



# Interaction effects of burn treatment and floral display on reproductive success within *Liatris aspera* and *Solidago speciosa*

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## Background

- Conservation efforts to maintain tallgrass prairie rely on the careful use of prescribed burns, as anthropogenic change to these regions has suppressed the occurrence of natural fires
- Prairie fires have been shown to reduce seed predation, improve conditions for germination, and promote growth and flowering<sup>1,2</sup>
- Still, burn treatment may impact the fitness of different species in contrasting ways, perhaps dependent upon physical characteristics, costs of reproduction, or plant-pollinator relationships
- To examine whether there is a differential effect of burns on reproduction in different species, we studied two Asteraceae angiosperms that share similar reproductive strategies yet differ in the number of flower heads they produce
  - Asteraceae produce composite flower heads, developing one fruit per ovule whether pollinated or not
  - Liatris aspera* and *Solidago speciosa* are two self-incompatible asters that regularly develop multi-headed floral displays, with *Liatris* generally producing fewer, larger heads than *Solidago*

## Question

Does the size of a plant's floral display interact with previous burn treatment to impact reproductive success?

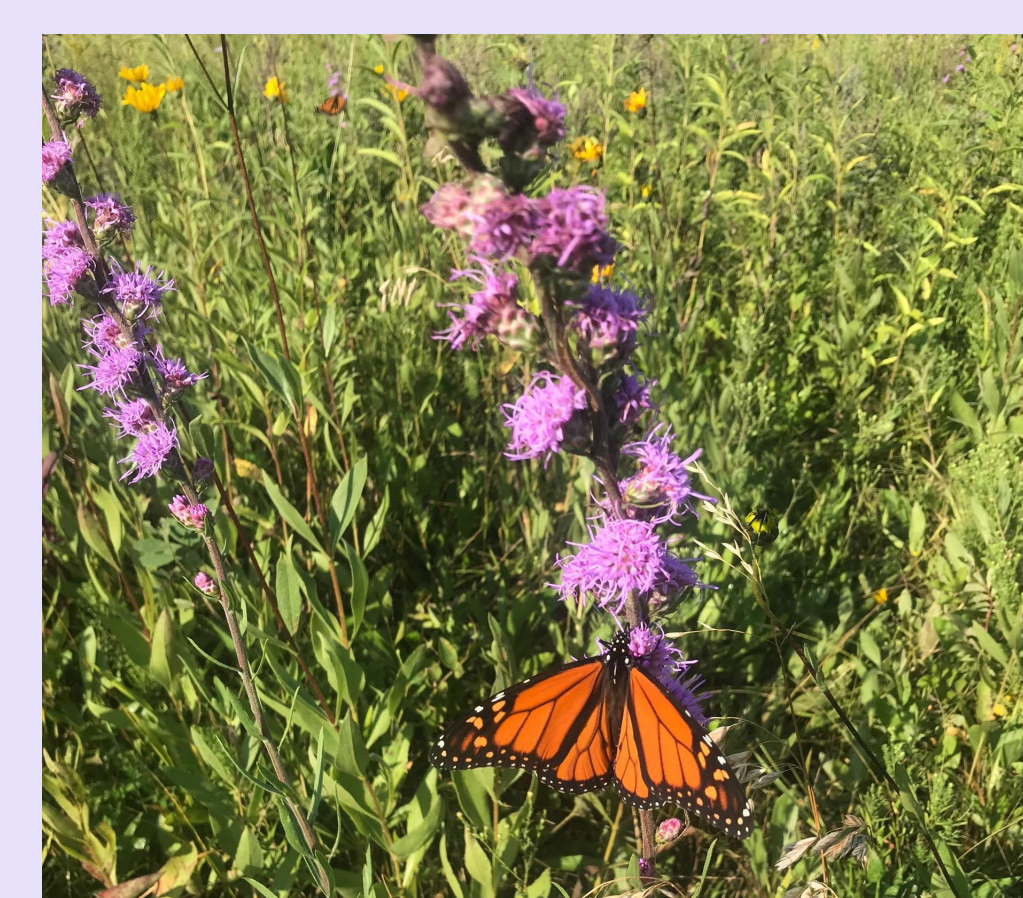
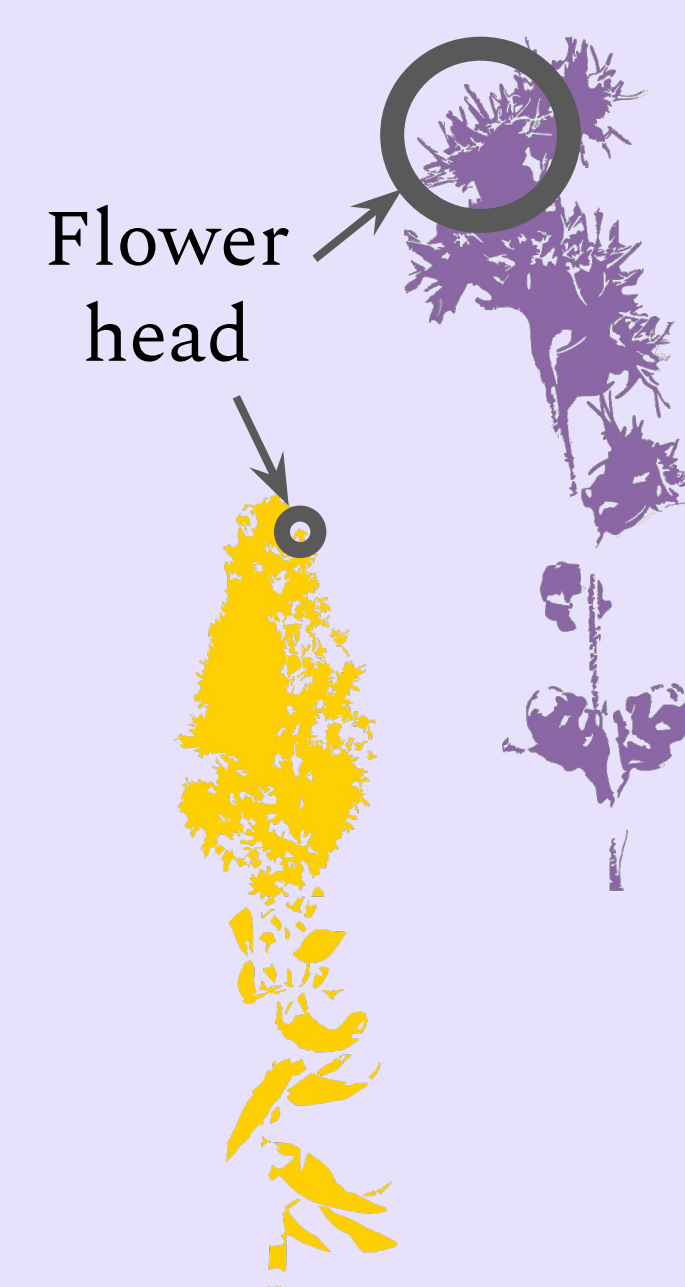
## Methods

Stalks from randomly selected *Solidago* and *Liatris* plants harvested from either side of a burn break at Staffanson Prairie

