

**PROCEEDINGS
OF THE
THIRD SYMPOSIUM
ON THE
BOTANY OF THE BAHAMAS**

**Edited by
Robert R. Smith**

**Conference Organizer
Donald T. Gerace**

**Bahamian Field Station, Ltd.
San Salvador, Bahamas
1990**

© Copyright 1990 by Bahamian Field Station, Ltd.

All Rights Reserved

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in written form.

Printed in USA by Don Heuer

ISBN 0-935909-36-2

THE TROPICAL FLORA OF ANDROS ISLAND BAHAMAS: OBSERVATIONS AND NOTES¹

W. Hardy Eshbaugh and Thomas K. Wilson
Department of Botany
Miami University
Oxford, Ohio 45056

ABSTRACT

Detailed investigations of the flora of the Bahamas have been in progress for more than a century. Andros Island is the largest of the Bahamian islands. Yet it has been poorly studied given that it has the richest flora of any of the islands in the archipelago. The characteristics of ten plant communities are detailed along with certain observations on the distribution of several plant groups.

INTRODUCTION

The Caribbean is most often divided into three regions, the Bahamas archipelago in the north and northeast, the Greater Antilles (Cuba, Hispaniola, Jamaica, and Puerto Rico) in the central and western area, and the Lesser Antilles to the east and south to Grenada. The Bahamas are the exposed parts of a chain of limestone platforms or banks (Howard, 1974). The Greater Antilles are the fragmented remains of two continental land masses: Cuba belongs to the North American Plate, while Jamaica, Hispaniola, and Puerto Rico are from the Caribbean Plate. The Lesser Antilles are volcanic islands and were never joined with the continents.

The Bahamas archipelago stretches southeast from Walker Cay for approximately 1000 kilometers to Salt Cay, just north of Hispaniola. At its widest point the Bahamas extends from the Cal Sal Bank, just north of Cuba to San Salvador, a distance of roughly 600 kilometers. The archipelago consists of some 35 islands, 700 cays and some 2400 exposed rocks, most of which are covered with vegetation (Correll, 1979).

The land surface is almost totally limestone. There is some controversy over the formation of the rock, but most concede that it is in part aeolian and in part water deposits. There is some evidence of emergence and subsidence having

taken place several times since the tertiary when the major depositions occurred. This has had a pronounced effect on the general land form. The numerous ridges, some reaching elevations of 12 meters are quite possibly fossil reefs. These are especially in evidence in the road cuts around Nassau.

Andros is the largest of the Bahamian Islands. It lies approximately due east of Key West, Florida. Andros is in reality not one island but a series of smaller islands separated by wide bights or shallow channels (Northrop, 1902). The whole of Andros is approximately 165 km long by about 65 km wide. The topography of Andros is low and very rugged. The soft limestone is easily weathered into a complex array of lakes, ponds, marshes, oceanic "blue holes", fresh water blue holes, sink holes of various sizes, and "a general rough surface of plated, pitted or honey combed rock" (Correll, 1979). There are occasional ridges of higher elevation (on Andros, Morgan's Bluff soars to a magnificent height of 18 meters above sea level), but most the landscape is rather monotonously level. There are no fresh water streams or rivers, but there are freshwater ponds here and there. The western side of Andros is a very inhospitable region called "swash" that is neither land or sea. The eastern edge of Andros is a little higher and most of the inhabitants live here.

Opinion is rather divided as to whether the climate should be considered tropical or subtropical. Correll (1979) notes that since the Tropic of Cancer crosses near the center of this vast region, the climate is tropical throughout. Since infrequent frosts have been known to occur, however, it is probably best to consider the climate subtropical, at least for Andros. The island is continually influenced by warm trade winds that sometimes result in hurricanes or tropical storms during the months of August through October.

¹Adapted and modified from Nickrent et al., 1988 and Wilson and Eshbaugh, 1990.

PLANT COMMUNITIES OF ANDROS ISLAND

General descriptions of the plant communities of the Bahamas Archipelago can be found in Correll (1979) and Correll and Correll (1982). For more detailed information on the entire West Indies the reader is referred to Howard (1974).

The first attempt at any serious study of the flora of Andros Island was by Mrs. Alice Northrop from March to July 1890 (Northrop, 1902). During this time, Mrs. Northrop and her husband (a zoologist) made many plant collections. Our work has been an extension of these earlier studies (Nickrent et al., 1988; Wilson and Eshbaugh, 1990). From our experience on Andros, at the present time, we recognize ten plant community types: Beach/Strand, Coastal Rock, Coastal Coppice, Interior Coppice, Pineland, Savanna, Scrub, Freshwater Marsh, Saltwater Marsh ("Swash"), and Mangrove which we continue to redefine.

