

Palm Forest

One of the most unique and restricted types of native vegetation in southeastern North America and in the important range state of Texas is the jungle-like forest dominated by the native palm that grows to tree size and habit and is known variously as sabal palm, Texas or Rio Grande palmetto, palma de micharos (*Sebal texana*= *S. mexicana*). This native woodland is a flatwoods or floodplain forest (more commonly than it is a riparian or gallery forest which is a narrower zone of wetland vegetation) that develops over the greater or general floodplain or the Rio Grande (= Rio Bravo) in the states of Texas and Tamaulipas. The other major woody plant species that defines this woodland community is Texas ebony or ebano (*Pithecellobium flexicaule*= *P. ebano*). Thus this natural plant community has been described as the sabal palm-Texas ebony jungle forest. A common associate (when interpreting sabal palm and ebony as co-dominants) is anacua or knock-away (*Ehretia anacua*), a small tree (and often with multiple trunks like a large shrub) in the Boraginaceae (borage family). The successional relation of Texas ebony and anacua was described later in this introduction.)

Other frequent large shrubs or small trees in this forest community include tpeguaje (*Leucaena palverulenta*) and tenaza (*Pithecellobium pallens*). The most common-- and, in fact, often dominant --understorey shrub is David milkberry or cahinca (*Chinococca alba*). Milkberry or cahinca frequently forms the entire understorey in groves of mature palms (shown below). Other common understorey shrubs include chile piquin, chillipiquin, or bird pepper (*Capsicum annuum* var. *minus*) and Drummond's turk's cap or Drummond wax-mallow or Texas mallow (*Malvaviscus drummondii*= *M. arboreus*). Bloodberry, rouge plant, pigeonberry or coralito (*Rivina humilis*= *R. laevis*= *R. portulacoides*) is one of the most common forbs in the understorey of this floodplain forest vegetation.

There is typically little or no understorey beneath larger adult palms as the older mature fronds (leaves) are shed complete with their immense petioles that can be as much as four or more inches wide at the abscission zone. These shed fronds form a mulch of multi-layers in various stages of decomposition so that the forest floor is devoid (or nearly so) of understorey plants. The hard woody petioles sometimes extend as much as two feet above the blade parts of fronds making travel through fallen palm leaves very difficult. These shed fronds are ready fuel and many of the trunks of older palms are blackened from past fires. Sabal palm appears to regenerate beneath adult palms, sometimes even in the dim-lite, frond-mulched interior of the palm forest (see photographs below).

There has been comparatively little material written describing this extremely restricted vegetation. The most readily available descriptions may be Texas Natural History, the original Biological Survey of Texas by Vernon Bailey with introduction and updates by Schmidly (2002, ps. 65, 75, 145, 319, 320, 326, 390, and 426) and the mostly faunal description in Saving the Best of Texas (Bartlett, 1995, ps. 132, 134-136). Vines (1962, p. 46) listed trees and shrubs in the sabal palm forest based on his previous visit to the Frank Rabb Ranch in Cameron County, Texas (this became the Sabal Palm Audubon Center and Sanctuary). Woody species included on Vines' list (and using his names) were Texas ebony or ebony apes-earring (*Pithecellobium flexicaule*= *P. ebano*), apes-earring (*P. pallens*), granjeno (*Celtis pallida*), Rio Grande or Mexican or Berlandier ash (*Fraxinus berlandieri*), Berlandier mimosa (*Mimosa berlandieri*), tepeguaje or great lead-tree or tpeguaje (*Leucaena pulverulenta*), white popinac lead-tree (*L. glauca*), Barbados-cherry (*Malpighia glabra*), lime prickly-ash (*Zanthoxylum fagara*), lotebush (*Condalia obtusifolia*= *Ziziphus obtusifolia*), saffron-plum bumelia (*Bumelia angustifolia*), Texas persimmon (*Diospyros texana*), and autumn salvia or autumn sage (*Salvia greggii*). Strangely, Vines (1962, p. 46) did not list anacua, one of the major trees, nor drummond's turk's cap and chile piquin, which are some of the major shrubs, for the sabal palm forest.

The sabal palm forest was apparently not a large community even in pre-European North America. Officials

associated with various organizations like the Sabal Palm Audubon Center and Sanctuary and World Wildlife Fund have reported in worldwide web publications (eg. www.tx.audubon.org/centers/sabal) that in North America sabal palm-dominated forest was limited primarily to the floodplains of such rivers as the Rio Grande and San Bernard and, except for isolated relict vegetation, extending northward primarily through the Lower Rio Grande Valley and up the Rio Grande for about 80 miles (Bartlett, 1995. p. 135). According to reports from the LaSalle Expedition sabal palm grew much farther west including along the Guadalupe River. There is no evidence, however, that the sabal palm-Texas ebony (ebano) jungle forest developed north or west of the Lower Rio Grande Valley.

