Vascular Plant Species Diversity on Two Barrier Islands in Southwest Florida

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ABSTRACT


The equilibrium theory of island biogeography was examined in relation to the indigenous vascular floras of two barrier islands of different size and distance from the southwest Florida mainland. On Cayo-Costa Island, which has a land area of 5.6 km² and is located 12.8 km from the mainland, 261 species were identified. On Sanibel Island, which has a land area of 43.6 km² and is located 3.2 km from the mainland, an inventory in the mid-1950's identified 266 species. The similar number of species, despite the differences in island area and distance from the mainland, was attributed to the incompleteness of the inventory of Sanibel in the 1950's. An inventory of Sanibel from 1965 to 1985 identified 432 native species. This almost two-fold difference in the number of species on Sanibel as compared with Cayo-Costa is more consistent with equilibrium theory which predicts a significantly greater number of species on a larger island located closer to the mainland. However, comparison of the species-area relations of Cayo-Costa and Sanibel with other studies of island floras suggests that Sanibel should have had even more species. Urban development and the spread of alien plant species following the construction of a causeway linking Sanibel to the mainland in 1963 may have reduced the number of native plant species on Sanibel.

ADDITIONAL INDEX WORDS: Barrier islands, coastal plants, Cayo-Costa Island, equilibrium theory, Florida, native species, Sanibel Island, species composition.

INTRODUCTION

The equilibrium theory of island biogeography has stimulated much research since it was first formulated by MACARTHUR and WILSON (1963). According to the equilibrium theory, species composition on islands is not fixed, but rather changes over time due to on-going immigration and extinction. The balance between these two processes is believed to result in a nearly constant equilibrium number of species. The theory also predicts that a large island located close to a mainland source area should have a higher equilibrium number of species than a smaller island located further from the mainland.

The equilibrium theory has been tested for microorganisms (CAIRNS et al., 1969; HAVE, 1987), fungi (ANDREWS et al., 1987), arthropods (SIMBERLOFF and WILSON, 1970; STRONG and REY, 1982), ants (GOLDSTEIN, 1975; BOOMSMA et al., 1987), land snails (SOLEM, 1973), fish (SMITH, 1979), birds (DIAMOND, 1969; JOHNSON, 1975; ABBOTT and GRANT, 1976), lizards (WILCOX, 1978) and mammals (LAWLOR, 1983). The theory also has been considered in relation to the vascular floras of high altitude paramo vegetation in South America (SIMPSON, 1974), lake islands in Sweden (NILSSON and NILSSON, 1978; RYDIN and BORGEGARD, 1988), very small islands and offshore cays in Australia, Venezuela, and Puerto Rico (ABBOTT, 1977; BUCKLEY, 1982; HEATWOLE and LEVINS, 1983; BURANDT and CAMPINS, 1986; FLOOD and HEATWOLE, 1986), the Galapagos Islands (VAN DER WERFF, 1983), and the Gulf of California Islands (CODY et al., 1983). The studies by VAN DER MAAREL (1982) and MENNEMA and WEEDA (1983) on the Frisian Islands along the coasts of the Netherlands and Germany are among the few that have documented plant species numbers on barrier islands of different size and distance from the mainland.

Barrier islands differ geologically from oceanic islands (such as the Galapagos) and
continental islands (such as those in the Gulf of California) which originate by volcanic and tectonic processes. Barrier islands, which comprise roughly 10 to 13% of the world's continental coastline (SCHWARTZ, 1973), are <10^8 yr old and are composed of unconsolidated sediments lying offshore on gently sloping continental shelves. They are generally separated from the mainland by a shallow lagoon or bay, and they rarely have elevations exceeding 10 m above sea level. Due to their depositional nature and their limited topographic relief, barrier islands are actively reworked by shoreline processes and are vulnerable to storm overwash. The objective of our study was to consider the equilibrium theory of island biogeography in relation to the indigenous floras of two barrier islands in southwest Florida.

