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ORIGINAL PAPER

Invasive ant (*Anoplolepis gracilipes*) disrupts pollination in pumpkin

Palatty Allesh Sinu · V. C. Sibisha · M. V. Nikhila Reshmi · K. S. Reshmi · T. V. Jasna · K. Aswathi · P. P. Megha

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Abstract Yellow crazy ant (*Anoplolepis gracilipes* (F. Smith); "YCA") is known for its aggressive predatory ability and ability to exert exploitation competition on both native and other invasive ants via floral nectar. We argue that YCA invasion can exert both interference and exploitation competition on legitimate pollinators. In pumpkin fields (*Cucurbita maxima* L.) of south India, YCA infested the flowers, particularly the pistillate flowers, for nectar foraging. Pumpkin is a honey bee-mediated cross-pollinated monoecious plant that produces disproportionately very few pistillate flowers. We hypothesize that YCA presence in the flowers can affect the visitation rate and foraging time of honey bees in the flowers, the fruit set in pumpkins, and can exert predatory pressure on the honey bees if the bees linger in ant-colonized flowers. Both YCA and honey bees preferred to forage on the limited pistillate flowers in the plants. After colonizing the flowers, YCA did not retreat for hours, even upon disturbance by competitors, such as honey bees. Both the visitation frequency and the foraging time of honey bees were drastically reduced in ant-colonized flowers, and none of the ant-colonized flowers developed into fruits, suggesting that the YCA exert both an ecological and evolutionary pressure on pumpkin. The ants preyed upon about 17% of the honey bees that lingered in ant-colonized flowers, and the time the bees spent foraging predicted the fate of the bees. Exploitation competition exerted by the YCA on pumpkin may have far-reaching consequences for the pollination and productivity of this cash crop.

Keywords Invasive species · Competition · Mutualism · Pollination · Pollination crisis · Honey bee · Crop production

P. A. Sinu (✉) · V. C. Sibisha · M. V. Nikhila Reshmi · K. S. Reshmi · T. V. Jasna · K. Aswathi · P. P. Megha
Department of Animal Science, Central University of Kerala, Padannakad, Kasaragod, Kerala 671314, India
e-mail: sinu@cukerala.ac.in; sinu@email.arizona.edu

P. A. Sinu
Department of Ecology and Evolutionary Biology, University of Arizona, 1041 E Lowell St., Tucson, AZ 85721, USA

Introduction

Ant-plant interactions, which are primarily mediated by the offer of floral and extrafloral nectar by the plants, can take different forms from facilitative to antagonistic interactions. The literature suggests that native ant species are generally facilitators to plants (Lach and Hoffmann 2011; Ford et al. 2015; Oliveira et al. 2015; Báez et al. 2016) and invasive ant species are generally antagonists to plants (Crowell 1968; Holway et al. 2002; Lach 2003, 2007, 2008; Ness and Bronstein 2004; Blancafort and Gómez, 2005; Zhang et al. 2012; Wilder et al. 2013; LeVan et al. 2014;