1. Beach/Strand Community

It is important to note that the sand on Andros is generally not of mineral origin. When the "sand grains" are viewed with a microscope or hand lens, they are seen to be small shell fragments, flattened carbonate scales (derived from the surfaces of certain marine algae and sea grasses), and/or tiny spheres of oolitic limestone.

The beach extends from the high tide mark to the strand. The substrate is very loose and is colonized by trailing vines and plants with prostrate growth habits, e.g. *Ipomoea pes-caprae*, *Sesuvium portulacastrum*, *Phloxerus vermicularis*, *Canavalia rosea*, *Chamaesyce mesembryanthemifolia*, as well as salt-tolerant grasses and herbs such as *Uniola paniculata*, *Distichlis spicata*, *Iva imbricata*, *Scaevola plumeri*, and *Cakile lanceolata*.

Strand associations are found primarily along the beaches on the east side of Andros. The strand community seems to merge (often imperceptibly) with the beach, hence some observers do not make a distinction between the two areas (e.g. Correll 1979). The major difference we recognize is that the substrate in the strand area is more consolidated and hence more stable. Here one sees small to large shrubs such as *Suriana maritima*, *Mallotonia gnaphalodes*, *Chrysobalanus icaco*, *Erithalis fruticosa*, *Coccoloba diversifolia*, *Thespesia populnea*, and *Salmea petrobioides*. Many of these plants have evolved special adaptations in response to high light intensity and the continual salt spray.

2. Coastal Rock Community

In many places the coastal beach and strand communities alternate with the coastal rock community. Because of the vastly different substrates, the two zones are quite distinct botanically. The limestone in this area is very jagged ("honeycombed" or "dogtooth") and the plants are rooted inside numerous crevices. Some examples of plants found in this area are *Coccoloba uvifera*, *C. diversifolia*, *Casasia clusiiifolia*, *Conocarpus erectus*, *Rhachicallis americana*, *Strumpfia maritima*, *Manilkara bahamensis*, *Jacquinia keyensis*, *Borrichia arborescens*, and *Pithecelobium bahamense*.

3. Coastal Coppice Community

On Andros this association is located back from the strand or coastal rock communities where the effect of the salt spray is less severe. The substrate is usually rock or a mixture of rock and sand which supports larger shrubs and trees that may reach 5 meters in height. Representatives of this community include *Pithecelobium keyensis*, *Lantana involucrata*, *Amyris elemifera*, *Jacquinia keyensis*, *Brysonima lucida*, *Malpighia polytricha*, *Eugenia confusa*, *Catesbaea parviflora*, *Psidium longipes*, *Erithalis fruticosa*, *Reynosa septentrionalis*, and *Thrinax morrisii*. Often the coastal coppice supports a diverse assemblage of epiphytes in the Bromeliaceae and Orchidaceae.

4. Interior Coppice Community

Perhaps the most difficult vegetation to characterize botanically (and walk through!) is the dense growth generally occurring as "islands" within the pinelands. Here the flora is predominantly of broadleaved (angiospermous) plants, although some of the areas (e.g. "London Creek Ridge" and "Maidenhair Coppice") have scattered, isolated pines. Because of the density of the vegetation in the coppice, they are sometimes called "thickets". Cocker (1905) further subdivided the coppice into "high and "low" types based upon the height of the vegetation. The Floristic difference between these two types is subtle and certainly merits further study.

The low coppice has an appearance very much like the scrub formation but it is thicker and generally found on rough, dogtooth rock (Fig.1). Saulea and Adams (1979) note that the

canopy here is 2-4 meters high. Some plants typical of the low coppice are *Acacia choriophylla*, *Coccoloba diversifolia*, *Bursera simaruba*, *Metopium toxiferum*, *Manilkara bahamensis*, *Cordia bahamensis*, *Ateramnus lucidus*, and *Bumelia salicifolia*.