Bartlett (1995, p. 135) reported that the pre-white man sabal palm forest totaled about 40,000 acres in the Lower Rio Grande Valley. It was not clear if this included acreage in both the United States and Mexico. Almost all of the sabal palm forest on the USA side of the Rio Grande (= Rio Bravo) was cleared for irrigated agriculture and, later, for urban sprawl, beginning in the early Twentieth Century. Prior to clearing, or simultaneously with clearing, sabal palms were felled so that logs from the limb-less, easily bucked boles could be used for warf-pilings. According to Landon Lockett (www.audubon.org/local/sanctuary/sabal/nativepalms.html) the wood of sabal palm is resistant to consumption by shipworms. Demand for shipworm-resistant wood in ports along the Gulf Coast was great enough that sabal palm populations were devastated by the "cut-and-run" logging practices of the time.

Interesting sidebar note: There are several species of bivalve marine mollusks that are known as shipworms because they are capable of destroying submerged wood by eating burrows or tunnels throughout the wood, a dire condition that can ultimately destroy submerged (or partly submerged) wood that is then said to be "wormshot". Burrowing begins with the larval stage. The most common of these marine bivalves is the tropical species, *Teredo navalis*, an elongated two-shelled clam that reaches lengths up to two feet. This species is especially active in the warm waters of the Gulf of Mexico.

As of this writing the only remaining sabal palm-ebano forest remaining in anything resembling natural vegetation is that preserved on the Sabal Palm Audubon Center and Sanctuary in Cameron County, Texas. Of the 527 acres in this sanctuary (www.audubon.org/local/sanctuary/sabal) only 32 acres is virgin palm-Texas ebony jungle forest (Bartlett, 1995. p. 135). Most of the vegetation remaining on the Audubon Sanctuary is second-growth, recovering (= secondary successional) forest.

Diamond (1998, p.1) described southwestern subtropical forest types in the Lower Rio Grande Valley. These included: 1) southwestern subtropical upland forest composed of broad-leaved, mostly evergreen species and that developed on moist uplands and resaca terraces (an evergreen low forest type), 2) floodplain hardwood forest composed mostly of (ie. dominated by) sugarberry (*Celtis laevigata*), cedar elm (*Ulmus crassifolia*) and Berlandier as (*Fraxinus berlandieri*), and 3) the Texas palmetto or sabal palm-dominated floodplain forest. Diamond (1998, ps.4-5) divided the upland subtropical evergreen forest type into two series: 1) Texas ebony-anaqua series that was described as a "well-developed forest and 2) Texas ebony-snake eyes (*Phaulothamnus spinescens*) series described as a "low forest grading into shrubland" but these series formed a continuum of vegetation on the uplands of the Lower Rio Grande Valley. Texas ebony was the defining dominant species on the more favorable sites of both of these upland forest series. Stands of old-growth upland subtropical evergreen forest also contain large trees of anaqua as well as Texas ebony. Shrub species in (and indicative of) understory of these old-growth forest include brasil, snake-eyes, and Texas persimmon. Sugarberry, cedar elm, soapberry (*Sapindus drummondii*), and tepeguaje are generally successional woody species. Neither mesquite nor huisache are dominants of these forest types. In fact, mesquite was usually found to be almost absent in interior of old-growth stands while Texas ebony or Texas ebony and anaqua comprise almost all of the canopy of climax forests.

There is little or no understorey in such forests resulting in a see-through feature below the canopy.

Apparently this Texas ebony or Texas ebony-anaqua upland forest type intergrades with the sabal palm-dominated floodplain forest. Furthermore the description that the Texas ebony or Texas ebony-anaqua forest type occupied ox-bow (resaca) terraces (Diamond, 1998, p. 1) seemed to the present author to argue for it also being a bottomland forest type under such conditions (ie. when it occurs on ox-bows of floodplains). In such locations ebano- or ebano-anaqua-dominated forests would likely "blend" into sabal palm-dominated forests.

It was the sabal palm-dominated and, often, sabal palm-ebano- or, even, sabal palm-ebano-anaqua-dominated floodplain or gallery forests that the following section was devoted to. On some local habitats there were palm groves whereas on others there was a mix of palm, ebano, and anaqua. Mostly sabal palm and ebano were co-dominant. All photographs were of forest vegetation from Sabal Palm Audubon Center and Sanctuary, (written in abbreviated form as "Audubon Sanctuary").

This natural community was not designated specifically by any of the standard authorities like Kuchler (1964), Garrison et al., 1977), Brown et al. (1998), Society of American Foresters (Eyre, 1980), or Society for Range Management (Shiflet, 1994). Diamond (1998, p. 4) also emphasized that there was no Society of American Foresters cover type. Vegetation was probably too small a unit to merit inclusion in treatments devoted to general units of vegetation or in hierarchial vegetation classification systems. Anyway, there were not published vegetation units for this range vegetation so none were shown. While this forest range vegetation was not named or described as a cover type or specific biotic community or series it was in Western Gulf Coastal Plains- Lower Rio Grande Alluvial Floodplain 34f (Griffith et al., 2004).



