Name: Laura ("Laurie") Hamon

Project title: Pollination ecology of Venus flytrap (*Dionaea muscipula*)

Most carnivorous plants depend on arthropods as both pollinators and as prey. However, the role of arthropods in the reproductive success of carnivorous plants remains poorly unknown. The present study had two primary objectives. First, we investigated the degree to which reproduction in *D. muscipula* is limited by pollen versus prey receipt. Second, we compared the per-visit pollen deposition of floral visitors to identify which pollinators of *D. muscipula* are most effective, and therefore play the largest role in its reproduction.

We tested the effects of pollen and prey limitation on *D. muscipula* reproduction using a two-way factorial design with two trials; one starting in summer 2019, and a second starting in spring 2020. This allowed us to compare the importance of previous-season versus present-season nutrients. For each trial, we selected 80 individuals and assigned them to a prey supplementation treatment (hand-fed or control) or pollen supplementation (supplemented or control). To supplement prey, every open trap was given a frozen cricket and then gently squeezed to simulate struggling prey. For the 2019 trial, plants were hand-fed five times from August to October. For the 2020 trial, plants were hand-fed two times during May. Both trials received supplemental pollen in 2020. To supplement pollen, we selected 1-2 flowers per inflorescence and saturated the stigma with outcross pollen. We then collected fruits and compared seed set per fruit between treatments.

To compare pollinator efficacy, we placed *D. muscipula* inflorescences in pollinator exclusion bags until flowering. Upon stigma receptivity, we removed the bag and observed the inflorescence for any arthropod visitors. Visitors were identified on-the-wing to the lowest possible taxonomic level (usually family). We then collected the stigmas and counted the number of pollen grains deposited on the stigma. The field work for this experiment was conducted in 2018 and 2020.

We found that seed set per fruit was not significantly different between pollen and prey supplementation treatments, either in the 2019 or 2020 trial. However, plants given supplemental prey during the spring 2020 trial produced an average of 1.9 more flowers per inflorescence compared to individuals with natural prey capture, demonstrating an increased investment in reproduction at the whole-plant level.

We observed a large number of honeybee (*Apis mellifera*) visits in both 2018 and 2020 due to a nearby apiary, representing a non-native floral visitor. Honeybees outperformed native sweat bees in terms of pollen deposition. We did not observe a significant difference in pollen deposition between any other taxa. Although beetles are a frequent visitor to *D. muscipula*, no beetle visits were observed during this experiment.

Although *D. muscipula* reproduction can be pollen-limited (Hamon et al. 2019), we did not observe pollen limitation in this study, perhaps due to the prevalence of honeybee visits. However, *D. muscipula* appears to quickly mobilize present-season nutrients towards flower production. Honeybees deposited more pollen per visit than sweat bees, which was surprising given that sweat bees were previously suggested to be the most important pollinator of *D. muscipula* (Youngsteadt et al. 2018). We noticed that smaller bees tended to not touch the stigma during visits. Although inconclusive, this suggests that larger arthropods may play an outsize role in *D. muscipula* reproduction. The full findings of this study were recorded in my Ph.D. dissertation and are in preparation for submission to a scientific journal. This work was only possible due to the generous support of the North Carolina Native Plant Society.