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SAMPLING METHODS FOR *MYLLOCERUS UNDECIMPUSTULATUS UNDATUS* (COLEOPTERA: CURCULIONIDAE) ADULTS

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An exotic weevil, *Myllocerus undecimpustulatus undatus* Marshall, was first detected in the U.S. in Broward County, Florida, in 2000 (Anonymous 2000; Thomas 2005) and since then, it has spread to 12 counties in south Florida (Mannion et al. 2006). *Myllocerus undecimpustulatus undatus* has a very broad host range in Florida with at least 81 plants reported as hosts for adults (O'Brien et al. 2006). *Myllocerus* spp. are typically polyphagous and larvae feed on rootlets (Anonymous 2000; O'Brien et al. 2006), however, the larval host plants for *M. undecimpustulatus undatus* are unknown (Mannion et al. 2006). As part of a study to learn more about the biology of this insect, emergence traps were placed under trees that are known as adult host plants at the USDA/ARS Subtropical Horticulture Research Station in Miami, FL. Captures in emergence traps were compared to captures in the same trees with other sampling methods including beat samples, Lindgren traps (4-funnel traps; BioQuip, Rancho Dominguez, CA), and Tedders traps (pyramid trunk traps; Great Lakes IPM, Inc., Vestaburg, MI). This study provides the first information on the population fluctuations of this pest in south Florida.

Emergence traps were constructed based on the description provided by Mulder et al. (1997). Emergence traps enclosed a surface area of ~0.5 m^2 per trap and the bottom edges were sealed to the ground with a layer of sand (~10 cm deep) placed around the periphery to prevent entrance of weevils from outside of the enclosed area. Emergence and Tedders traps were placed close to the edge but within the drip zone of the tree to be sampled. Lindgren traps were hung in the lower canopy so that the funnels hung below the foliage. Beat samples were obtained by placing the open mouth of an insect net (38 cm diam) under a branch and knocking weevils into the net by striking the branch. This was repeated for 5 branches per tree to obtain 1 sample. Emergence and Tedders traps were sampled twice a week (every 3-4 d) and number of weevils captured was summed to obtain number of weevils per trap per week (per 7 d). Lindgren traps were sampled and beat samples were obtained once a week (every 7 d). All data are presented as number of weevils per trap per week (per 7 d).

Studies were initiated on 9 Nov 2005. Emergence and Lindgren traps were installed at a longan (*Dimocarpus longan* Lour.), a mamey sapote (*Pouteria sapota* (Jacq.)), and 2 mango (*Mangifera indica* L.) trees. These 4 trees were sampled for 12 weeks (first sampling period). On 24 Feb 2006, Lindgren traps were removed from all trees, the emergence trap was removed from the mamey sapote tree, and additional emergence traps were placed under 2 longan, 1 mango, and 2 lychee (*Litchi chinensis* Brewster) trees. These 8 trees were sampled for 21 weeks (second sampling period). On 3 Aug 2006, emergence traps under the 3 longan, 3 mango and 2 lychee trees were moved to new locations within the drip zone of these trees, and additional emergence traps were installed under 3 longan and 3 mango trees, and Tedders traps were installed under all trees with emergence traps. These 14 trees were sampled for 25 weeks (third sampling period). Beat samples were obtained from trees with emergence traps for all 3 sampling periods. Correlation analysis was used to test the relationships among sampling methods (Proc Corr, SAS Institute 2000), with separate analysis conducted within each sampling period. Data from some trees were deleted from analysis when problems with the traps occurred, i.e., traps fell over or were otherwise damaged.

During the first sampling period, similar numbers (mean ± std dev) of weevils were captured per week in emergence traps and beat samples (7.2 ± 8.3 and 8.4 ± 5.5, respectively). Few weevils were captured per week in Lindgren traps (0.6 ± 0.7), however, capture in Lindgren traps was correlated with capture in beat samples ($r = 0.32460$, $n = 47$, $P = 0.0264$). There was no correlation between captures in emergence traps and either Lindgren traps or beat samples ($r = 0.23715$, $n = 47$, $P = 0.4154$; $r = 0.09027$, $n = 47$, $P = 0.5462$, respectively). During the second sampling period, more weevils were obtained per week in beat samples than emergence traps (6.6 ± 7.3 versus 2.5 ± 3.8, respectively) and, again, there was no correlation between these 2 sampling methods ($r = 0.11037$, $n = 165$, $P = 0.1582$). During the third sampling period, most of the weevils were obtained per week with beat samples (9.6 ± 8.4), while fewer were captured in emergence and Tedders traps (2.9 ± 5.8 and 3.3 ±

