Exotic Mustard Effects on Native Tarweed Insect Communities

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Background

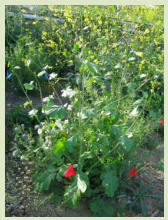
Invasive plants are known to affect native plants, but little is known about how invaders affect insect communities. Most work considers these interactions from the perspective of biological control (top-down effects), but few studies have considered the effect of invasive plants on the whole insect community (bottom-up effects).

This study investigates how the presence of the common California invader Black Mustard (*Brassica nigra*) affects the insect community on a common annual grassland species, Fascicled Tarweed (*Deinandra fasciculata*). Black Mustard is known to affect plant fitness through competition for space as well as allelopathy.

Because mustard tends to decrease the size of its neighbors, we expected to find a greater insect density on the plants grown without mustard. Also, we expected there to be a higher diversity of insects on the plants grown without mustard because these plants can allocate more resources towards defensive chemicals, attracting a more diverse specialist insect community. In summary, we expect that Black Mustard may increase herbivore abundance on natives, but at a cost to insect diversity.

Methods

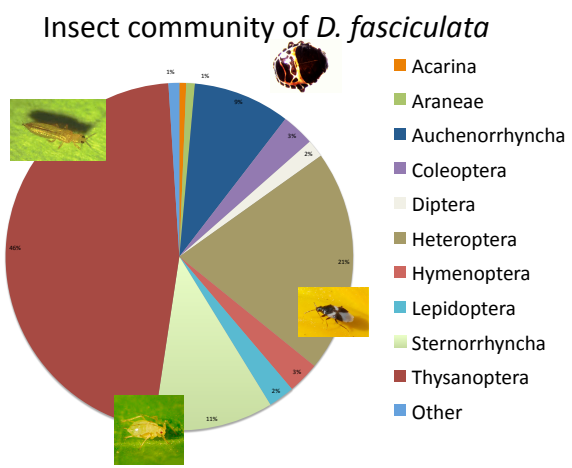
Native *D. fasciculata* individuals were grown with (90 plots) and without (30 plots) *B. nigra* in a community with four other grassland species in 0.25m^2 plots. Insects were collected from half of the *D. fasciculata* individuals during peak flower. Aboveground biomass was collected from both *B. nigra* and *D. fasciculata* one week after insect sampling. Insects were separated into morphospecies and identified to order.

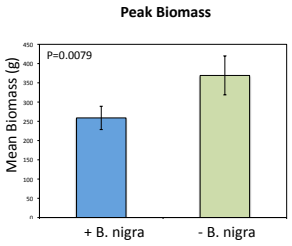


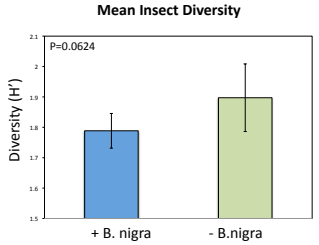
Plot with Mustard

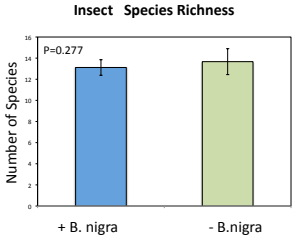
Plot without Mustard

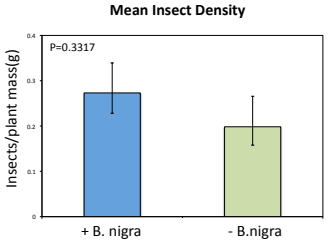
Results











Conclusions and Implications

Invasion by exotic mustards such as *Brassica nigra* may have a minor effect on insect density and diversity on abundant species such as *Deinandra fasciculata.* In this study *B. nigra* had no significant effect on these metrics.

B. nigra may have a greater affect on insect communities by outcompeting less robust native food sources.

Because *B. nigra* had a small effect on the insect community of *D. fasciculata*, restoration of native insect communities may be easily attained in invaded communities.

Future Directions

Because *B. nigra* is known to affect mycorrhizal colonization through allelopathy, the belowground implications of invasion may be important in this system. This experiment is half of a larger experiment to test these belowground effects of *Brassica nigra* on *Deinandra fasciculata* insect communities. In addition to the invasion treatments, our experiment included treatments with and without fungicide in a factorial design.

We are finding the percent mycorrhizal colonization in the *D. fasciculata* roots from the same individuals I used for insect collection. I will relate insect community metrics to the root colonization.

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