STUDY AREA

The two barrier islands examined in this study are Cayo-Costa and Sanibel Islands. These islands are part of the Charlotte Harbor barrier island system located west of Fort Myers (latitude 26°45'N, longitude 82°10'W) (Figure 1). The north end of Cayo-Costa is adjacent to Boca Grande Pass which is the major tidal inlet serving Charlotte Harbor and the discharge site of the Myakka and Peace Rivers. The south end of Sanibel Island is adjacent to San Carlos Bay, the discharge site of the Caloosahatchee River.

Sanibel Island is the largest of the five islands that comprise the chain. It has a land area of 4,362 hectares and recurses landward at its southern end to a distance of 3.2 km from the mainland. Cayo-Costa Island is located 14.9 km to the north. It has a land area that is 13% of the land area of Sanibel, and it is 4 times further from the mainland.

Both islands are composed mainly of calcareous biogenic marine sediments and some quartz sands derived from river discharge (HUANG and GOODELL, 1967). The Gulf coast of Florida is periodically subject to hurricane disturbances and storm overwash events. Accretionary beach ridges with the characteristic ridge and swale topography comprise the Gulf side of both islands. The more protected bay side consists of tidal swamp deposits.

Southwest Florida has a moist subtropical climate with a mean annual temperature of 23°C and a mean annual precipitation of 1360 mm (NATIONAL CLIMATIC CENTER, 1982). Floristically, the islands are a mixture of southern temperate and tropical Caribbean species.

METHODS

An inventory of vascular plant species on Cayo-Costa Island was made over the two-year period from 1975 to 1977. The results from Cayo-Costa were compared with two inventories made on Sanibel Island: (1) an inventory carried out in 1953 and 1954 (COOLEY, 1955), and (2) a more recent inventory carried out from 1965 to 1985 (WUNDERLIN and HANSEN, 1985). We assumed that the number of plant species on Cayo-Costa did not change significantly over the period 1977 to 1985.

Our study consisted of comparing only the native vascular plant species from the three inventories. Obsolescent nomenclature was updated. Ruderal species, naturalized exotics, and ornamentals that had escaped from cultivation were excluded from the comparison.

To evaluate the predictions of the equilibrium theory, the number of species on each island was considered in relation to the land area of the island and its distance from the mainland. The species-area relationship was expressed in the standard form \( S = CA^z \), where \( S \) is the species number, \( A \) is the island area, \( C \) is a coefficient that relates to biogeographic region and is generally less in regions where there are fewer potential colonizing species in a given taxon, and \( z \) is an exponent that tends to increase as a function of increasing island isolation (MACARTHUR and WILSON, 1967). The best-fit equation was determined for Cayo-Costa and Sanibel Islands by plotting the two data points on log-log graph paper and then fitting a line through these points. Comparisons were made between the equation from our study and those equations derived from other studies of plant species number and island area.

RESULTS

The extent of land development on Sanibel at the time of COOLEY’s inventory was comparable to Cayo-Costa in the 1970's. Both islands were sparsely inhabited, and had essentially the same habitat diversity consisting of beach strands, savannas, cabbage palm forests, slash

pine flatwoods, freshwater marshes, mangrove swamps, salt marsh tidal flats, and tropical hardwood hammocks (COOLEY, 1955; HER-WITZ, 1977). In 1963, the construction of a causeway linking Sanibel to the mainland led to urban development on parts of Sanibel dur-
ing the period of WUNDERLIN and HANSEN's inventory. Sanibel continues to have the same habitat diversity as Cayo-Costa, but the areal extent of these habitats on Sanibel has been reduced.

Table 1 shows the number of native vascular plant species and genera on the two islands. The inventories of Sanibel reported by COOLEY (1955) and by WUNDERLIN and HANSEN (1985) are shown separately in Table 1.

On Cayo-Costa, 261 species were found representing 203 genera. Thirty-nine genera were represented by two or more species. COOLEY (1955) reported 266 native vascular plant species representing 196 genera. Forty-five genera were represented by two or more species. Non-co-occurring species on islands having similar habitat diversity may be considered suggestive of species turnover (CODY et al., 1983). On the basis of the COOLEY (1955) inventory, Sanibel had 34% of its species and 25% of its genera not co-occurring on Cayo-Costa, while Cayo-Costa had 33% of its species and 27% of its genera not co-occurring on Sanibel (Table 1).