36. Exterior view of sabal palm-ebano or Texas ebony forest- Physiognomy of a virgin palm-ebano Rio Grande Valley forest. Local small palm grove (= stand) with Texas ebony in background. Understorey consisted of David milkberry or cahinca (*Chinococca alba*), bloodberry or rogue plant (*Rivina humilis*), chilipiquin or bush pepper (*Capsicum annuum* var. *glabriusculum*), and Drummond wax-mallow or Texas mallow (*Malvaviscus arboreus*). Bloodberry was the only major forb.

Audubon Sanctuary, Cameron County, Texas. October.



37. Stand of sabal palm forest- Species composition and structure of a virgin grove of *Sabal mexicana* (= *S. texana*) with understorey dominated-- almost exclusively --by David milkberry or cahinca. Mature and immature individuals of Texas ebony or ebano (*Pithecellobium flexicaule*= *P. ebano*) were visible in midground of both photographs.

The smooth bark on trunks of palms indicated mature trees. Abscission scars and residue of frond petioles were "long-gone" in contrast to younger trees (see photographs below).

Audubon Sanctuary. Cameron County, Texas. October.



38. Species diversity of a sabal palm-ebano jungle forest- Co-dominants of this floodplain forest were in close association on this "photo- sample" of one of the most rare of North American range types. Ebano or Texas ebony was growing alongside sabla palm with David milkberry or cahinca dominated the shrubby understorey. Rouge plant or bloodberry was most abundant forb.

Note abscission scars and "trash" (residue) of shed fronds on trunk of the young palm. These leaf bases are commonly known as "boots".

Audubon Sanctuary, Cameron County, Texas. October.



39. "Outskirts" of a sabal palm-Texas ebony floodplain jungle forest- On the edge of this Lower Rio Grande Valley floodplain palm-ebano forest both of these dominant tree species were accompanied by lime prickly ash and young plants of anaqua and tpeguaje (*Leucaena pulverulenta*). In the lower understorey the most common

species were bloodberry and chilipiquin.

Dead fronds of sabal palm are shed and fall to the forest floor to form a relatively deep litter layer. "Boots", the bases of shed fronds, typically remain for a period of time (perhaps several years) following shedding of the leaves. This relative early shedding of dead leaves is in contrast to some other palm species in which dead fronds remain on trees to form a "skirt".

Audubon Sanctuary, Cameron County, Texas. October.



40. Jungle on the Rio Grande- Vegetation layers of sabal palm-ebano jungle forest were conspicuous in this photograph of the interior of the virgin vegetation that got sunlight for only a relatively short period (at least long enough for this composed shot).

Regeneration of sabal palm beneath its own shade was obvious in this and the next three succeeding slides as well as others below. *Sabal mexicana* (= *S. texana*) was not included in the Forest Service Silvics of North America (Burns and Honkala, 1990), but the similar *S. palmetto* was classed as shade-tolerant and probably both climatic climax and fire climax (Burns and Honkala, 1990, p. 765).

Audubon Sanctuary, Cameron County, Texas. October.



41. Palm and ebony along a resaca- The sabal palm-Texas ebony virgin forest shown in this series of photographs developed around a resaca (Spanish for ox-bow or ox-bow lake) that formed on the previous bed of the meandering Rio Grande. In 1895 the Rio Grande flooded to such extent that it changed course-- formed a new meander as such rivers are wont to do --and formed a new river bed. After being cut off from the main channel of the Rio Grande the old riverbed developed into a lake (or several small lakes) along the old meander. Ox-bow takes its name from the bows of an ox yoke. A bow is one of the two curved, slender wooden pieces that fits around the ox's neck. Later a saddle stirrup in which the boot is less likely to hang up was patterned after this piece so as to become known as ox-bow stirrup. Pioneer geologist adopted the name of the then-common piece of teamster (bull-wacker) equipment and applied it to stream meanders, especially when backwater lakes formed behind river meanders that became cut off from the main stream channel as when floods changed the river or its major tributaries.

Sabal palm-ebano jungle forests developed along the floodplain of the Rio Grande in the Lower Rio Grande Valley, especially around an ox-bow (or, again the Spanish, resaca). That phenomenon was "caught on Kodachrome" in the scene shown here and in the next photograph. Both ebano or Texas ebony and sabal palms were growing in standing surface water and with tree crowns of both species outlined against the humid Gulf Coast sky. Furthermore, the tolerant palm had regenerated such that young palms were growing in open water of the resaca.

Audubon Sanctuary, Cameron County, Texas. October.



42. Crowns along the El Rio de las Palmas- One of the numerous names of the river now know as Rio Grande and Rio Bravo alluded to the palm-lined terminus of the river that has its source in the Rocky Mountains of Colorado. Spanish explorers were forced to skirt the dense palm jungle forest that grew in the floodplain of the Rio de Palmas. Deep mud and perhaps quicksand may have "teamed-up" with the multi-storied floodplain forest in causing diversion of horseback Spanish exploration parties.

