What's Best for Bees? Determining Landscape Suitability of Bumblebees Using RFID Technology

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Abstract

Pollination by insects is a crucial ecosystem service that helps to provide over $70\,\%$ of economically important crops worldwide. As the world population and food demands continue to increase, there is a premium for these services. Despite this, pollinating insects, especially bees, are declining due to increased agricultural intensification. However, these declines can be mitigated by developing conservation strategies aimed at protecting landscapes that support healthy and abundant bee communities. In order to develop conservation strategies, it is imperative that we determine which types of landscapes are most suitable to bees. In a 2014 pilot study, we used radio frequency identification (RFID), we tracked common eastern bumblebee (*Bombus impatiens*) foraging and monitored colony performance in relation to floral resources and a range of landscape types across southern Wisconsin in attempts to determine an empirical relationship between the landscape and colony health and performance. We found no evidence of differences in foraging patterns between locations, but did see a positive response in colony reproductive success in agricultural landscapes, and a negative response in urban landscapes. These data suggest that using behavioural traits such as foraging pattern and performance metrics could be used as a measure of landscape suitability to wild bees. Identifying the most suitable landscapes in terms of the aforementioned metrics could help to guide conservation strategies for these essential ecosystem service providers. Work in 2015 will involve testing these methods in a larger subset of landscapes, as well as in a mass-flowering crop (American cranberry: *Vaccinium macrocarpon*) to determine how bumblebees respond to resource pulses in agroecosystems.

Keywords: Agroecosystem, bumblebee, cranberry, ecosystem service, foraging, landscape, pollination, RFID

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