WUNDERLIN and HANSEN (1985) identified >1.6 times more species on Sanibel than COOLEY (1955). They found 432 species representing 282 genera. Seventy-nine genera were represented by two or more species. On the basis of the WUNDERLIN and HANSEN (1985) inventory, Sanibel had 51% of its species and 34% of its genera not co-occurring on Cayo-Costa, while Cayo-Costa had 91% of its species and 62% of its genera not co-occurring on Sanibel (Table 1).

Table 1 shows the number of native vascular plant species and genera on the two islands. The inventories of Sanibel reported by COOLEY (1955) and by WUNDERLIN and HANSEN (1985) are shown separately in Table 1.

Comparison Based on COOLEY Inventory

The number of species identified on Sanibel between 1953 and 1954 by COOLEY (1955) was essentially the same number of species identified on Cayo-Costa. Some variance in species numbers would be expected due to turnover noise (DIAMOND, 1969), but this variance cannot explain why the species numbers should be so similar. Four possible explanations may be presented.

1. Sanibel may have been in a nonequilibrium condition at the time of Cooley’s inventory. The physiography of the Charlotte Harbor barrier island chain and radiometric dates from Sanibel suggest that Sanibel may be the youngest island in the chain, and may have had less time to establish the equilibrium species number. Barrier islands in many different geographic localities date from about 7000 yr BP (PETHICK, 1984); however, barrier islands that originate from elongating breached spits (FISHER, 1968) would be expected to differ in age. The oldest beach ridges on Sanibel are only 4300 ± 50 yr old and the landward-recuring progradational lobe, which constitutes the bulk of Sanibel’s land area (Figure 1), has been dated at less than 2000 years (MISSIMER, 1973). The Charlotte Harbor barrier island chain may
have developed in a southerly direction with Cayo-Costa being >1000 years older and therefore closer to the equilibrium condition. The weakness of this explanation is that 1000 years should be adequate time for a nearshore island to achieve equilibrium (RYDIN and BORGERGARD, 1988).

(2) Prior to Cooley’s inventory, Sanibel may have undergone an environmental perturbation. For example, storm overwash, which can be extremely disruptive to the vegetation of barrier islands (GODFREY and GODFREY, 1976), may have resulted in a significant reduction in species numbers on Sanibel. Sanibel would be vulnerable to storm overwash from the south and southwest because of the orientation of its coastline. Cayo-Costa would be most vulnerable to storm overwash from the west because of the north-south orientation of its coastline. Meteorological records for southwest Florida over the last 60 years indicate a relatively high frequency of storms from the south and southwest (GENTRY, 1974) with at least four hurricanes known to have been destructive to vegetation on Sanibel between 1922 and 1953. The weakness of this explanation is that, despite the different orientation of Cayo-Costa’s shoreline, it would be difficult to envisage Cayo-Costa being unaffected by these storm events.

(3) Islands that have undergone a reduction in land area, for example, as a result of shoreline erosion, may initially support more species than the equilibrium number (WILCOX, 1978). The southern half of Cayo-Costa (Figure 1) has undergone significant shoreline erosion as evidenced by the exposure of mangroves on the Gulf side of the island. The number of plant species on Cayo-Costa, therefore, could represent a number that exceeds the equilibrium condition. This explanation is weakened by the fact that there has been a corresponding accretion of beach ridges on the northern half of Cayo-Costa, and no significant net reduction in land area (HARVEY, 1979).

(4) The floristic inventory of Sanibel by COOLEY (1955) may have been incomplete. If we consider it complete, a total of 166 additional species of native vascular plants would have had to colonize the island in the 30-year period from 1955 to 1985. While the construction of the causeway could have increased the opportunities for both deliberate and inadvertent introduction of mainland species, a 62% increase in the number of native species seems unlikely. The unusually high proportions of non-co-occurring species (>30%) on the two islands, therefore, probably reflects the incompleteness of COOLEY’s inventory.

Comparison Based on Wunderlin and Hansen Inventory

According to the WUNDERLIN and HANSEN (1985) inventory, Sanibel had 171 more native vascular plant species than Cayo-Costa. This result is more consistent with equilibrium theory. Species-area curves of MACARTHUR and WILSON (1967) predict a doubling in species number with roughly a ten-fold increase in island area.