That combination of treacherous river and formidable forest vegetation was presented in this photograph. Crowns of sabal palm and ebano, co-dominants of this range type, clearly showed botanical composition of this riparian corridor or what could be viewed as a gallery forest at this location. In addition to reproduction of sabal palm, other plant species growing along the resaca included anaqua, tpeguaje, tenaza, David milkberry, bloodberry, chilipiquin, lime prickly ash, Texas mallow or Drummond wax-mallow, and, the large native wetland grass, common reed or carrizo (*Phragmites communis*= *P. australis*).

Audubon Sanctuary, Cameron County, Texas. October.

68. The "drier end" of sabal palm-ebano jungle forest- The series of three photographs presented immediately below showed range vegetation that developed on parts of the floodplain palm forest above (higher in elevation) and farther from the resaca (ox-bow lake) and its vegetation that were shown in the two immediately preceding photographs. On these "higher and drier" localized habitats plant species composition shifted from that of palm groves with less dense understories to dense, impenetrable thickets of thornscrub that lived up to the billing of a "jungle".



Regeneration of palm and ebano in the "jungle"- Young sabal palm and Texas ebony or ebano were growing along with lime prickly ash, anaqua, and common reed on a location within 25-30 steps of the backwater of the Rio Grande in a resaca. Audubon Sanctuary, Cameron County, Texas. October.



No wonder the explorers detoured- Lime prickly ash, night-blooming cereus (*Acanthocereus pentagonus*), ebano, tpeguaje, and anaqua along with a few sabal palm presented this formidable fortress of vegetation "uphill" (maybe a yard increase in elevation) from an ox-bow along the former channel of the Rio Grande. This would seem to be the "jungle"-like expression of sabal palm-ebano floodplain forest that forced Spanish explorers to divert from the Rio Grande then known as El Rio de las Palmas. Cameron County, Texas. October.



"There's gotta be a better way than this" (or "Ah, but what interesting vegetation")- Spanish dagger (*Yucca treculeana*) and some species of pricklypear (*Opuntia* sp.) joined ebano, tpeguaje, lime prickly ash, chilipiquin, and Berlandier fiddlewood to form this vegetational arrangement often described as a "jungle". It was readily

apparent why such a barrier of thornscrub forest caused mounted explorers to find another route. Audubon Sanctuary, Cameron County, Texas. October.



43. Past fire and present undergrowth- Boles (trunks) of sabal palm and ebano or Texas ebony along with tenaza, tpeguaje, Berlandier fiddlewood, lime prickly ash, chilipiquin, and bloodberry or rouge plant produced this "jungle"-like sample of floodplain palm-ebano virgin forest. This range vegetation was close to the edge of a resaca (ox-bow lake) that formed when a flood 110 years ago changed the course of the Rio Grande. The resaca formed along the former channel meander that was cut off from the new riverbed.

Viewers attention was drawn to the fire-burnished trunks of sabal palm. Readers were reminded of the dense, often multi-layered litter or debris composed largely of shed fronds that covered the forest floor. This constitutes a readily available fuel for fire which, as evidenced by fire-charred palm trunks, has occurred in this vegetation. It was cited above that in Silvics of North America Burns and Honkala (1990, p.765) regarded the cabbage palm (*Sabal palmetto*) of Florida as a fire-climax species. *S. mexicana* (= *S. texana*) was not treated in Silvics but it seemed likely that sabal palm was similar to *S. palmetto* in response to fire (and shade).

Ages of trees and shrubs was not determined. Indeed, the monocotyledonous palm does not produce annual growth rings so ages of individuals of this species could not be accurately determined. It seemed obvious, however, that Texas ebony or ebano trees (pole-size trunks) were younger than the larger palms because there was no evidence of fire on bark of ebano poles. It followed from this that ebano had grown after the fire that charred palm trunks. From this self-evident fact it was obvious that ebano had grown under shade of the pre-existing sabla palms. Ergo, ebano or Texas ebony is also relative shade-tolerant, which is consistent with its ecological niche and role in this forest range type as a climax (and co-dominant) species.

Audubon Sanctuary, Cameron County, Texas. October.



44. Intriguing view of virgin forest- A composite scene of old-growth sabal palm-ebano Rio Grande floodplain forest revealing regeneration of both co-dominant climax tree species. Other woody species in this forest tract were lime prickly ash, anaqua, tenaza, tpeguaje, Spanish dagger, and David milkberry or cahinca (the overall dominant understorey shrub). Other low-growing shrubs that were common in the understorey included chilipiquin and Texas mallow or Drummond wax-mallow. Bloodberry or rogue plant was the major forb. Common reed or carrizon, the large arundinoid grass, was locally dominant and frequently present as a major herbaceous species (in latter case, as in foreground of this photograph).

Abscission scars from shed fronds were distinctive on trunk of palm (right foreground).

Audubon Sanctuary, Cameron County, Texas. October.



