Correlation between the endangered *Helianthus schweinitzii* and neighboring plant species

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Introduction

Helianthus schweinitzii (Asteraceae) is an endangered sunflower native to North and South Carolina. It is a perennial, flowering in the fall. It prefers areas with poor soil conditions, clay or rock, and tends to grow in disturbed areas (Matthews 1999). *H. schweinitzii* has been under the protection of the Endangered Species Act since 1991 (Matthews 1999). There are only 96 known populations of Schweinitz's sunflower. Its populations are thought to be limited due to habitat destruction, pesticides, roadside construction, and mining (Fish and Wildlife Service).

There are many known interactions between plant species. These can be things like competition, parasitism and mutualism. *H. schweinitzii* shares its habitat with several other species of plants, some closely intertwined and some nearby. Populations of *H. schweinitzii* may be affected by the species with which it shares resources and habitat.

The plant communities in which *H. schweinitzii* are found contain numerous plant species which have similar requirements for successful growth and seed dispersal. It is likely that the plants that surround *H. schweinitzii* will have some influence on the success of the species. We hypothesized that the plant species that grow in close proximity to the *H. schweinitzii* may differ from those that are found in areas where there are not *H. schweinitzii.* We performed experiments to test this.

Methods

- Three protected sites were selected in Mecklenburg and Gaston Counties where *H. schweinitzii* is present– Redlair, Latta Plantation, and Gar Creek.
- At each site, five 1m^2 plots containing *H. schweinitzii* were haphazardly chosen.
- At each site, three 1m^2 plots that were >2 m away from any *H. schweinitzii* were haphazardly chosen.
- All plants in each 1m^2 plot whose flowering times overlapped with the *H. schweinitzii* were quantified and identified.
- These data from the plots with and without *H. schweinitzii* at each of the sites were compared.
- Observations were recorded of pollinator movements from the flowers of *H. schweinitzii* to others of the same species, from *H. schweinitzii* to other species, from other species to *H. schweinitzii,* or from other species to other species.

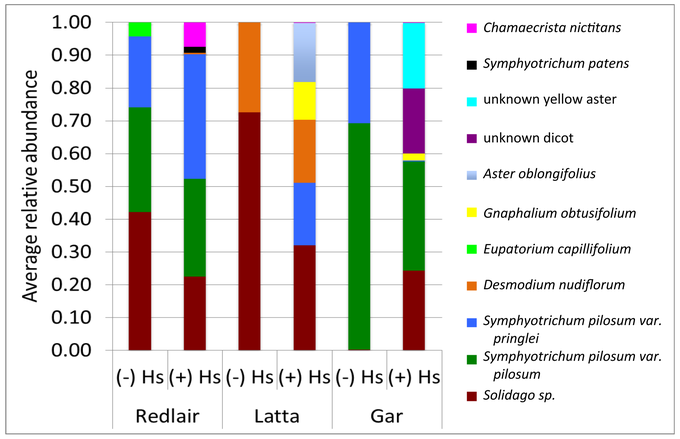

Figure 1. Average relative abundance of plants in plots with and without *H. schweinitzii,* (+) Hs and (-)Hs, respectively.

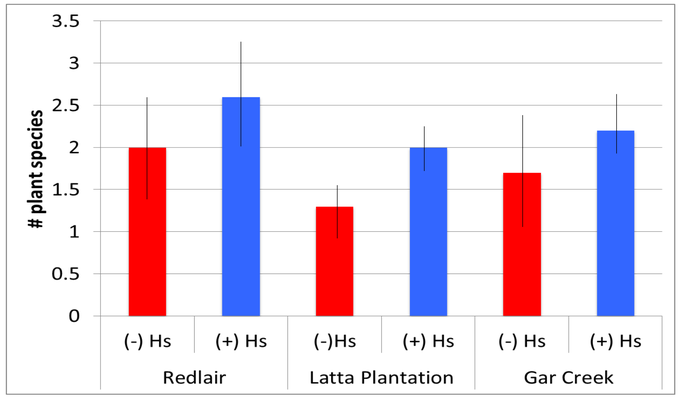

Figure 2. Average number of plant species plants in plots with and without *H. schweinitzii,* (+)Hs and (-)Hs, respectively.

	Redlair (+) Hs	Redlair (-) Hs	Latta (+) Hs	Latta (-) Hs	Gar (+) Hs	Gar (-) Hs
Redlair (+) Hs	100					
Redlair (-) Hs	74	100				
Latta (+) Hs	41	51	100			
Latta (-) Hs	42	52	51	100		
Gar (+) Hs	52	56	26	24	100	
Gar (-) Hs	61	54	19	0	33	100

Figure 3. Percent similarity of relative abundance of plant species between treatments (+Hs and –HS) at the different sites.

Results

- Eleven species, in addition to *H. schweinitzii* were flowering in the plots sampled (Figure 1). Six species were only present in plots with *H. schweinitzii*. One species was only found in plots without *H. schweinitzii.*
- Plots with *H. schweinitzii* had significantly more plant species than plots without *H. schweinitzii* (Figure 2; p=0.008).
- The relative abundance of plant species in the two treatment groups at Redlair more similar to each other than any other pairwise comparison (Figure 3). The (-) HS Gar and Latta communities were quite dissimilar to each other, as were the (+) HS Gar and Latta communities.
- Of the pollinator movements observed, more pollinators were traveling between inflorescences of *H. schweinitzii* than to/from other plant species (Figure 4).

Conclusions

The plant communities at the three sites were highly variable. This indicates that there are not certain species with which *H. schweinitzii* typically resides. Overall, however, more species were present in plots with *H. schweinitzii* than in plots without it. This indicates that preserving habitats where *H. schweinitzii* is present will also provide appropriate habitat for other plant species that have similar requirements as the *H. schweinitzii.* Very few controlled experiments and in-depth observational studies have been conducted regarding specific environmental requirements of *H. schweinitzii.*

The native habitat of *H. schweinitzii* is fire-maintained prairie and savannah. These habitats have declined in abundance, but the plant has been found in areas such as roadsides which incur frequent disturbance. More experiments and observations are needed to determine the specific characteristics of this habitat that make it preferable to *H. schweinitzii* and its neighbors. Studies that span several years should be conducted to see if the species around *H. schweinitzii* change with different dominant weather patterns (drought vs. wet years, for example).

Greater attention should also be paid when roadsides and meadows are mowed. At one of our "protected" sites, for example, some *H. schweinitzii* individuals had been mowed between two of our sample collection dates.

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