

## Spotted knapweed, native forbs, and pollinators



Are invasive plants friend or foe to pollinators? It depends- some invasive plants can be toxic to pollinator larvae while others aid pollinators by providing additional floral resources. A recent study set out to determine how pollinator communities are affected by an invasive plant common in Montana and elsewhere, spotted knapweed (*Centaurea stoebe*). Researchers at Montana State University studied how density and growth stage of spotted knapweed affected pollinators. Another study investigated impacts of spotted knapweed on reproduction of the native forb hairy goldenaster (*Heterotheca villosa*); this species shares many pollinators with spotted knapweed and their

flowering periods overlap for six weeks.

**Methods:** In the first study, pollinators were observed at nine sites in western Montana where spotted knapweed was present at varying densities (0 to >15 plants/16m<sup>2</sup>). Observations included pollinator abundance, species richness, and flower visitation rates. Observations were also categorized into different spotted knapweed growth stages (pre bloom, early bloom, peak bloom, and late bloom). The second study took place near Bozeman, MT, at a site dominated by native forbs. Because no spotted knapweed was present at the site, potted spotted knapweed plants were placed next to naturally-growing hairy goldenaster plants at varying densities (0 to 4 spotted knapweed plants/hairy goldenaster plant). Pollinator visitation and reproduction of the native plant was followed through one growing season.



**Results:** Thirty seven pollinator taxa visited spotted knapweed flowers, while 26 pollinator taxa exclusively visited native flowers. Most co-flowering species shared at least 50% of their pollinators with spotted knapweed. Prior to spotted knapweed blooming, pollinator abundance and richness was higher in plots without spotted knapweed versus plots with high density (>15 plants/16m<sup>2</sup>). However, during peak spotted knapweed bloom in August, high density spotted knapweed plots had greater pollinator abundance and richness than plots without spotted knapweed. In the second study, both spotted knapweed and hairy goldenaster were visited by a variety of pollinator groups (Table, right). There was little evidence of competition for pollinators between spotted knapweed and hairy goldenaster at spotted knapweed densities used here.

**Pollinator groups observed visiting hairy goldenaster (*H. villosa*) and spotted knapweed (*C. stoebe*).**

Pollinator group	% of visitors	
	<i>H. villosa</i>	<i>C. stoebe</i>
Bumble bees	3.6	42.7
Butterflies	1.1	2.6
Beetles	1.6	0.5
Flies	31.3	5.4
Honey bees	0.7	2.1
Other native bees	60.4	46.2
Wasps	0.7	0.0
Unknown insects	0.7	0.5

**Management implications:** Keeping spotted knapweed at low densities may be sufficient to prevent negative effects on pollinator-dependent native plant reproduction and may even be beneficial to some pollinators by providing floral resources later into summer. Furthermore, competition for pollinators does not appear to be a mechanism by which spotted knapweed invades a native plant community, at least not in the early stages of invasion (i.e. low densities of spotted knapweed). In locations where spotted knapweed is too abundant to eradicate, maintaining ecologically tolerable thresholds is a reasonable management goal, which may come as good news to land managers faced with this widespread, persistent species.

You can read more about this research by clicking here: <http://onlinelibrary.wiley.com/doi/10.1002/ecs2.1233/abstract>