45. Not an island paradise but Texas' Lower Rio Grande Valley- No, this was not a tropical island in the Caribbean Sea, but sabal palms, an anaqua, Texas persimmon, and common reed welcomed guests to a floodplain forest near the mouth of the Rio Grande emptying into the Gulf of Mexico. Young palms and ebano saplings attested to regeneration of these climax co-dominants of this forest range type.

(And, yes for some folks this always warm-- and, usually, hot -- and humid, mesquite-infested, closed-in,

backwater "jungle" is paradise. "To each his own".)

Audubon Sanctuary, Cameron County, Texas. October.



46. Next crop of co-dominants- Regeneration of sabal palm (foreground) and ebano or Texas ebony (background) was shown distinctly in this view of the understory of a palm-ebano floodplain forest.

Litter from shed palm fronds covered much of the forest floor, but some plant species grew through this debris (and perhaps benefitted from it). It was remarked previously that based on tolerance of cabbage palm it was logical to assume that sabal palm is probably a shade-tolerant species. .

Audubon Sanctuary, Cameron County, Texas. October.



47. Inside a sabal palm-ebano forest- Deep interior of a Rio Grande floodplain forest with young sabal palms and older and larger ebano (largest tree trunk but with uncharacteristic lower bark) and anaqua (two trees with dark trunks in right background and one tree at extreme right margin). It was mentioned above that *Sabal mexicana* is likely shade-tolerant so that palm regeneration occurs in climax forests.

Low-growing plants on forest floor included David milkberry or cahinca, chilipiquin, bloodberry, and common

reed. Almost all individuals of these species were stunted and were not flowering or bearing fruit in sharp contrast to individual plants of these same species. (Sexually reproductive specimens of these species that were photographed at this same time and in this forest were presented below.)

Climax forest vegetation seen here was a representative sample of the Texas ebony-anaqua series of upland subtropical evergreen forest described by Diamond (1998, p.4). The author of the present publication explained in the introduction to this section on Palm Forest the likelihood that floodplain sabal palm groves (the Texas palmetto [*S. mexicana*]-dominated forest of Diamond [1998, p.1]) intergraded (ie. "blended") into the ebano-anaqua series. Diamond (1998, p. 4) described a vegetational continuum of similar and floristically related plant communities in the Lower Rio Grande Valley.

The absence of a well-developed understorey that was described by Diamond (1998, p. 4) as "... essentially no middle story or ground cover" was evident in this photo-quadrant.

Audubon Sanctuary, Cameron County, Texas. October.



48. Forest smorgasbord- Within this dense sabal palm-ebano forest community several strata (layers) of vegetation were visible illustrating the structure of this floodplain range type. David milkberry was the conspicuous twining, leafy shrub ascending trunks and into the more open canopy. Bloodberry or rouge plant (also pigeonberry), the most common forb, and Texas wax-mallow or shrubby turk's cap and Berlandier fiddlewood were other common shrubs. Also present (and very conspicuous in right foreground) was common reed or carrizo. The forked-limb tree with the "dead giveaway" mottled bark was Texas persimmon. Recall from the introduction of this section that Texas persimmon was interpreted by Diamond (1998, p. 4) as a member of the climax Texas ebony-anaqua forest type. Dead fronds and "boots" (remaining bases of dead leaves) were visible on almost the entire trunks of sabal palms in foreground indicating that these were relatively young trees and that regeneration of sabal palm was on-going..

Audubon Sanctuary, Cameron County, Texas. October.



49. New forest on an old-field- Old-field is an "old" term in American ecological circles where it is still used in reference to abandoned farm land, most of which consisted of fields (referring to land that had been devoted to field crops). Historically before involvement of the Federal (United States) government, abandoned farm ground was left without much, if any, attempt at revegetation. What natural revegetation took place on such abandoned land did so by secondary succession. Land so abandoned was left to "go back on its own" and hence also became known as "go-back land" (a synonym for old-field and used in more western-- subhumid to arid --regions). With advent and wide acceptance of government cost-sharing (ie, subsidized) programs for soil conservation and revegetation like the Soil Bank and, later (and more successful), Conservation Reserve Program most abandoned fields (and mined lands) in the United States are now artificially revegetated by seeding or tree planting.

The range presented in this slide was an old-field or go-back land undergoing secondary succession. Forest range vegetation was in an advanced seral stage that was approaching plant species composition of climax sabal palm-ebano forest. The complete chronology of agricultural use (livestock grazing, field crop farming, horticultural cropping) on this land was, of course, not known. Likewise, the record of human inputs-- direct and/or indirect -- on this stand of Texas ebony or ebano was incompletely known. Diamond (1998, p. 5) pointed out that while there had been considerable effort directed toward reforestation of abandoned cropland in the Lower Rio Grande Valley (more than 5000 acres) "only dubious records" had been kept on materials and methods or successes and failures of this restoration effort. Even on property of proverbial "crack-conservation outfits" like The Nature Conservancy details of restoration projects are far from complete.

