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Plant mating systems in the scrub

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VENUS — When you look at a flower, chances are you'll see both female and male parts. The female parts typically include the pistil in the middle of the flower, while the male parts include multiple stamens surrounding the pistil. However, while this example of a 'bisexual' flower (also called a 'perfect' flower) is common for many plant species, it is not always the case. In fact there is a large diversity of what biologists call 'mating systems' in plants. According to Dr. Aaron David, Archbold Plant Ecology Program director, "the Florida scrub is host to dozens of rare plant species unique to the Lake Wales Ridge, and several have unique and fascinating mating systems."

Sometimes plants have 'imperfect' flowers that only contain either male or female parts. Dioecious plants are those with two sexes, male and female, and their populations generally require individuals of both sexes to be successful. Florida rosemary (*Ceratiola ericoides*) is one example of a dioecious species found in the scrub. In fact, both sexes of this shrub are typically found growing in

close proximity to one another.

Scrub spurge (*Euphorbia roscens*) also has male and female individuals, though individuals can also have bisexual flowers with both male and female parts. Scrub spurge is a state-listed endangered species whose populations are limited to Highlands County, and several populations only exist as mostly female plants or male plants, with a only few bisexual plants. The question for biologists is whether populations can persist in this manner. In the short term, the answer seems to be yes. They can reproduce clonally belowground and maintain the population without producing seed. But in the long term, populations need to reproduce sexually, and we don't know how long they can hang on. It may be that the occasional occurrence of a bisexual plant is enough to help these populations persist.

Lewton's milkwort (*Polygala lewtonii*) has bisexual flowers with three types of flowers. First, chasmogamous flowers that are large, showy, and pollinated by insects. Second, cleistogamous flowers are tiny and don't actually open; instead, they fertilize themselves and therefore don't require cross-pollination with other individual plants. Even stranger is that Lewton's milkwort, like some other milkwort species, produces a third type of flower that is found underground! It's thought that having these three different types of flowers help the plant species hedge against the numerous dangers it faces including being eaten or lack of neighboring plants with which to cross-pollinate.

Finally, Florida ziziphus (*Pseudoziziphus celata*) has a mating system with a complex wrinkle – rather than having different sexes with male and female parts, it has compatible and incompatible mating types which are referred to as 'genotypes.' Plants cannot mate with themselves or other plants of the same genotype, but can cross pollinate with certain other genotypes although many combinations of genotypes simply do not produce viable seed. It is not entirely clear what drives differences in genotype compatibility, and biologists are still working to answer this question.

Because Florida *ziziphus* is one of the rarest of the rare species found on the Lake Wales Ridge, Archbold, together with other conservation partners including, including Bok Tower Gardens, has conducted more than a dozen plantings into the wild to improve its conservation outlook.

“It’s important that we know that we are putting out compatible plants when we conduct this work to ensure that the new populations can be maintained into the future,” says Dr. Sterling Herron, Archbold Plant Ecology research assistant.

The wide range of plant mating systems showcases the diverse strategies for persisting in the harsh scrub habitat, and understanding these mating systems helps biologists better conserve them.

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