The species-area relationship for Cayo-Costa and Sanibel Islands is best expressed by the equation $S = 171A^{0.25}$. Figure 2 shows this relationship on log-log axes together with the best-fit lines found for vascular plant species numbers on the Galapagos Islands (VAN DER WERFF, 1988), the Gulf of California Islands (CODY et al., 1983), and the Frisian Islands (MENNEMA and WEEDA, 1983). These studies all found an exponential increase in species number with increasing island area; however, there were some marked differences in the C and z values (Table 2).

As would be expected for oceanic islands located >700 km from the mainland, the species numbers on the Galapagos were lower than the numbers on comparable-sized continental islands (Figure 2). Both the Galapagos and the Gulf of California Islands had low C values presumably because they are located in relatively dry biogeographic regions with a smaller pool of potential colonizing species. Higher C values would be expected in the more favorable, mesic biogeographic regions of Florida and Europe.

The range of z values is generally between 0.20 and 0.35. According to MACARTHUR and WILSON (1967), the values at the lower end of this range correspond to islands located close to the mainland where there tends to be a higher colonization rate of transient species. The z values of 0.20 for the Gulf of California Islands and 0.25 for Cayo-Costa and Sanibel are consistent with the prediction that the logarithm of species number increases less rapidly on nearshore islands. The z value of 0.31 for the Galapagos
Table 2. Species-area slopes and coefficients for different island systems.

<table>
<thead>
<tr>
<th>Islands</th>
<th>C</th>
<th>z</th>
<th>n</th>
<th>r</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galapagos</td>
<td>30</td>
<td>0.31</td>
<td>18</td>
<td>0.89</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Gulf of California</td>
<td>55</td>
<td>0.20</td>
<td>30</td>
<td>0.87</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Frisian</td>
<td>133</td>
<td>0.37</td>
<td>17</td>
<td>0.90</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Cayo-Costa &amp; Sanibel</td>
<td>171</td>
<td>0.25</td>
<td>2</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Species-area equation $S = C A^z$.

$C$ = number of islands.

$r$ = correlation coefficient.

$P$ = significance probability.

NA = not applicable.

Islands is at the higher end of the expected range as predicted for oceanic islands located far from a mainland source area.

The $z$ value of 0.37 for the Frisian Islands is greater than that found for the other island systems including the Galapagos (Table 2). This finding is contrary to the MACARTHUR-WILSON prediction that the logarithm of species number increases less rapidly on nearshore islands. SCHÖNER (1976), CONNOR and McCoy (1979), and WILLIAMSON (1988) have rejected the MACARTHUR-WILSON prediction, and they have argued that the $z$ values tend to be lower for more distant and isolated archipelagoes. In the case of nearshore barrier islands such as Cayo-Costa, Sanibel, and the Frisian Islands, high $z$ values perhaps could be expected. The characteristic narrowness of barrier islands and their susceptibility to the influences of storm overwash, subsurface saltwater intrusion, and salt spray may limit the colonization rate of transient mainland species, thus increasing the $z$ value.

The Frisian Islands are comparable to Cayo-Costa and Sanibel both in terms of their geomorphogenesis, and their land area and distance to the mainland. The Frisian Islands best-fit equation $S = 133A^{0.37}$ is based on species inventories of 17 islands and is highly significant ($r = 0.90; P < 0.001$). If the high $z$ value for the Frisian Islands is representative of barrier islands in general, the $z$ value of 0.25 obtained for Cayo-Costa and Sanibel may be considered low.

Figure 2 shows how the number of species on Cayo-Costa is almost directly on the Frisian species-area best-fit line, while the number of species on Sanibel is well below the line. Adding those species on Cayo-Costa not co-occurring on Sanibel to the Sanibel species list yields a sum of 472 species. This sum is still less than the number predicted using the Frisian Islands species-area equation.

