

The Florida Scrub has more unique species than any other habitat in the Southeastern US. This is due to its geological history, which started as a string of islands off the coast of the United States back when the majority of Florida was under the ocean. Due to their isolation, many unique species evolved on this island chain.

Now, in 2020, many of these species are threatened or endangered as a result of intense development pressures driven by Florida's burgeoning human population. Over 70% of the Florida Scrub has already been converted to human land uses, and much of the remainder remains in the crosshairs. In order to properly manage the habitat fragments that remain, it is important to understand the population ecology of the denizens of this imperiled habitat, especially the threatened and endangered ones.

The new greenhouse recently completed by the University of Miami in the Gifford Arboretum provides an ideal venue for these investigations. Assistant Professors of Biology Michelle Afkhami and Christopher Searcy are working researchers at Archbold Biological Station to collect seeds from 13 of the rare, herbaceous plants found in the Florida Scrub. "The Fall, at the end of the wet season, is when most of these species set seed" said Afkhami. "We have been studying these rare plants for four years, but up until now have needed to conduct our experiments under grow lights in the basement of Cox Science Center. It is really exciting to have this new temperature controlled greenhouse facility available."

The new seeds will be part of an experiment investigating the demographic rates (germination, early growth, etc.) that these rare plants experience in different soils. In their previous experiments, Searcy, Afkhami, and graduate students and postdoctoral researchers from their research teams discovered that demographic rates of these plants are highly dependent upon the soil microbes with whom they interact. For example, one of these endangered species, the Highlands scrub St. John's wort (*Hypericum cumulicola*), cannot persist without the boost these soil microbes give to germination rates. "We used the grow room experiments in the Cox basement and some new demographic modeling tools, known as integral projection modeling, to determine this relationship for the endangered *Hypericum*" shared Searcy. "The goal of the new experiment is to expand this work to a number of the other rare plants in the Florida scrub and see how general the results are. This research is going to require a much bigger experiment, so we are lucky that the new greenhouse is now online."

The ultimate goal for this study, which is funded by the National Science Foundation, is to determine the role of soil microbes in determining plant distributions. This requires the merger of direct fitness effects observed on individual plants in the greenhouse with various modeling tools that can project the consequences of these effects at the population, metapopulation, and landscape scales. Come January, you may see the first of the plants from this new experiment poking up out of their pots in the greenhouse – that is, assuming they like the soil microbes provided by Afkhami and Searcy in the new set of treatments.