Effect of diurnal and nocturnal pollination on fruit quality of wild lowbush blueberry (*Vaccinium angustifolium*) patches on Kent Island

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This summer I studied the effect of pollination on lowbush blueberry fruit quality. More specifically, I was interested in exploring the differences between diurnal and nocturnal pollination by comparing the resulting ripened blueberry fruit. Insect-driven pollination is a critical component to lowbush blueberry reproduction as these flowers are largely self-incompatible, meaning single flowers do not tend to pollinate themselves and yield healthy fruit. The bell-shaped flowers along with their heavy, sticky pollen further resist wind pollination, which increases blueberry's reliance on insect pollinators (Fig. 1).

Figure 1. Lowbush blueberry bushes have small, whitish flowers which may sometimes also have pink vertical stripes. The bell-shaped flowers of this species require cross-pollination by insects to achieve fruit set.

Lowbush blueberry, native to Eastern Canada and the Northeastern United States, are prized for their intense blueberry flavor over commercial highbush species. Although not as agriculturally dominant as highbush varieties, lowbush blueberry have been extensively researched. My study sought to better understand lowbush blueberry by studying the influences of island dynamics on pollination success and fruit quality. Islands tend to have lower pollinator densities than mainland environments, increased exposure to ocean winds, and greater fluctuations in temperature changes, which can all influence pollinator activity. Furthermore, my experiment has a somewhat agricultural application in that fruit quality was used as the metric for pollination success. Fruit quality was measured by three qualities: bud count to fruit count differences, total seed set, and total soluble solids to titratable acidity. My work this summer represents a substantial proportion of data collection for my biology independent study project that I will continue working on for the duration of the 2018-2019 school year.

My experiment consisted of studying twenty lowbush blueberry patches located in the North and South savannah sparrow fields of Kent Island. Fifteen individual stems with unopened, virgin buds were selected from each patch for five pollination exclusion treatments, such that each treatment was represented in replicates of three. Pollinator exclusion was achieved by bagging individual stems over the twenty-day flowering period ranging from June 4 to June 23, 2018. This resulted in 300 total study stems with a total of 60 stems for each of the following five treatments:

Treatment A (Negative control) (ABC) — left continually bagged, no exposure;

Treatment B (Diurnal) (DEF) — diurnal exposure only (7am-9am to 7pm-9pm): bagged only during nighttime hours (7pm-9pm to 7am-9am), to exclude nocturnal but not diurnal pollinators;

Treatment C (Nocturnal) (GHI) — nocturnal exposure only (7pm-9pm to 7am-9am): bagged only during daytime hours (7am-9am to 7pm-9pm), to exclude diurnal but not nocturnal pollinators;

Treatment D (Positive control) (JKL) — left continually exposed during both diurnal and nocturnal periods, with no bag;

Treatment E (full exposure with bag effect) (MNO) — left exposed during both diurnal and nocturnal periods, but with a bag placed and immediately removed once daily to stimulate the degree of manipulation to flowers in diurnal and nocturnal treatments.

Other data I collected during my summer included bud counts of each stem, flowering period weather data, spectrophotometry measurements of buds, flowers, and patch leaves, patch-level temperature and light intensity monitoring, and post-flowering period fruit progress checks. I will be back on Kent Island to harvest my ripe blueberry fruit on August 15 and take soil cores for each patch on September 7, to be analyzed over the course of the coming semester. Overall, my time on Kent Island has been incredibly enriching and rewarding. I am very grateful for this unique opportunity to conduct field research and am excited to continue working toward completing my independent study project!

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