The high coppice has a much different appearance since the canopy is typically 5-12 meters high (Saulea and Adams 1979). Very often this community occurs on the more elevated parts of the island, locally called "sea ridges". Other coppices are not located on a ridge (e.g. "Attala Coppice"). The substrate surface of the high coppice is very much eroded and sink holes of various sizes are quite common. The largest sink holes, called "Banana holes" may be 5-7 meters in diameter and 5-8 meters deep (Fig. 2). It is difficult to characterize the plant associations since this community is the most diverse on Andros Island. A sample of the common woody species one might see include *Bursera simaruba*, *Metopium toxiferum*, *Ficus aurea*, *Exothea paniculata*, *Calyptanthus pallens*, *Drypetes diversifolia*, *Clusea rosea*, *Psychotria angustifolia*, *Ateramnus lucidus*, and *Nectandra coriacea*. Rarer species are exemplified by *Capparis cynophallophora*, *Hypelate trifoliata*, and *Jacaranda coerulea*.

The sink holes of the high coppice provide a microenvironment that plays host to a major portion of the fern flora of Andros. Commonly encountered species include *Adiantum tenerum*, *Asplenium dentatum*, *Sphenomeris clavata*, *Tectaria lobata*, *Anemia circuitaria*, and *Selagenella eatonii*.

5. Pineland Community

The Pine "barrens" or "pineyards" occupy a large area of the central part of North Andros. On South Andros the pine forests are much less common and do not extend to the far eastern edge of the island, as occurs on North Andros. The land surface is comparatively level and covered almost exclusively with Bahamian pine (*Pinus caribaea*). Within the pinelands, low coppices appear where slight elevational rises occur. Similarly, clumps of palmettos and other palms appear in the slight depressions. The pines do not form thick stands, but are rather widely spaced, even when young, which gives the pineland a "planted" appearance. Most of the pinelands have been lumbered for the very heavy, hard, insect-resistant wood, although all commercial lumbering ceased about fifteen years ago. *Pteridium aquilinum* (Bracken Fern) is quite common among the

pinelands often forming "impenetrable thickets, six or seven feet high" (Northrop, 1902).

Correll (1979) and others point out that there are two variations of pinelands to be found: wet and dry. The wet pinelands are characterized by having water within a few inches of the surface. Plants found among the pines in this rather open community are *Metopium toxiferum*, *Byrsonima lucida*, *Lantana involucrata*, *Bourreria ovata*, *Thrinax morrisii*, including many vines such as *Smilax laurifolia*, *Ipomoea microdactyla*, and *Centrosema virginiana*.

In the dry pinelands, *Coccoloba diversifolia* is more often found. Other species include *Tetrazygia bicolor*, *Duranta repens*, *Chiococca parvifolia*, *Linum bahamensis*, *Ernodea littoralis*, *Pteridium aquilinum*, *Vernonia bahamensis*, *Dichromena colorata*, *Bletia purpurea*, *Hypericum hypericoides*, and *Cassia lineata*.

Our studies have provided some important insights into the successional cycle characteristic of these burned over pineland sites. We know that over a four year period species diversity in the understory shrub layer increases significantly.

6. Savanna Community

According to Northrop (1902), this region is found only on Andros (Fig. 3). Correll (1979) does not consider this a distinct type but rather under the heading of "Tidal Flats and Salt Marshlands." These level, prairie-like stretches lie between the pines and the swash and are most common in the northwest part of North Andros Island. Good examples of savanna may be found along the road to Red Bays. The ground is not rocky and is not as saline as the swash region to the west. The predominant plant is saw grass (*Cladium jamaicensis* - a sedge). The landscape is broken by clumps of palms (*Coccoloba diversifolia*) and sometimes rather extensive, but thin stands of brier tree (*Bucida spinosa*) which give the landscape an "African" appearance. This area also supports many interesting shrubs such as *Antirhea lucida* and *Psidium longipes*, and herbs including *Polygala baldwinii*, *Sabatia stellaris*, *Samolus ebracteatus*, *Aletris farinosa*, *Bletia purpurea*, *Calopogon tuberosus*, and *Flaveria linearis*.

7. Scrub Community

Howard (1974) considers this formation to be

one of the most characteristic formations of the West Indies. Since the plants in it are often thorny, it is often called the "thorn scrub". On Andros, this formation seems to occur where the substrate is not the honeycomb limestone but a smoother pavement broken into many shallow sinkholes. Common plants in these areas are *Acacia choriophylla*, *Pithecellobium bahamense*, *Guettarda scabra*, *Tabebuia bahamensis*, *Bursera simaruba*, *Myrsine floridana*, *Bumelia americana*, *Stigmaphyllon sagraeanum*, *Manilkara bahamensis*, and *Randia aculeata*.