A lower-than-predicted number of plant species on Sanibel would suggest that Sanibel may have been in a nonequilibrium condition at the time of the Wunderlin and Hansen inventory. This finding would be consistent with the fact that urban development on Sanibel has mark-
edly increased following the construction of the causeway linking Sanibel to the mainland in 1963. The reduction in the area of native habitats as a result of human disturbance would be expected to decrease species numbers. In addition, HEATWOLE and WALKER (1989) recently noted that the spread of alien plant species on islands may reduce the number of native plant species.

Barrier islands often are desirable shoreline localities vulnerable to human activity. Establishment and maintenance of an equilibrium condition may be less commonly achieved on readily accessible barrier islands such as Sanibel Island. We conclude that human disturbance of native habitats and the spread of alien plant species into undisturbed native habitats may have caused a significant reduction in the number of native plant species on Sanibel.

Appendix I. Native Vascular Plant Species on Cayo-Costa and Sanibel Islands

Acrostichum danaeifolium Langsd. & Fisch.
Agalinis maritima (Raf.) Raf.
Agave decidua Baker
Alternanthera flava Kunth
Amaranthus australis (A. Gray) Sauer
Amaranthus viridis (S. Wats.) Sauer
Ambrosia artemisiifolia L.
Ambrosia hispida Pursh
Andropogon glomeratus (Walt.) BSP.
Andropogon virginicus L.
Ardisia escallonioides Schlecht. & Cham.
Aristida patula Chapm. ex Nash
Aristida purpurascens Poir.
Aster subulatus Michx.
Atriplex pentandra (Jacq.) Standl.
Avicennia germinans L.
Baccharis angustifolia Michx.
Baccharis halimifolia L.
Bacopa monnieri (L.) Pennell
Batis maritima L.
Bidens alba (L.) DC.
Blechnum serrulatum L. Rich.
Boerhavia diffusa L.
Borrichia frutescens (L.) DC.
Bouteloua hirsuta Lag.
Buchnera americana L.
Bumelia celastrina Kunth
Bursera simaruba (L.) Sarg.
Caesalpinia bonduc (L.) Roxb.
Cakile lanceolata (Willd.) O. Schulz
Callicarpa americana L.
Canavalia rosea (L.) DC.
Capparis cynophallophora L.
Capsicum frutescens L.
Cassia auriculata L.
Celtis pallida Torr.
Cenchrus excentus M.A. Curtis
Centrostephhus virginianus (L.) Benth.
Coreus gracilis Mill.
Chamaecrista fasciculata (Michx.) Greene
Chamaecrista nictitans (L.) Moench
Chamaesyce blettigii (Engelm. ex Hitchc.) Small
Chamaesyce hypericifolia (L.) Millsp.
Chamaesyce hyssopifolia (L.) Small
Chamaesyce nixembryanthemifolia (Jacq.) Dugand
Chiroccus albus (L.) Hitchc.
Chrysocephalus icaco L.
Cirsium horridulum Michx.
Cladium jamaicense Crantz
Cnidocladus stimulosus (Michx.) Englem. & Gray
Coccoloba uvifera (L.) L.
Comelina erecta L.
Conocarpus erectus L.
Conyza canadensis (L.) Cronq.
Coreopsis leavenworthii Torr. & Gray
Crinum americanum L.
Crotalaria rotundifolia (Walt.) Gmel.
Croton glandulosus L.
Croton punctatus Jacq.
Cynanchum angustifolium Pers.
Cynanchum scoparium Nutt.
Cyclus compressus L.
Cyphans ligularis L.
Cypris pflanzfliess L. Rich.
Cypris polyspachyos Roth.
Dalbergia ecastophyllum (L.) Taub.
Dichanthelium dichotomum (L.) Gould
Dichanthelium portoricense (Defv. ex Ham.) B. F. Hansen & Wunderlin
Dichanthelium strictosum (Muhl. ex Ell.) Freekman
Digitaria villosa (Walt.) Pers.
Distichlis spicata (L.) Greene
Dodonaea viscosa (L.) Jacq.
Encyclia tampensis (Lindl.) Small
Eragrostis ciliaris (L.) R. Br.
Erechtites hieracifolia (L.) Raf.
Erigeron quercifolius Lam.
Eryngium planum L.
Erythrochryseum Sw.
Erythrina herbacea L.
Eugenia axillaris (Sw.) Willd.
Eugenia foetida Pers.
Eupatorium mikaniodes Chapm.
Eustachys petraea (Sw.) Desv.
Evolvulus alsinoides L.
Ficus aurea Nutt.
Fimbristylis stenostachya (Jacq.) Fern.
Fimbristylis castanea (Michx.) Vahl
Fimbristylis spathacea Roth
Flaveria linearis Lag.
Forestiera segregata (Jacq.) Krug & Urban
Galium hispidulum Michx.
Gaona angustifolia Michx.
Genipa clusiifolia (Jacq.) Griseb.
Gnaphalium obtusilobum L.
Hedyotis nigricans (Lam.) Fosberg
Hedyotis procumbens (L.) Gmel. Fosberg
Hedyotis uniflora (L.) Lam.
Heliotropium angiospermum Morr.
Heliotropium eurassavieum L.
Appendix 2. Native Vascular Plant Species on Cayo-Costa Island But Not on Sanibel Island