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6.4, respectively). There was a correlation between emergence trap and Tedders trap samples ($r = 0.15531, n = 346, P = 0.0038$), but no correlation between beat samples and either emergence trap ($r = 0.03275, n = 346, P = 0.5438$) or Tedders trap ($r = 0.00777$, n = 346, $P = 0.8854$) samples. Although our field tests were not designed to document the population dynamics, weevils were monitored with emergence traps and beat samples from Nov 2005 through Jan 2007 (Fig. 1). Except for a few sampling dates, numbers in beat samples were higher than numbers in emergence traps. Within each of these sampling methods, beat sample numbers were high during summer or fall, and emergence trap numbers were high in late fall or winter.

Different segments of the population were sampled by the methods evaluated in this study. Emergence traps sample only newly emerged adults from a fairly small area within the drip zone of the associated tree, and it is not known if those adults fed as larvae on the host tree roots or if they fed on the roots of grass or other plants within the drip zone. Weevils were captured in every emergence trap at some time during the study, with the highest single capture of 42 weevils at a mango tree in 1 week. Tedders and Lindgren traps capture adults moving between trees or within the tree canopy, and these traps use visual cues that mimic a tree trunk (Tedders & Wood 1994) or branch (Lindgren 1983), respectively. Tedders traps are more effective for weevils that upon emerging from underground pupal cells walk to host trees rather than fly (Bloem et al. 2002), and this may explain the correlation between captures in Tedders and emergence traps in our study. In contrast, Lindgren traps may be indicators of adults that are moving within the tree canopy, and even though capture in these traps was low, it was correlated with capture in beat samples.

Results of this study show that either emergence or Tedders traps could be used as sampling methods for *M. undecimpustulatus undatus* adults. They may also be used in areas where the tree canopy is too high to be easily sampled by other methods. Tedders traps provide cumulative capture of weevils over time, and thus could provide effective detection at low population levels. Beat samples are also effective as adults feign