8. Freshwater Swamp Community

Inland on the island can be found swamps with fresh to brackish water such as at "Goby Lake" (Fig. 4). These swamps often occur in the middle of a pineland formation. Here the vegetation is characterized by many shrubs and small trees such as *Iva cheiranthifolia*, *Myrsine floridana*, *Bumelia salicifolia*, *Ilex cassine*, and *Conocarpus erectus*. Herbs such as *Phyla nodiflora*, *Typha domingensis*, *Cladium jamaicensis*, *Sagittaria lancifolia*, *Utricularia purpurea* and *Nymphoides grayana* can also be seen in or around the standing water.

9. Saltwater Marsh Community

This area is equivalent to what Correll (1979) calls the "Tidal Flats" and "Marshlands" and may be covered with brackish water or, after periods of heavy rain, may be "washed" out by fresh water. Perhaps this is the derivation of the word "Swash" which was used by Northrop (1902) to describe this area. The saltwater marsh is perhaps the most desolate and inhospitable of all of the areas on Andros and occupies hundreds of square kilometers. This is certainly the impression one gets while viewing the numerous ponds and lakes when approaching Andros by air from the west. The ground is a soft calcareous mud which is often covered by algal mats. Northrop (1902) states:

The scenery was monotonous and desolate. In many places as far as the eye could reach, the ground seemed perfectly flat and covered with small mangroves (*Rhizophora mangle*), salt bush (*Avicennia germinans*) and a low form of button wood (*Conocarpus erectus*), none more than a few feet in height. The plants were in reality quite scattered and a

considerable distance apart...

Herbaceous plant life such as *Salicornia virginiana*, *Suaeda linearis*, *Batis maritima*, *Juncus roemerianus*, and *Atriplex arenaria* are also prevalent here. One species recently found in this community is *Triglochin striata* which is new to area nine in the Correll and Correll (1982) scheme.

10. Mangrove Community

This distinctive community is also called "mangal" and is readily characterized by the presence of red mangrove, *Rhizophora mangle*. Mangroves are very common along the east shoreline of Andros as well as in portions of the saltwater marsh or swash community. The red mangroves are important colonizers of tidal shorelines and can be found in similar habitats all over the world. Their method of retaining the fruits on the parent plant until long after germination (vivipary) and the sprawling vegetative growth habit are just two examples of adaptations to the coastal saltwater environment. Three other species on Andros are called mangroves: black mangrove (*Avicennia germinans*), white mangrove (*Laguncularia racemosa*), and buttonbush (*Conocarpus erectus*). Since these species are members of three families, "mangrove" is not a taxonomic category but a life form evolved in response to the particular environment.

OBSERVATIONS

If one looks at the vegetation of Andros Island one is struck by the differences from North Andros to South Andros. Much more precipitation falls to the north giving rise to a lush and richer vegetation. At the same time South Andros is characterized by a number of species associated with drier down island locations e.g. *Croton linearis*, *Catesbaea spinosa*, and *Pseudocarpidium wrightii*. There are a number of taxa which occur on South Andros that are restricted to that area e.g. *Celtis iquanaea* (also West Indies, Mexico, and South America) and *Catalpa punctata* (Cuba).

Using the check list in Correll and Correll (1982) we can account for a total flora for the Bahamas of 1,371 species, subspecies, varieties, and hybrids. Our studies of Andros Island indicate a flora for region nine in excess of 812 taxa. Therefore, the Andros Island Flora is



Fig. 1. A view of a typical "Interior Coppice Community" with various tree species "growing" from limestone honey combed with small sinkholes.



Fig. 2. A large "Banana Hole" in a High Coppice Community as seen to the east of Love Hill, North Andros Island. Subject, E. Wendy Brown, is 5' 9" tall.

