Population growth of *Aphis echinaceae* on four species of prairie forbs
Preliminary Project Proposal

Background:

Aphis echinaceae is a recently identified species of aphid which appears to specialize on the herbaceous perennial *Echinacea angustifolia* and is its most common insect herbivore. A previous study, currently under review, noted that *A. echinaceae* populations were less dense on inbred *Echinacea* plants and pursued this observation by examining the abundance of *A. echinaceae* on three different genotypes of *Echinacea* (inbred, bred within a fragment, and bred between fragments). They found that the mechanism driving variability in the success of aphid populations on the three different genotypes could be partially explained by differences in the carbon and nitrogen composition of their leaves. However, an unknown (genotypic) factor in addition to nutrient composition also influenced aphid host selection and population growth.

While observation has suggested that *A. echinaceae* is a specialized herbivore of *E. angustifolia*, there is no experimental evidence supporting this hypothesis. We propose a study examining the level of specialization of this aphid species by performing an addition experiment and enclosing an aphid on four species of forbs: *E. angustifolia*, *Echinacea purpurea*, and the forbs *Heliopsis helianthoides* and *Coreopsis palmate* (which are members of the same family as *Echinacea* species). Furthermore, while the previous study observed a pattern of increased aphid abundance on inbred *Echinacea*, their methods of recording aphid count did not allow them to determine any difference in the growth rate of aphid populations on each *Echinacea* genotype.

Methods:

This experiment will be conducted primarily in the common garden but will also include nearby prairie plots in order to find sufficient numbers of the four desired species of interest: *E. angustifolia* (3 treatments), *H. helianthoides, C. palmate*, and *E. purpurea*. Fifteen plants of each species will be chosen. However, in the case of *E. angustifolia*, each of the three genotypes represents a treatment so 15 inbred plants, 15 within-remnant crossed plants, and 15 between-remnant crossed plants will be included. One leaf on the selected plants for each treatment will be checked for and cleared of aphids. *Aphis echinaceae* will be located and small vials will be used to transport the aphids. One *Aphis echinaceae* will then be placed on each plant. The leaf the aphid is placed on will be bagged to limit predation and migration. The status of the aphid will be checked every other day for 30 days, and the number of aphids present will be recorded for each visit. Treated plants will be marked with a blue flag, and the row and position number will be recorded for plants in the common garden.

Materials:

Blue flags, fine mesh bags, small vials