Samples dissected; heads and achenes counted

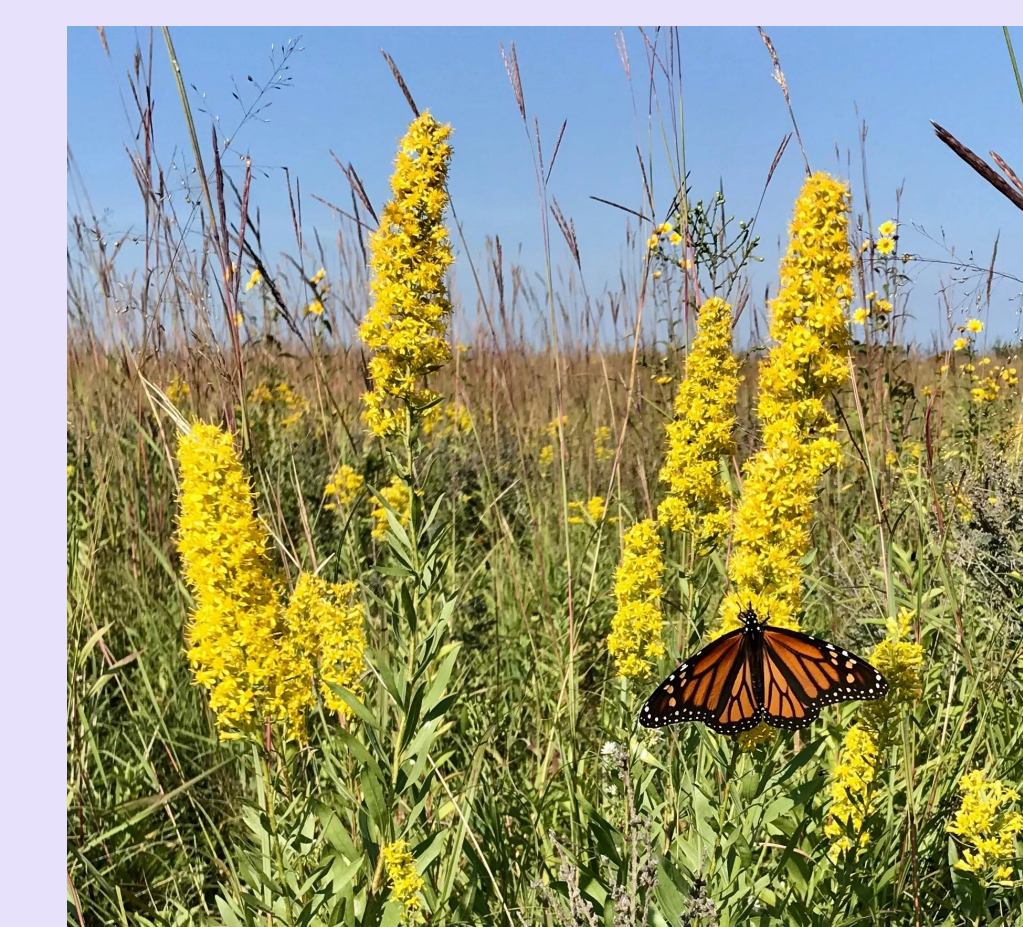
Randomly selected 30 achenes from each plant for x-ray analysis; counted number of achenes with and without seeds to determine seed set

Used R to analyze data: backwards elimination technique to determine minimal adequate model



*Liatris aspera*

- For *Liatris aspera*, burn treatment and head count appear to interact while affecting seed set (proportion of achenes with developed seeds)
  - Without recent burn, greater head count correlates with increased seed set
  - After recent burning, plants generally have more heads, but a greater number of heads did not predict similar increases in seed set
- For *Solidago speciosa*, an interaction model between burn treatment and head count was not statistically significant