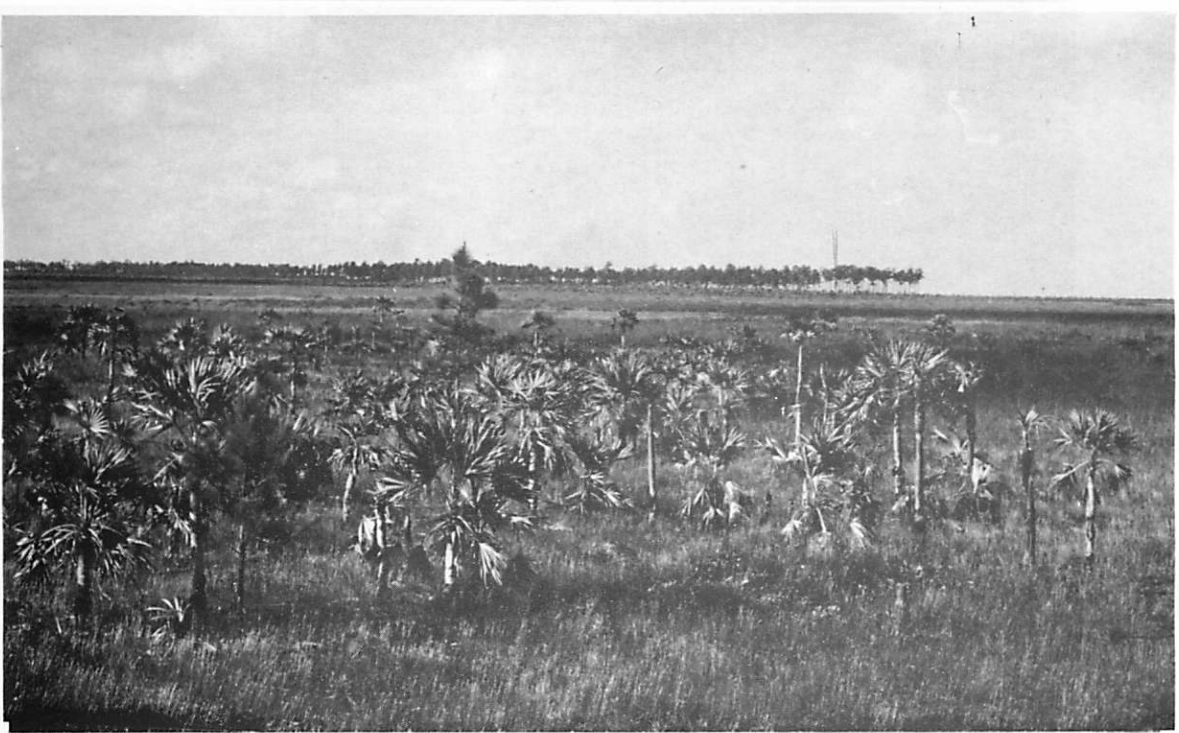


Fig. 3. Savanna Community as seen from Red Bays road, North Andros Island.



Fig. 4. Fresh Water Swamp Community at "Goby Lake" in the interior of North Andros Island.

represented by approximately 60 percent of the total flora for the archipelago. Andros Island is especially rich floristically for specific plant families. The orchid flora of the Bahamas embraces 52 taxa of which 47 (90%) occur on Andros. The fern flora include; 36 species of which 26 (72%) occur on Andros.

If one examines the species list for the Bahamas Archipelago some 44 taxa are listed as unique to region nine of Correll and Correll (1982). Many of these taxa have distributions that encompass the southern United States, Mexico, Central America, or South America. At least four taxa appear endemic to Andros Island including *Encyclia cochleata* var *triandra* (Orchidaceae), *E. withneri*, *Phoradendron northropiae* (Viscaceae), and *Psidium androsianum* (Myrtaceae).

LITERATURE CITED

- Coker, W. C. 1905. Vegetation of the Bahama Islands, p 185-270. In G. B. Shattuck, The Bahama Islands. Geogr. Soc. Balt., John Hopkins Univ. Press.
- Correll, D. S. 1979. The Bahama archipelago and its plant communities. *Taxon* 28:35-40.
- Correll, D. S. and H. B. Correll. 1982. Flora of the Bahama Archipelago. J. Cramer Publishers.
- Howard, R. A. 1974. The vegetation of the Antilles, p 1-38, In A. Graham (ed.), Vegetation and vegetational history of northern Latin America. Elsevier, New York.
- Nickrent, D. L., W. H. Eshbaugh, and T. K. Wilson. 1988. Vascular flora of Andros Island, Bahamas. Kendall/Hunt Publ. Co., Dubuque, Iowa.
- Northrop, A. R. 1902. Flora of New Providence and Andros. *Mem. Torrey Bot. Club* 12:1-98.
- Sauleda, R. P. and R. M. Adams. 1979. Epiphytic orchids of North Andros. *The Bahamas Naturalist* 4:25-33.
- Wilson, T. K. and W. H. Eshbaugh. 1990. Tropical flora of the Bahamas, Andros Island - Workbook. Privately published.