Using Nectar Guides to increase bee sample size

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Abstract
Bees play an important role in nature and are keystone components of healthy ecosystems. Because a growing body of researchers are interested in studying native bees, it is important to test how effective common sampling techniques are at collecting bees. We investigated if nectar guides (lines drawn on the bottom of the pan traps) would increase the number of bees collected compared to traditional pan traps. Our results clearly show that nectar guides do attract more bees to pan traps \((P = 0.048)\) with traps that included nectar guides collecting on average 19.5 more bees than traps without nectar guides (results based on a transect of 10 bowls, 5 with guides and 5 without). These findings are important because they illustrate that relatively simple changes in trapping techniques can increase sample size, which can be important when documenting species diversity in an area. Furthermore, we suggest that nectar guides be implemented in future standardized sampling protocols as a way to more effectively collect bees.

Introduction
• Bee populations have been declining all over the world (Biesmeijer et al., 2006; Potts et al., 2010; Cameron et al., 2011).
• To improve our understanding of these declines, it is important to investigate alternative pan trap methods in order to accurately assess bee (Hymenoptera: Apoidea) diversity.
• Several studies have shown that nectar guides (Fig. 1) increase pollination rates both at artificial flowers and in nature (Free, 1970; Leonard et al., 2013).
• Here, we ask if pan traps with nectar guides collect more bees than standard traps.

Materials and Methods
• Fluorescent yellow pan traps (8 oz.) were used in this study.
• Ten traps were deployed along a 50 m transect, five with nectar guides and five without nectar guides in an alternating pattern (Fig. 2).
• Nectar guides were drawn onto the bottoms of the pan traps using a black permanent marker and consisted of six bisecting lines (Fig. 2).
• Samples were collected seven times from July through September 2013 in Tooele County Utah.
• Samples collected from each pan trap type (with guides or without; averaged across transect) were compared using a paired t-test in the program R.

Results
• A total of 611 bees were collected, 374 total from pan traps with nectar guides and 237 from standard traps.
• Results from the paired t-test suggest that pan traps with nectar guides collected more bees than standard traps (Figs. 3, 4: \(t = 1.9737, P = 0.04793\)).
• On average, pan traps with nectar guides collected ~19.6 more bees per transect than standard traps.

Discussion
• Our study clearly shows that current pan trap methods could be improved by adding nectar guides the the bottom of the bowls, which would increase the number of specimens collected.
• Increased sample size is important to help us better understand patterns of bee diversity and decline across the world so more informed management decisions can be made.
• Future studies should investigate if nectar guides also increase species diversity in pan trap collections.

Literature Cited