Aeglinis filifolia (Nutt.) Raf.
Apium leptophyllum (Pers.) F. Muell.
Appendix 3. Native Vascular Plant Species on Sanibel Island But Not on Cayo-Costa Island

Acacias pinnata (Small) Herm.
Aeschynomene americana L.
Agalinis fasciculata (Ell.) Raf.
Amaranthus hybridus L.
Amaranthus spinosus L.
Amaranthus viridis L.
Ampelopsis arborea (L.) Kotsch. 
Amphicarpum muhlenbergianum (Schult.) Hitchc.
Anagallis minima (L.) Krause
Annona glabra L.
Aeghione mexicana. L.
Asplenium aequiwm Wild.
Asplenium scolopendrium L.
Asplenium trichomanes L.
Axonopus forcatu (L.) Hitchc.
Baccharis glomeruliflora Pers.
Berclandia subacaulis (Nutt.) Nutt.
Boerahvia erecta L.
Bothriochloa pertusa (L.) A. Camus
Capar beeviora L.
Capsicum annuum L.
Evolvulus sericeus Sw.
Fimbristylis autumnalis (L.) Roem. & Schult.
Flaveria floridana J.R. Johnston
Flavcrnia floridana (Nutt.) Moq.
Fuirena breviseta (Cov.) Cov.
Fuirena pumila (Torr.) Spreng.
Fuirena scirpoidea Michx.
Gaillardia pulchella Foug.
Galactia striata (Jacq.) Urban
Galactia volubilis (L.) Britt.
Galium tinctorium L.
Geranium carolinianum L.
Gnaphalium falcatum Lam.
Gnaphalium pensylvanicum Willd.
Habenaria odontopetala Reichb.
Hamelia patens Jacq.
Haplopappus phyllocephalus DC.
Hedyotis corymbosa (L.) Lam.
Helenium armarum (Raf.) Rock
Hemarthria micrantha (Vahl) Pax
Hexalectris spicata (Walt.) Barnh.
Hydrocotyle verticillata Thunb.
Hypcxis juncea Smith
Ipomoea triloba L.
Juncus marginatus Rostk.
Juncus megacephalus M.A. Curtis
Khallane canadensis (L.) Dun.
Linaria canadensis (L.) Dun.
Lindernia crustacea (L.) F. Muell.
Linum medium (Planch.) Britt.
Lipocarpha maculata (Michx.) Torr.
Lobelia acuminata (Gray
Ludwigia curtisii Champ.
Ludwigia erecta (L.) Hara
Ludwigia octovalvis (Jaeg.) Raven
Ludwigia palustris (L.) Ell.
Ludwigia peruviana (L.) Hara
Lythrum alatum Pursh
Malvastrum americanum (L.) Torr.
Melochia villosa (Mill.) Fawc. & Rendle
Montiaea floridana Nutt.
Micranthemum glomeratum (Chapm.) Shinners
Mitreola petiolata (J.F. Gmel.) Torr. & Gray
Mollugo verticillata L.
Morinda royoc L.
Najas guadalupensis (Spreng.) Magnus
Najas marina L.
Nephoropsis bisserrata (Sw.) Schott
Neptunia pubescens Benth.
Nymphpha mexicana Zucc.
Oenothera laciniata Hill
Opizia stolonifera Presl
Oxalis corniculata L.
Oxalis florida Salisb.
Panicum adspersum Trin.
Panicum champani Vasey
Panicum dichotomiflorum Michx.
Panicum hians Ell.
Panicum repens L.
Panicum rigidulum Bose ex Nees
Parietaria praeterrima Hinton
Paspalum blodgetti Champ.
Paspalum boscutum Fluegge
Paspalum caespitosum Fluegge
Paspalum floridanum Michx.
Paspalum setaceum Michx.
Pectis linearifolia Urban
Pectis prostrata Cav.
Physalis angulata L.
Physalis angustifolia Nutt.