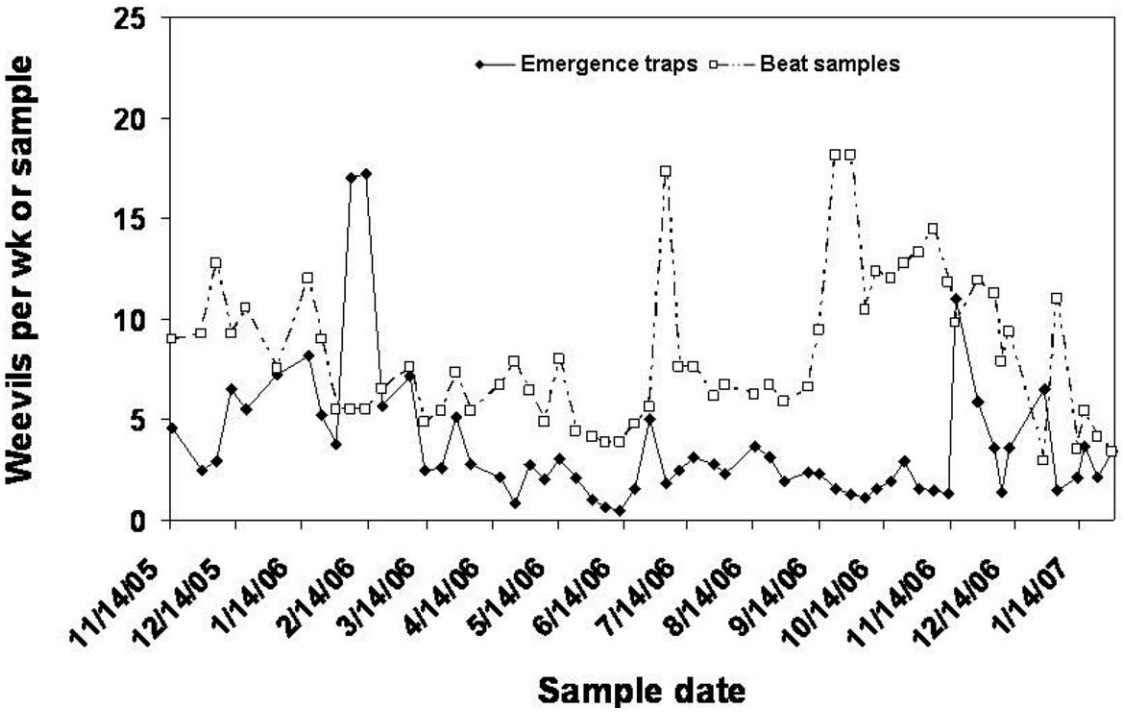


Fig. 1. Population fluctuations of *Myllocerus undecimpustulatus undatus* adults as indicated by number of weevils per trap per week (per 7 d) captured in emergence traps (solid line, solid diamond) or counted in beat samples (dashed line, open square) in 3 sequential field tests conducted from 2005 to 2007 in Miami, FL. Emergence traps were placed within the drip line of adult host trees including longan, lychee, mamey sapote and mango, and beat samples were obtained from trees with emergence traps. Samples were from 4 trees with emergence traps placed 9 Nov 2005, from 8 trees with emergence traps placed 24 Feb 2006, and from 14 trees with emergence traps placed 3 Aug 2006.

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death when disturbed. Few weevils were captured in Lingren traps, but attractant semiochemicals may be identified and used in the future to improve their effectiveness.

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Summary

Emergence traps placed under mango, lychee, longan and mamey sapote trees captured adults of *Myllocerus undecimpustulatus undatus*, confirming reproduction of this weevil in the drip zone of these host trees for adults. Numbers of adults captured in emergence traps were correlated with numbers captured in Tedders (pyramid) traps, while numbers captured in beat samples were correlated with numbers captured in Lindgren (4-funnel) traps. Thus, capture in Tedders traps may be biased toward adults newly emerged from underground pupal cells, whereas capture in Lindgren traps may be biased towards adults that are moving within the tree canopy.

References Cited

Anonymous 2000. NPAG data: *Myllocerus undatus* an Asian grey weevil, URL http://www.pestalert.org/storage/MundatusPAS.pdf

Bloem, S., Mizell, R. F., and O'Brien, C. W. 2002. Old traps for new weevils: new records for curculionids (Coleoptera: Curculionidae), brentids (Coleoptera: Brentidae) and anthribids (Coleoptera: Anthribidae) from Jefferson Co., Florida. Florida Entomol. 85: 632-644.

Lindgren, B. S. 1983. A multiple funnel trap for scolytid beetles (Coleoptera). Canadian Entomol. 115: 299-302.

Mannion, C., Hunsberger, A., Gabel, K., Buss, E., and Buss. L. 2006. Sri Lanka weevil (*Myllocerus undatus*). Univ. of Florida, IFAS Extension, URL http://trec.ifas.ufl.edu/mannion/pdfs/SriLankaWeevil.pdf

Mulder, P. G., McCraw, B. D., Reid, W., and Grantham, R. A. 1997. Monitoring Adult Weevil Populations in Pecan and Fruit Trees in Oklahoma. Oklahoma State Univ. Ext. Facts F7190.

O'Brien, C. W., Haseeb, M., and Thomas, M. C. 2006. *Myllocerus undecimpustulatus undatus* Marshall (Coleoptera: Curculionidae), A Recently Discovered Pest Weevil from the Indian Subcontinent. FL Dept. Of Agric. & Cons. Serv., Entomology Circular No. 412.

SAS Institute. 2000. SAS System for Windows release 8.01. SAS Institute, Cary, NC.

Tedders, W. L., and Wood, B. W. 1994. A new technique for monitoring pecan weevil emergence (Coleoptera: Curculionidae). J. Entomol. Sci. 29: 18-30.

Thomas, M. C. 2005. Pest Alert: *Myllocerus undatus* Marshall, a weevil new to the Western Hemisphere, URL http://www.doacs.state.fl.us/pi/enpp/ento/weevil-pest-alert.html

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