On the Audubon Society forestland shown here it was not known how much or what proportion--if any-- of Texas ebony forest regeneration was due to artificial revegetation (including tree planting) and what was attributable to the natural processes of secondary plant succession. Furthermore, "little is known about processes in old-growth Texas ebony forests, nor about presettlement disturbances". "Gap-phase succession is not clearly apparent in old-growth upland forests of the Rio Grande Valley" (Diamond, 1998, p. 5). Consistent with the latter statement, it appeared that on go-back land adjacent to sabal palm-ebano forest (such as the old-field shown here) climax plant species reestablished rapidly on the forest sere via old-field (= secondary) succession.

A possible important factor in reforestation-- natural and/or artificial revegetation --of subtropical evergreen forests, including the various cover types and series of both floodplain and upland forests, was role played by invasive and naturalized plant species. The introduced guinea grass (*Panicum maximum*) recently and with unbelievable rapidity naturalized throughout much of southern portions of the Rio Grande Plains vegetational area (and extending north of the Lower Rio Grande Valley). Naturalization (Clementsian invasion) of (by) guinea grass was complete within the time frame of approximately 30 or 40 years. This phenomenal rate of spread rivaled that of annual grasses in California and King Ranch bluestem throughout much of Texas. Guinea grass comprised almost all of the herbaceous cover in the vegetation seen in this and the next succeeding slide. Role, if

any, of guinea grass in re-establishment of Texas ebony, anaqua, sabal palm, Texas persimmon, etc. has apparently not been established or, perhaps, not even investigated. Would presence of dense cover by perennial grass have any impact on invasion by native species-- climax and/or seral -- on the forest sere? Would any such impact be different with an exotic like guinea grass than with native species?

Audubon Sanctuary, Cameron County, Texas. October.



Forest come-back on go-back land- Young Texas ebony or ebano and sabal palm re-established on an old-field adjacent to old-growth floodplain forest co-dominated by these climax tree species. This was another view of the same land and range vegetation introduced in the preceding photograph. The forest community was obviously dominated by Texas ebony and sabal palm which are climax dominants of this forest cover type, subtropical evergreen upland forest. Anaqua was also established but at much less cover and density than the other two tree species. The herbaceous layer of this range plant community was composed almost exclusively of the introduced and naturalized guinea grass. There were trace amounts of bufflegass (*Pennisetum ciliare*), another introduced (exotic or alien) and widely naturalized grass, present in the otherwise single-species herbaceous layer. Other woody species present as widely scattered individual plants included mesquite, huisache, lime prickly ash, and the subshrub ivy treebine (*Cissus incisa*). These species did not comprise a shrub layer.

Audubon Sanctuary, Cameron County, Texas. October.



Species line-up of come-back forest- Botanical make-up of the young forest that was developing on the go-back land introduced in the two immediately preceding photographs was shown here in greater detail. Re-establishment of climax tree species of Texas ebony, sabal palm, and anaqua along with shrubs like Texas persimmon and lime pricklyash resulted in on-going reforestation of a subtropical, evergreen upland palm-ebano-

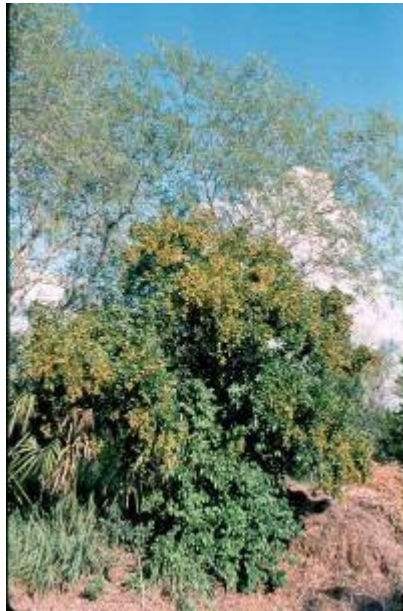
anaqua forest, the climax vegetation for this forest range site.

Attention was drawn to the smaller (younger) individual plants of the climax tree species that had regenerated in close proximity to larger (more mature) and, apparently, parent plants. A closed-canopy, climax palm-ebano forest was developing on this old-field. Secondary plant succession had advanced on this forest sere to advanced stage(s) such that botanical composition of this forest community was very similar to species make-up of what is interpreted as climax (= potential natural) vegetation.

Almost all of the herbaceous layer was the introduced and naturalized guinea grass.

Other local aggregations of vegetation on this go-back land had not advanced to this successional stage and instead were in various brush stages composed largely of mesquite and huisace (along with guinea grass, lime prickly ash, tpeguaje, tenaza, Texas fiddlewood, etc.).

Audubon Sanctuary, Cameron County, Texas. October.



Botanical sampler- Detailed sample of second-growth sabal palm-ebano forest. This photo-plot showed the plant species composition of a young but climax forest. It may not have all the outer trappings of an old-growth sabal palm-Texas ebony forest like scenes from the virgin tract shown above but this "little bit" of vegetation had the species composition of climax palm jungle forest.

