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Abundance and Mortality of Two Epiphytic Tillandsias (Bromeliaceae) in a Florida Hammock

Meg Lowman[1], Lisa Downey[2], Agnes Farres[3], Elijah Mermin[4]

The authors surveyed the abundance and mortality of two bromeliads during 1994 in an endangered coastal hammock ecosystem in southwestern Florida. *Juniperus silicola,* or scrub juniper, formerly comprised the major canopy tree of coastal hammocks along many shorelines on the west coast of Florida. In Sarasota County, one of the few remaining juniper hammocks has been preserved on the property of the Water Club Condominiums at Longboat Key. Selby Gardens has collaborated with New College students over the past four years to study different ecological aspects of the epiphyte community in this endangered ecosystem.

METHODS

In this study, we report on the abundance of *Tillandsia recurvata* and *T. utriculata* in the juniper tree crowns, and their mortality rate as measured by fallen bromeliads under the canopies of adult trees.

We observed and counted *Tillandsia* species in juniper trees using ladders for canopy access. We tagged each bromeliad with a small bracelet of colored tape to minimize the likelihood of counting any individual twice. Then we divided each tree into three height zones; lower (0-2 meters), midzone (2-4 meters), and canopy (more than 4 meters), and estimated the numbers of

[1] Director of Research, Marie Selby Botanical Gardens
[2] New College, Sarasota, Florida
[3] New College, Sarasota, Florida
[4] New College, Sarasota, Florida

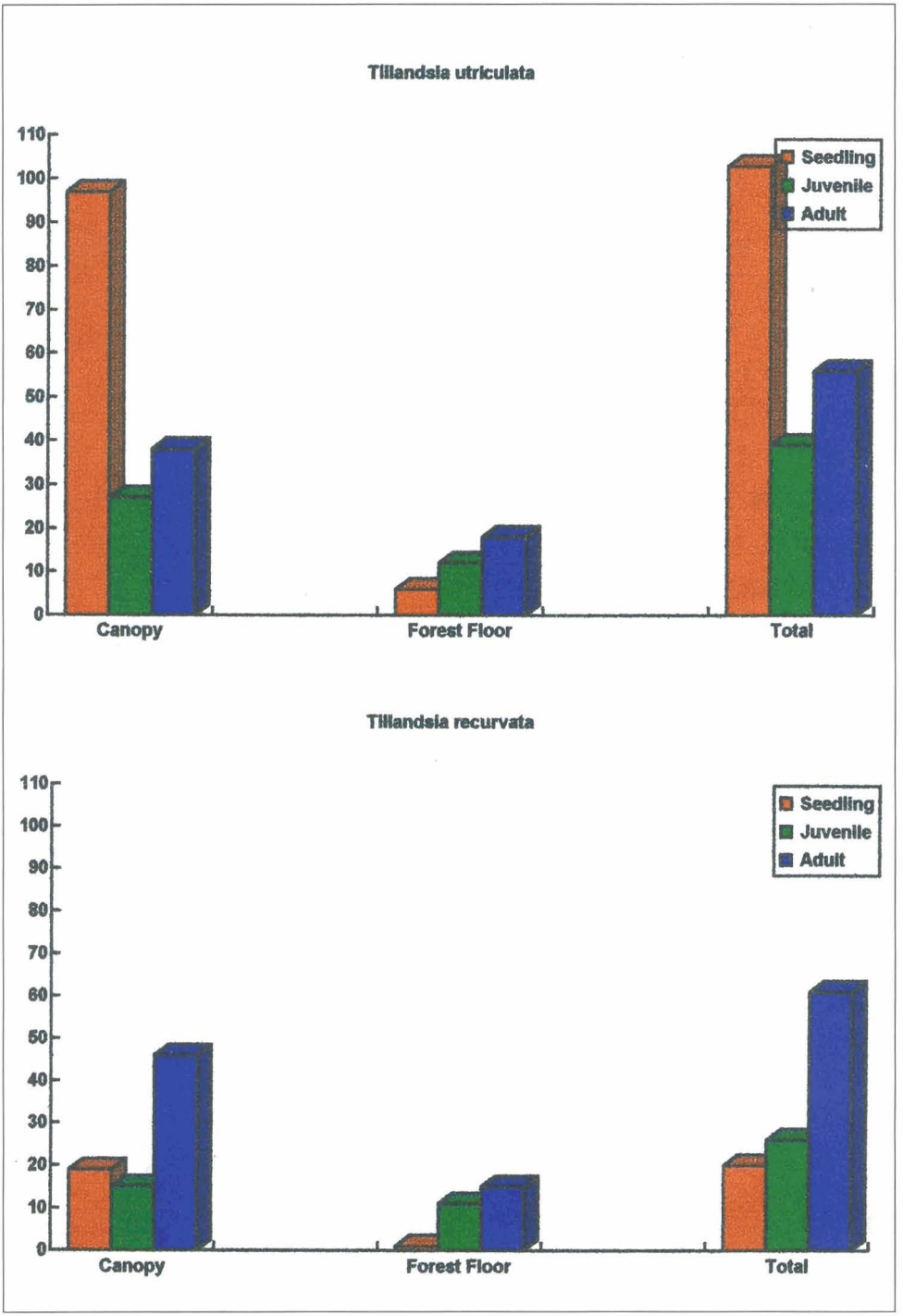

Figure 16.
Raw numbers of epiphytes tagged and counted in scrub juniper at Longboat Key, Sarasota, Florida

epiphytes in each zone. A numerical scale was used: 1 = 0-10 plants; 2 = 11-25 plants; 3 = 26-40 plants; and 4 = more than 40 plants.

