Insect-plant pollination networks of central Alaska in the presence of invasive white sweetclover

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Brief introduction

Pollination in boreal and arctic habitats

Flower visiting guilds
- Bees
- Butterflies
- Beetles
- Flies
- Muscid
- Syrphid
- Tachinid
- Mosquito
- Ants
- Wasps
Plant-Pollinator Networks
Plant-Pollinator Networks

“Invasion of the Floral Market”
(Chittka & Schürkens 2001)
Question

- How does the plant-pollinator network change in boreal Alaska with the invasion of *Melilotus albus*?

Predictions

- Reduction in pollinator visitation rate to native plants
- Reduction in native plant-pollinator network interactions
- Reduction in fruit and seed set of native *Vaccinium*
Methods

- Watch pollinators and plants (video and in-person)
  - 4 cameras/site * 30 min each * 2 bouts
  - 2 observers/site * 30 min * 2 bouts

- Unmanipulated sites
  - 10 with *M. albus*, 10 without

- Manipulation/*M. albus* addition
  - 4 control, 8 addition sites
  - Included pollen load, fruit set, seed set measurements
Unmanipulated sites – Observations

In-person observations of sites without *M. albus* (C = 0.21, L/S = 0.69)

In-person observations of sites with *M. albus* (C = 0.45, L/S = 1.57)

(*M. albus* removed from calculations: C = 0.38, L/S = 1.23)
Insect families collected during in-person observations

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<td>Apidae - <em>Bombus</em></td>
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<td>Megachilidae</td>
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<td>Vespidae</td>
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<td>Lepidoptera</td>
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Probability of Visitation

- Appears to have a nonlinear relationship to *Melilotus* patch size (number of individuals)
Manipulated Sites

Control

*Melilotus albus* Addition
Visitation rates – Manipulated Sites

*Melilotus albus* absent or present at site

Wilcoxon
\( p = 0.25 \)
Pollen loads, seed set, and fruit set in Vaccinium vitis-idaea – Spellman et al. in prep.

N.S. = P > 0.05
Conclusions

- Contrary to “Invasion of the floral market” hypothesis:
  - More pollinators and more plant-pollinator interactions when *M. albus* is present
  - No evidence of reduced visitation rates to native plants in the presence of *M. albus* – potentially increases (at modest *M. albus* abundance)
  - Higher seed-set of native *V. vitis-idaea* with large *M. albus* addition
    - Increased diversity of plant-pollinator interactions promotes compatible pollen movement?

Dale Rhoda (2006)