Tallest, sparsely foliated trees were ebano or Texas ebony. Foremost tree (shorter than ebano and with dense foliage and ripening fruit) was anaqua or knock-a-away. A young sabal palm was at extreme left foreground (margin of photograph). Grass in front of young palm was common reed or carrizo. All of these species were present in an adjacent old-growth floodplain forest that had developed along a resaca (ox-bow) of the Rio Grande. Thus species composition of this local aggregation of vegetation consisted of the same climax tree species as the virgin forest vegetation. However, species make-up was not as rich or diverse as that of the relict old-growth in that there was an absence of many of the understory shrub and forb species (eg. chilipiquin, shrubby turk's cap or Drummond wax-mallow, Texas fiddlewood, and bloodberry or rouge plant) and twining or liana-like shrubs (eg. typical understory dominant, David milkberry or cahinca). As such, structure and function of the smaller,

botanically incomplete stands of vegetation was not the same as in larger and pristine palm-ebano forest communities.

Audubon Sanctuary, Cameron County, Texas. October.

Shown below were examples of major plant species of climax subtropical evergreen sabal palm-Texas ebony forest. Photographs of twigs, inflorescences, and legumes of Texas ebony or ebano or ape's earring were presented above with the other species of woody legumes.



50. Fruit of sabal palm (*Sabal mexicana*= *S. texana*)- Fruit cluster (panicle inflorescence type) in sabal palm. Fruit type in the Palmae (palm family) is a drupe or berry. Fruit of sabal palm has been described as "berrylike" or "fruitlike" (Correll and Johnston, 1979).

The common name for sabal palm in Spanish is palma de micheros. Micheros is Spanish for the palm fruits which are resemble grapes but are have more of a datelike flavor and are relished by numerous species of animals including humans (at least under the right conditions).

Cameron County, Texas. October (both ripe and unripe fruits).



51. Texas ebony or ebano- Trunk and major limbs of a mature tree with characteristic bark. Smaller tree or shrub to immediate right of ebano with its "can't miss this one" bark was Texas persimmon. It was explained previously in this section that Texas persimmon is a climax (and indicator) species associated with ebano-anaqua forest (see again Diamond, 1998, p. 4).

Audubon Sanctuary, Cameron County, Texas. October.



52. Anaqua (*Ehretia anacua*)- This medium-sized tree of the Boraginaceae (borage family) is a climax co-dominant with Texas ebony on forest sites of the Texas ebony-anaqua series of subtropical evergreen upland forest in the Lower Rio Grande Valley (Diamond, 1998, p. 4). In the present publication anaqua was interpreted as the major associate of co-dominant species, sabal palm and Texas ebony, on climax floodplain forests near mouth of the Rio Grande. This was based on empherical observations by this author in the relict vegetation of Sabal Palm Audubon Center and Sactuary, Cameron County, Texas.

The example of leaves and fruit shown here was of the large anaqua specimen in the last photograph of forest range vegetation on the old-field of the Audubon Sanctuary. October.



53. Leaves and fruit of anaqua or knock-away- Fruit type in anacua (anaqua is spelled with either a "c" or a "q") is a drupe. Each drupe has two stones or pits each of which has two seeds. The fruit is juicy and eaten by numerous wildlife species. Viewers should scroll back to the preceding slide and observe again the heavy fruit crop. Multiply that by four and get an idea of the number of seeds dispersed from a single tree. Anacua trees deep inside sabal palm-ebano forest do not produce high fruit yields like the specimen in the go-back land above. More realistic examples of fruit yield in forest interiors were presented in the present two photographs. Still, a "heap of seeds" are produced by one tree.

Trunk of sabal palm in background of first of these photographs depicted close association of these two climax tree species.

Audubon Sanctuary, Cameron County, Texas. October.



54. David milkberry or cahinca (*Chinococca alba*)- This woody vine has been interpreted as the most common dominant species of the understory of climax sabal palm-Texas ebony floodplain forest. Cahinca is especially common-- sometimes the exclusive or nearly sole --dominant shrub of palm groves.



55. David milkberry or cahinca- Leader and shoot apex with some fruit of the dominant shrub (woody vine) of sabal palm groves. Audubon sanctuary, Cameron County, Texas. October.



56. Shrubby or woody turk's cap, Drummond wax-mallow or Texas mallow (*Malvaviscus drummondii*= *M. arboreus* var. *drummondii*)- One of the more common and, certainly, conspicuous understory shrubs in climax sabal palm-Texas ebony forests is this member of the mallow family (Malvaceae). Audubon Sanctuary, Cameron County, Texas. October.



57. Drummond wax-mallow- Shoot apex with inflorescence. The telltale staminal column of the mallow family was displayed prominently by this proud member of the lower woody layer of the climax sabal palm-ebano floodplain forest. Audubon Sanctuary, Cameron County, Texas. October.



