Pitre 1962, Cuthbert 1967).

Scars were 1–3 mm wide in most cases and usually led to a cavity under the skin of variable size (Fig. 2). In some cases, however, the holes were less than 1 mm wide or deep, and similar in appearance to the pinhole damage described for larvae of *Systena* spp. (flea beetles) commonly found in sweetpotato fields (Thomas 1927, Cuthbert 1967). These findings suggest that spotted cucumber beetle larvae could be an economic pest of sweetpotatoes. However, sweep-net samples of spotted cucumber beetle collected from sweetpotato fields in Mississippi late season in 2008 and season-long during the 2009

growing season indicated that females were very rare from mid to late season (Reed et. al., 2010). This indicates that more research is needed to determine what factors may affect the ability of spotted cucumber beetles to reproduce in sweetpotato fields and cause damage to sweetpotato roots.

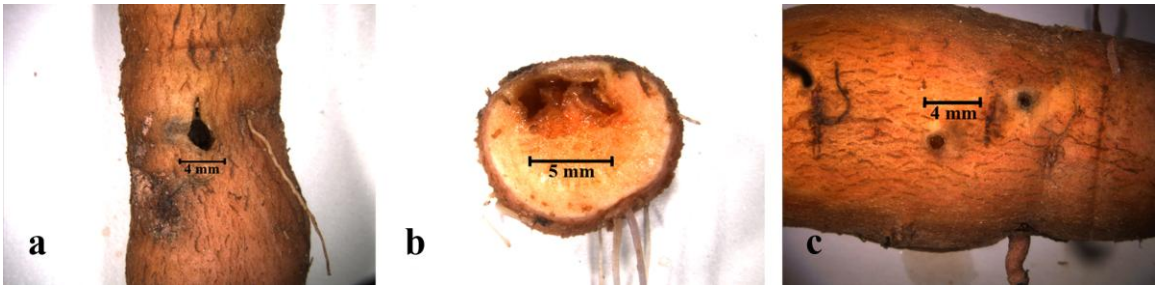

Figure 2. a) Damage to sweetpotato roots caused by spotted cucumber beetle larvae. b) Cross-section of sweetpotato root showing feeding cavity under skin. c) Sweetpotato root with pinhole damage.

Acknowledgment

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