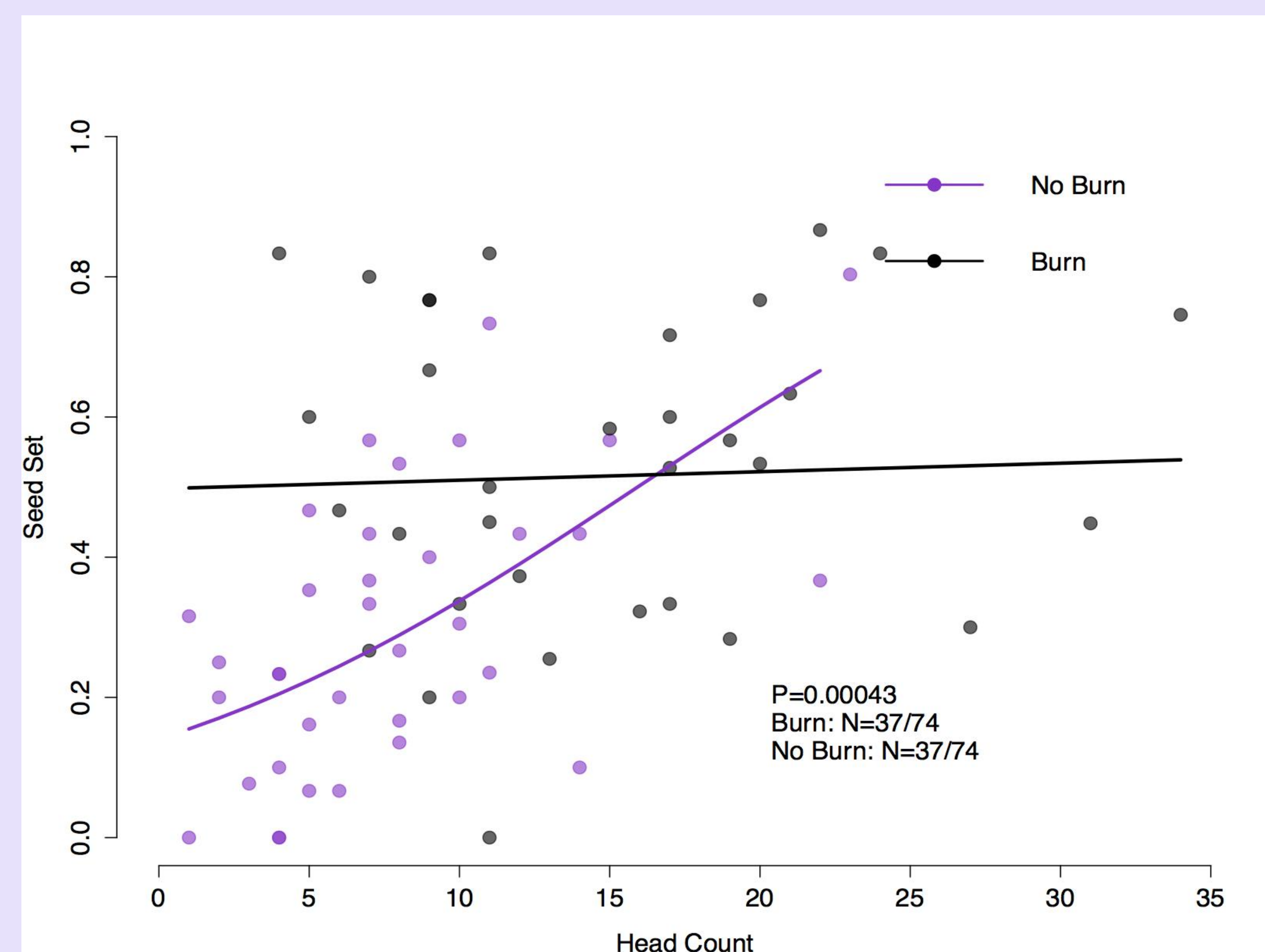


*Solidago speciosa*

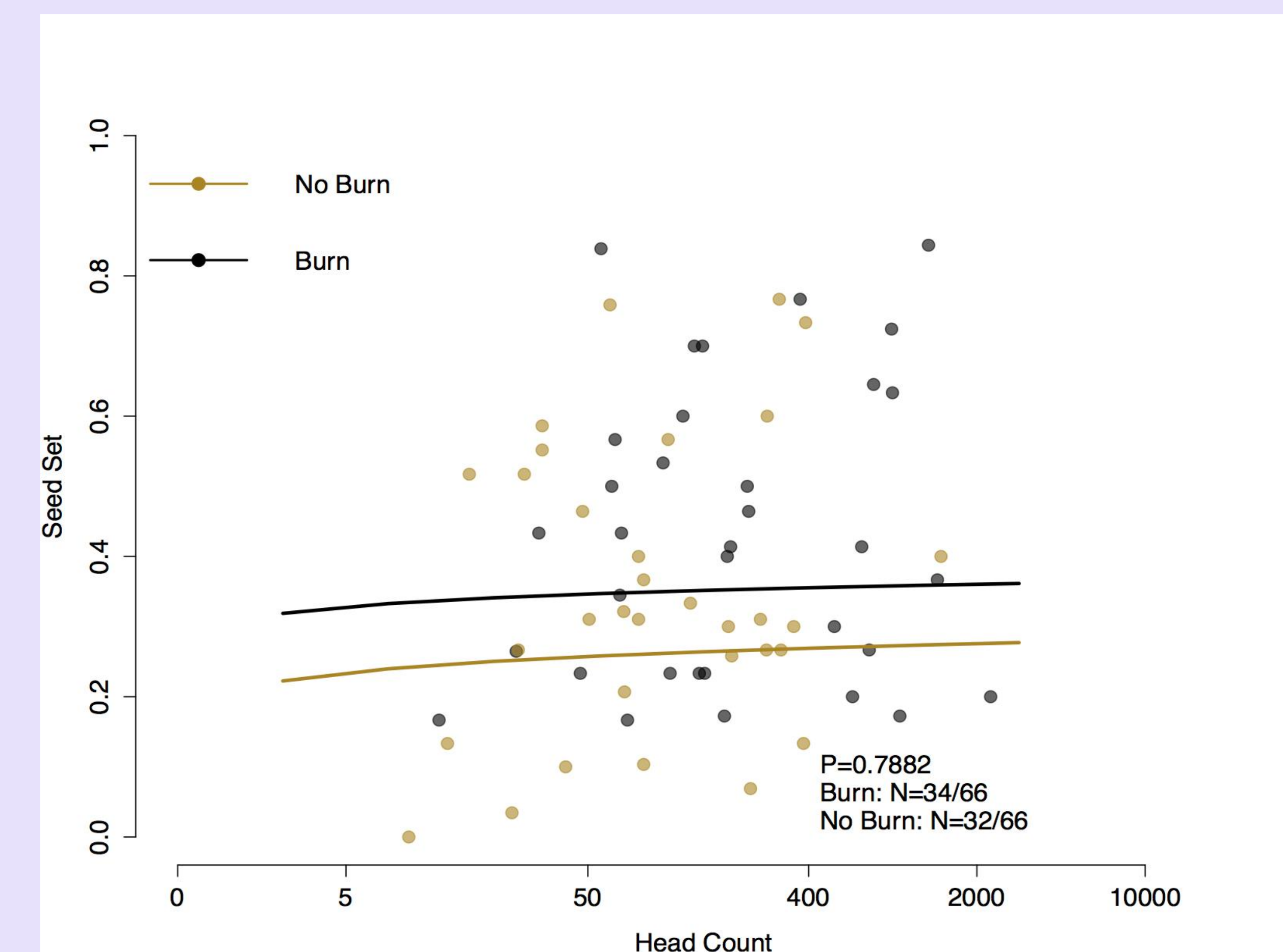
## Discussion & Conclusion

- In thickly-grown, unburned sections of prairie, larger floral displays may, to an extent, be more noticeable and appealing to pollinators
- However, plants in populations that regularly produce large floral displays may not experience these benefits to seed set, as most individuals in the population are relatively visible and pollinator visits are divided between a larger number of heads
  - Such an observation may be seen for *Solidago speciosa*, as this species often produces hundreds of flowering heads per plant
  - This concept may also apply to the burned population of *Liatris* we studied, as these burned plants tended to have larger floral displays
- Fire may interact with variations in plant characteristics such as head count to influence reproductive success, warranting a careful approach to prescribed burns that takes into account species composition

## Results



**Figure 1.** Interaction between burn treatment and total flowering head count influencing seed set in *Liatris aspera*. Colors represent burn treatment prior to flowering.



**Figure 2.** Model for burn treatment and of total flowering head count (on a log scale) interacting to influence seed set in *Solidago speciosa*. A statistically significant interaction was not observed.

## References

- Vickery, P. 2002. Effects of prescribed fire on the reproductive ecology of northern blazing star *Liatris scariosa* var. *novae-angliae*. The American Midland Naturalist Journal 148:20-27.
- Medve, R. J. 1987. The effects of fire on resource allocation and growth of *Liatris spicata*. The American Midland Naturalist Journal 117:199-203.

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