To estimate mortality, we tagged fallen epiphytes on the ground. The area around the tree was divided into four quadrants, delineated by N,S,E, and W marked A,B,C, and D respectively. The ground was further delineated by concentric circles, 1, 2 and 3 whereby 1 was directly below the interior crown, 2 was below the outlying crown, and 3 extended just beyond the central crown region but contained some outlying branches.

RESULTS AND DISCUSSION

1. Total Numbers of Bromeliads in Tree Crowns

In one canopy tree, we counted 333 tillandsias, of which 117 were *T. recurvata* and 216 were *T. utriculata.* Of these, the proportions of seedlings, juveniles and adults for each species differed widely. The population of *T. recurvata* was composed of 24% seedlings, 16% juveniles, and 60% adults. The population of *T. utriculata* was composed of 51% seedlings, 14% juveniles, and 35% adults. Despite their relative abundance in the hammock, the two species differ greatly in their demographics, since *T. recurvata* is predominantly an adult population whereas *T. utriculata* is younger. The relatively lower incidence of *T. recurvata* seedlings and juveniles may be due to the fact that it is polycarpic, i.e. it produces small seed crops, as compared to *T. utriculata* which is monocarpic, i.e. produces a single large seed crop (up to 10,000 propagules at a time) (Luther, pers. comm.)

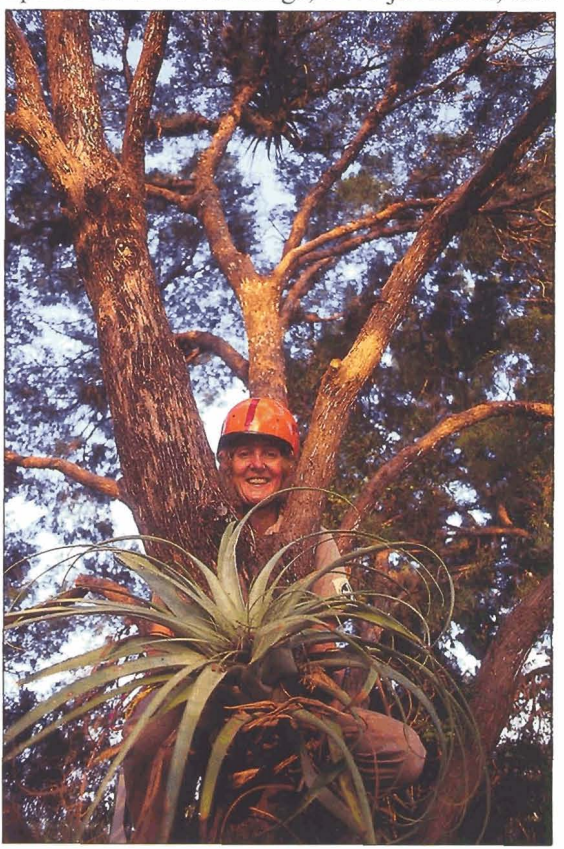

Figure 17.
Scientist tagging epiphytes in the scrub juniper of southern Florida.

2. Numbers of Fallen Epiphytes

Throughout our year of study, less than 1% of the tillandsia population fell to the ground. Consequently the mortality rate during one year was very low (only 0.3%). Of the total of 8 epiphytes that fell

in one year, 5 were seedlings, 2 juveniles, and 1 adult. We hypothesize that the predominance of seedling mortality may suggest that winds caused epiphyte-fall, and that seedlings were less firmly attached than adults. The fact that few epiphytes fell (even during tropical storm Gordon which hit during this study period) may also indicate that epiphytes located in trees growing within a hammock formation are more protected from winds and storms than isolated trees or trees situated near the edges of hammocks. More extensive field experiments to monitor both young and old epiphytes are needed to confirm this theory.

3. Distribution of fallen epiphytes in relation to prevailing winds.

We mapped all the fallen epiphytes, presumably several years' accumulation since they were in varying stages of senescence. We mapped them in quadrants, according to aspect and to concentric regions away from the trunk. The number of epiphytes in each quadrant ranged from 8 individuals (B) to 29 (D), with 17.5 and 21.5 individuals in A and C, respectively. There were more epiphytes in the SE section of the tree canopy and fewer in the NW section, which correlated with prevailing winds (which come from the NW) leaving the SE crown region more sheltered.

The number of epiphytes per square foot of ground space decreased away from the trunk region. Closest to the trunk (circle 1) were 1.56 plants per square foot, 0.42 in concentric circle 2, and 0.26 plants beneath the outer crown (circle 3). This is probably because the branch size decreases and provides inadequate support for large numbers of epiphytes progressively toward the outer crown.

4. Distribution of Epiphytes in Relation to Canopy Height Levels.

Using a visual scale, we estimated the distribution of epiphytes at tree height levels. The lower canopies averaged 15 epiphytes, mid-canopy 43 epiphytes, and the upper canopy averaged more than 40 epiphytes. All trees extended to approximately 8 m in height. The lower canopy obviously had less sunlight than the upper canopy, making it less conducive for survival of epiphytes. The juniper has a relatively open canopy, however, allowing a moderate number of epiphytes to survive in its lower branches, as compared to some tropical trees which have no epiphytes in the lower canopy.

Our study showed the epiphyte densities in Florida coastal juniper hammocks is high, despite the relatively small size of the trees and depletion of this habitat. We urge conservation of these important epiphytic habitats that have been depleted by human activities.

Sarasota, Florida