58. Chilipequin, bird-pepper, or bush pepper (*Capsicum annuum* var. *glabriusculum*= *C. annuum* var. *minus*)- This member of the nightshade family (Solanaceae) is regarded as subshrub or undershrub (suffrutescent or suffruticose). Whichever term is most appropriate this is one of the more widely distributed species along the Rio Grande (= Rio Bravo) growing from the Gulf of Mexico through the Chihuahuan Desert portions of the Trans-Pecos Region.

Chilipequin was a common associate of David milkberry, Drummond wax-mallow, and bloodberry as a member of the understorey of sabal palm-Texas ebony forests. This one was happy in the Audubon Sanctuary, Cameron County, Texas. October.



59. Leaves and fruit of chilipequin- Close-up photograph showing detail of shoot apex with unripe (immature) and ripening fruit. Fruit type is a berry. *Capsicum* is the genus of various chilis and peppers. *C. annuum* is the species commonly known as cayenne pepper. Fruit of chilipequin is commonly used as a seasoning, in various "hot sauces", and as an all-around good tonic. This little fruit is adored as a wild spice by rangers and foresters, cowhands and loggers, and other outdoorsmen who take life's little pleasures where we find them. Have some on the woods.

Audubon Sanctuary, Cameron County, Texas. October.



60. Berlandier fiddlewood or negrito (*Citharexylum berlandieri*)- This member of the verbena or vervain family (Verbenaceae) is a not-so-common species in climax sabal palm-ebano forest. Negrito is most commonly found growing in well-lit forest microsites (eg. outer edges of floodplain forests). Fiddlewood can grow to size of a small tree. It bears considerable fruit which is undoubtedly feed for animals, especially birds.

Audubon Sanctuary, Cameron County, Texas. October (fruit-ripe stage).



61. Barbed-wire cactus or triangle cactus, or (*Acanthocereus pentagonus*= *Cereus pentagonus*)- This sprawling specimen was growing in the most dense, most jungle-like thicket of a sabal palm-Texas ebony floodplain forest just upslope from a resaca (ox-bow) along an old riverbed of the Rio Grande. This species blooms at night and ever so briefly such that it is sometimes referred to as night-blooming cereus, but most authorities reserve that title as a preferred common name for another species (one which does call palm jungles home).

This specimen's dancing partner was a lime prickly ash (single-stemmed shrub with gray-colored trunk immediately to right of the cactus). Both were safe at home in Audubon Sanctuary, Cameron County, Texas. October.



62. Shoot apex and fruit of triangle cactus- The cactus plant shown in the preceding photograph was at fruit-ripe phenological stage and the happy occasion was a "Kodak moment" for the reader's fortunate author/photographer. Fruit of triangle or barbed-wire (the origin of second common name was obvious in first photograph) is extremely sweet and a bon appetite bonanza for animals including the hymenopteran (ous) guests shown here. All were happy on the Audubon Sanctuary, Cameron County, Texas. October.



63. Leaves of lime prickly ash or colima (*Zanthoxylum fagara*)- In recent times the Lower Rio Grande Valley became famous for its production of fine citrus fruit. This species is not one of those horticultural fruit crops, but it is in the citrus family (Rutaceae). *Z. fagara* is widely distributed in the Rio Grande Plains and Coastal Prairies and Marshes vegetational areas of Texas across the Gulf Coastal Plain to Florida and south into Central America. Lime prickly ash is a common member of climax sabal palm-texas ebony forest as well as of the "brush country" in general. Colima superficially resembles legumes including possessing catclaw-like prickles.

The example shown here was growing at the edge of a resaca in association with (and within wind-blown touching distance of) sabal palm, anaqua, and ebano on the Audubon Sanctuary, Cameron County, Texas. October.



64. Bloodberry, pigeonberry, coralito, or rouge plant (*Rivina humilis*)- This is one of the few forb species that grows in the usually deeply shaded interiors of climax sabal palm-Texas ebony forest, but it is a common herbaceous plant in that range plant community. Bloodberry is in the small family Phytolaccaceae although some taxonomists have included the genus in the Petiveriaceae. Audubon Sanctuary, Cameron County, Texas. October.



65. Shoots of bloodberry or coralito- Leaves, flowers, and fruit of one of the most common (and one of the few) forbs in climax palm-ebano floodplain forest. Audubon Sanctuary, Cameron County, Texas. October.



66. Cow-itch, ivy treebine, or hierba del buey (*Cissus incisa*)- This woody vine or liana was growing on the old-field land featured in photographs above that was undergoing natural reforestation back to a sabal palm-Texas ebony forest. Cow-itch was not common in an adjoining old-growth palm-ebano forest where it was observed (in very scrawny form) on more open local sites (microsites). Audubon Sanctuary, Cameron County, Texas. October.



67. Shoot tip of ivy treebine- Details of leaves and flower cluster of cow-itch growing on go-back land on floodplain of Rio Grande where it was growing in association with sabal palm, Texas ebony, anaqua, and common reed. Audubon Sanctuary, Cameron County, Texas. October, full-bloom stage.

[[Home](#)]