Question: How does the presence of aphids and distance from thatch-ant mounds alter the effects of willow genotype on insect communities?

Completely Randomized Block Experimental Design

* 6 treatments
  + Distance from ant mound: 1, 6, and 12 meters
  + Aphids presence: no addition or add 5 wingless individuals
* 10 genotypes (60 cm cuttings)
  + Genotypes vary significantly in C:N ratios which may influence aphid performance.
  + Will also measure plant traits for greenhouse study.
* 5 blocks
  + 5 different ant mounds. Only 1 replicate of each treatment-by-genotype per block, since I’m not interested in a treatment-by-block interaction.
* Experimental unit: 1 willow cutting planted into the ground
* Summary of material needed
  + 300 cuttings (5 blocks \* 6 treatments \* 10 genotypes)
  + 600 aphids (4 blocks \* 3 treatments \* 5 aphids per cutting \* 10 genotypes)
    - decided to only use 5 aphids, because after looking at Appendix of Johnson 2008, he seemed to get plenty of aphids by the end of 5 weeks.
* Bag all cuttings to prevent insect colonization. Allow aphids to establish for 24-48 hrs.
* Unbag all plants, and after 2-3 months, survey cuttings for insect abundance and diversity. Sample galls and leaf miners and rear them for their parasitoids.

Greenhouse Study: Unbiased assessment of plant quality for aphids (no confounding effects of ant tending or predation on natural plants) as well as induced vs. non-induced effects of aphids

* 2 Treatments
  + Aphids and no aphids
  + 4 replicates of all 10 genotypes per treatment (40 cuttings of each genotype from 40 cm trees)
* 200 aphids
* Bag 5 aphids on each aphid treatment cutting and monitor aphid population growth
* After 2-3 weeks, measure plant traits of both aphid and non-aphid grown cuttings.
* Maybe do this in the field with 4 different blocks…
  + Results will be more noisy…
  + More difficult to access…
  + Won’t have to worry about other herbivores or purchase full bags for cuttings…
  + But it may enable me to more directly compare effects of ants on aphids population growth…(not as much of a confounding effect of the lab vs. natural environments)

Observational Study:

* Assess gall and leaf miner densities on branches or trees with and without ants at various distances from thatch-ant mounds
* Rear subsample of galls and leaf miners to assess parasitism.