

Background

Habitat fragmentation divides the prairie into remnants, therefore reducing their size. This decrease in size limits the ability to reproduce within each remnant. These conditions result in the Allee effect, which is a positive relationship between population growth and population density and the average fitness of the individual. This could possibly increase the rate of extinction when the population or density is below a certain level. Reproduction depends on the availability of mates, and reproduction rates could be lower in smaller remnant populations (Wagenius et al, 2007).

In smaller remnants, populations, specifically those of *Echinacea angustifolia*, are of lower fitness because of the lack of potential mates. In addition to limited numbers of potential mates, self-incompatible plants are limited genetically as well. This limitation is found on the S locus located in the pollen and styles. Whether the style accepts pollen or not is determined by the dominant S allele. Plants with the same or similar alleles are incompatible with one another. The closer plants are in proximity to each other, the more likely they will mate and the more likely they share an S-allele or two.

In this experiment, I will test to see which plants are compatible with others within one or two remnants by performing crosses between randomized individuals. I will also observe how proximity comes into play when determining compatibility between individual plants within remnants.

Questions:

- How does proximity to other plants affect the ability to successfully pollinate?
- How does the phenology of the plants affect the ability to hand-pollinate?

Goals

- Complete a poster and paper pertaining to this experiment
- Gain experience in independent field work
- Efficiently collect and analyze data

Methods

- Day 1: paint bracts of flowers to be pollinated (3 colors per head, 6 bracts per color)
- Day 2: hand-pollinate each style that was painted the previous day
- Day 3: waiting day
- Day 4: observe whether style is shriveled or not
- I will randomly select plants in one or two remnants (ALF and EELR) to perform crosses
- I will attempt to perform as many sets of crosses as the plants allow. Each set of crosses will last 4-5 days.

Materials:

Pollinator exclusion bags (~40), microfuge tubes (~50), toothpicks (a zillion), tags/twist ties, acrylic paint, refrigerator, measuring tapes, flags, GPS

Concerns

- Does it matter if I start on the first day of flowering? Will the experiment still work if I start mid-flower? There is the risk of pollen contamination if started mid-flower.
- What if the pollen donor and the to-be-pollinated plant don't flower on the same day? How will that affect my experiment?
- Is it useful to compare data within remnants to data between remnants?