

this stage. This co-culture method will be used to phenotype recombinant inbred lines derived from parents contrasting for incompatibility in efforts to identify the gene(s) underlying this *Striga* resistance trait.

*Research advisor Patrick Rich writes: “Cameron meticulously phenotyped a recombinant inbred sorghum population for resistance to the parasitic weed Striga hermonthica. He worked for months in our special containment facility with delicate biological materials that required careful handling, observations, and record keeping. His work moves us closer to finding genes controlling post-attachment Striga resistance.”*

### **Gossypium hirsutum as a Study Species to Understand Plant Responses to Drought Stress**

**Student researcher:** Sam Schafer, Senior

Throughout the past year of working with cultivated upland cotton (*Gossypium hirsutum* L.), it has been intriguing to learn how it can serve as a study species for understanding the effects of genotype and water stress on photosynthetic parameters. The goal of the project is to discover whether genotype and environment play a significant role in crop photosynthesis and to quantify any potential interaction between the two variables. Photosynthesis-CO<sub>2</sub> response (A/C<sub>i</sub>) curves of 14 biogeographically diverse cotton accessions grown under controlled greenhouse conditions were collected using a Li-COR 6800 Portable Photosynthesis System (Li-COR: Lincoln, Nebraska) and analyzed using R software. Broad-sense heritability (H<sup>2</sup>) for maximum rate of rubisco carboxylation (V<sub>cm<sub>max</sub></sub>) and electron transport (J<sub>max</sub>) were 0.575 and 0.686, respectively. Paired with a one-way ANOVA test, results suggested that photosynthetic parameters were not significantly affected by genotype. A subset of 4 cotton accessions were selected for a follow-up study. During the second experiment, a control group of replicates were maintained under well-watered conditions while another replicate group experienced a 75% reduction in irrigation for two weeks after flowering. Following the first week of treatment, a suite of physiological parameters were collected including plant height, number of developing bolls, number of healthy leaves, and number of buds. Results indicated significant differences between the two populations, which suggests a reduction in photosynthetic activity.



*Upland cotton plants growing under controlled greenhouse conditions.*

A/C<sub>i</sub> curves were collected at the two-week mark of drought treatment and are yet to be analyzed. Conclusions will be drawn based on the differences in photosynthetic performance between accessions from the first and second experiments.

*Research advisor Diane Wang writes: “Sam came to me one and a half years ago with an interest in plant physiology research. He has since led this study from concept to analysis and has continuously impressed me with his energy, enthusiasm, and ability to master new skills from technical measurements to data analysis using R.”*

### **Lake Michigan Shoreline Landowner Survey**

**Student researcher:** Colby Smock, Junior

The Lake Michigan Shoreline Landowner Survey was developed to understand the perspectives of homeowners along Indiana’s shoreline who have experienced rapidly changing conditions due to water level fluctuations over the past 10 years. From near-record lows in 2013 to record highs in 2020, the significant water level swing is one of many factors that are causing severe erosion of the beach and foredune area. These erosion problems have put the communities along the Indiana shoreline in a dire spot as they risk losing their beaches and homes along the lakeshore. Based on a comprehensive review of community plans and ordinances, many of these communities have little to no plan for addressing the management of their shoreline, significantly altering the ability to fund future management advancements.