Physalis pubescens L.
Pilea hernarioides (Sw.) Lindl.
Pilea microphylla (L.) Liebm.
Piriqueta caroliniana (Walt.) Urban
Piscidia pescipla (L.) Sarg.
Plantago virginitica L.
Plumbago scandens L.
Poinsettia heterophylla (L.) Kl. & Gke.
Polygonum setaceum Baldw. ex Ell.
Pyrrhophappus carolinianus (Walt.) DC.
Reinarnochloa oligostachya (Manro) Hitchc.
Rhabdadenia bifora (Jaeg.) Muell.-Arg.
Rhus copallina L.
Rhynchosia michauxii Vail
Rhynchosia minima (L.) DC.
Rudbeckia hirta L.
Rumex pulcher L.
Rumex verticillatus L.
Ruppia maritima L.
Sabatia stellaris Pursh
Sagittaria graminea Michx.
Salvia riparia Kunth
Sambucus canadensis L.
Scirpus robustus Pursh
Scirpus validus Vahl
Scleria reticularis Michx.
Scleria verticillata Muhl. ex Wild.
Senecio glabellus Poir.
Senna occidentalis (L.) Link
Sesbania emerus (Aubl.) Urban
Sesbania vesicaria (Jaeg.) Ell.
Sesuvium maritimum (Walt.) BSP.
Setaria magna Griseb.
Sida rhombifolia L.
Sisyrinchium atlantiacum Bickn.
Spartina alterniflora Loisel.
Spermacoce assurgens Ruiz & Pavon
Spiranthes vernalis Englem. & Gray
Sporobolus domingensis (Trin.) Kunth
Sporobolus junceus (Michx.) Kunth
Stilllingia sylvatica L.
Stylosanthes hamata (L.) Taub.
Thalassia testudinum Banks & Solander ex Koening
Thelepteris interrupta (Willd.) Iwatsuki
Tillandsia fasciculata Sw.
Tribulus terrestris L.
Triglochin striata Ruiz & Pavon
Trisacum dactyloides (L.) L.
Typha latifolia L.
Urena lobata L.
Verbena scabra Vahl
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LITERATURE CITED


RESUME

Examine, en fonction des floras indigènes vasculaires, une théorie de l'équilibre biogéographique de deux îles barrière, différentes par leur taille et par leur éloignement du SW de la Floride. Sur Cayo-Costa (5.6 km² de surface et localisée à 12.8 km de la terre), 261 espèces ont été identifiées. Sur Sanibel (43.6 km² de surface et située à 3.2 km de la terre) un inventaire des années 50 a identifié 266 espèces, ce dernier étant incomplet par rapport à celui de Cayo-Costa. Un inventaire a identifié de 1965 à 1985 432 espèces indigènes sur Sanibel. Cette différence doublant presque le nombre d'espèces sur Sanibel par rapport à Cayo-Costa est cohérente par rapport à une théorie de l'équilibre qui prédit significativement un nombre plus grand d'espèces sur une île plus vaste et plus proche de la Terre. Comparée à d'autres études de flore insulaire, Sanibel a pu avoir davantage d'espèces. Le développement urbain et l'expansion des espèces allogènes qui résulte de la création d'une chaussée reliant Sanibel à la terre en 1983 a pu y réduire le nombre de plantes autochtones.—Catherine Bressolier (Géomorphologie EPHE, Montrouge, France).

ZUSAMMENFASSUNG