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Assistance to RENARE**Selected forest species and the seed
collection season of Panama****The most common ornamental plants
of Panama City and the Canal Zone**

by

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by

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**EXPERIENCE, INCORPORATED**

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Agency for International Development (AID)
Experience, Incorporated

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The most common ornamental plants
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Report No. 1

San Jose, Costa Rica

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Introduction

This report is based on a consultation which took place in the Republic of Panama, under the auspices of the Agency for International Development, through Experience, Incorporated.

Consultation took place with the help of the Departamento de Recursos Naturales Renovables (RENARE), and was based exclusively on field trips. Emphasis was given to the study of forest trees most common in Panama, and in some instances where these were known, taxonomic identification was made.

When possible, seeds or other germoplasmic material was collected and placed in the Banco de Semillas of RENARE and in the Alajuela nursery.

As concern ornamentals, a list was made of the main species that are utilized in Panama City and the Canal Zone.

Along with various plants, botanical samples were taken for further identification in the Herbario Nacional of Costa Rica.

The following sites were visited: Parque Nacional Soberanía, Jardín Botánico Summit, Cerro Azul, Parque Nacional Campana, Cerro Oscuro de Capira, Agua Salud, Lago Alajuela, Cuipo and Valle de Anton.

Objectives

1. Tabulate some of the forestry species most appropriate for reforestation in Panama, including the better months for the collection of seeds.
2. List some of the ornamental plants most commonly found and recommended for reproduction in Panama, including climatological, edaphic, etc. data for their proper development.
3. Provide forestry data on two of the better species to reforest Panama with (Cedro macho and Jaúl).

RECOMMENDED MONTHS FOR COLLECTING SEEDS OF SELECTED PANAMANIAN FOREST SPECIES.

SCIENTIFIC NAME	MONTH												COMMON PANAMANIAN NAME	
	J	F	M	A	M	J	J	A	S	O	N	D		
Anacardium excelsum			X	X	X									Espavé
Anthocephalus chinensis	X	X												Cadamba
Albizzia adinocephala						X	X							Pava
Albizzia guachapeli	X	X	X	X	X									
Astronium graveolens				X	X	X								Zorro
Andira inermis	X										X	X		Arenillo, quina
Aspidosperma megalocarpa					X	X								Alcareto
Bursera simaruba			X	X										Carate, jiñocuabe
Bombacopsis quinata			X	X										Cedro espinoso
Copaifera aromatica			X	X										Cabimo
Cedrela odorata			X	X										Cedro cabello
Cupressus lusitanica	X	X	X	X										Ciprés
Cordia alliodora				X	X									Laurel
Calophyllum brasiliense				X	X									María
Cedrela fissilis			X	X										Cedro amargo
Caesalpinia coriaria		X	X											Macano
Chimarrhis latifolia	X	X											X	Jagua amarillo
Carapa guianensis								X	X	X				Cedro bateo
Calycophyllum candidissimum			X	X										Madroño, Harino
Delonix regia				X	X	X								Flamboyan
Didimopanax morototoni						X	X							Pava
Diphysa robinoides		X	X											Macana
Dialium guianensis	X						X	X						Tamarindo
Enterolobium cyclocarpum	X	X	X	X	X									Corotú
Gmelina arborea	X	X	X	X	X	X	X	X						Gmelina
Guazuma ulmifolia				X	X	X								Guácimo
Genipa americana			X	X										Jagua

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Goethalsia meiantha	x									x	x	Guácimo blanco	
Hura crepitans	x	x	x	x								Nuno	
Hyeronima laxiflora			x	x	x	x						Zapatero	
Khaya senegalensis	x	x	x									Caoba africano	
Mora oleifera									x	x	x	Alcornoque	
Minguartia guianensis			x									Criollo	
Ochroma pyramidale		x	x	x								Balsa	
Ocotea veraguensis		x										Sigua	
Prioria copaifera			x	x		x	x					Cativo	
Pithecolobium longifolium		x	x	x	x							Guabito de río	
Podocarpus oleifolius			x	x								Pinotea	
Pithecolobium saman			x	x								Guachapelí	
Pelthophorum inermis			x	x	x	x							
Prosopis juliflora			x	x								Henero	
Phoebe mexicana							x	x				Sigua blanca	
Peltogyne purpurea	x	x										Nazareno	
Pterocarpus officinalis								x	x	x		Sangre de Dragón, Bloodwood	
Platymiscium pinnatum	x			x	x	x						Cachimbo, Cristóbal	
Swietenia macrophylla	x	x										Caoba nacional	
Swietenia mahogami	x	x										Caoba dominica	
Sterculia apetala		x	x	x								Panamá	
Spathodea campanulata		x	x	x								Tulipán africano	
Simaruba glauca			x	x	x							aceituno	
Schyzolobium parahibum		x	x	x								Gavilán, Indio	
Swartzia panamensis	x										x	x	Malveciño
Sweetia panamensis									x	x	x		Malvecino
Symphonia globulifera							x	x	x				Barillo
Terminalia chiriquensis	x	x											Guayabo de monte
Terminalia amazonia			x	x									Amapillo
Terminalia ivorensis	x	x											
Tetragastrispanamensis		x	x	x									Animé
Tabebuia guayacan			x	x	x								Guayacán
Tabebuia rosea			x	x	x								Roble
Tabebuia ochracea			x	x	x								
Tectona grandis	x	x											Teca
Vitex cooperi						x	x	x	x				Rajatebien
Vochysia ferruginea							x	x	x				Yemeri mayo
Virola sebifera	x	x					x	x					Fruta dorada
Virola surinamensis													

Shrubs, Trees and Palms Recommended as Ornamentals
for the Republic of Panama

Key to climatological and edaphic conditions:

- A: For cool or cold areas (5-15°C)
- B: For temperate areas (10-21°C)
- C: For warm areas (16-30°C)
- D: Can be used as an indoor plant
- E: For balconies, closed patios, parks, roads
- F: Greenhouse
- G: Requires soil rich in manure
- H: Requires soil rich in vegetal fertilizer, humus
- I: Needs total sunlight
- J: Needs partial shading
- K: Needs shade
- L: Drought resistant
- M: Soil needs to be kept partially humid
- N: Always needs humidity

Acalypha hispida. CFGJM
Acalypha wilkesiana B E G I M.
Aiphanes caryotaefolia C F G J M
Allamanda Cathartica NE- F G I M
Araucaria excelsa B D H J M
Artocarpus communis C E G I M
Artocarpus heterophyllus C E G I M
Azalea sp. A- B E H I M
Bactris gasipaes C E G J M
Bambusa vulgaris B E G I M
Bauhinia purpurea C E G I M
Bentinckia nicobarica C F G J M
Bougainvillea glabra C E G I L
Caesalpinia pulcherrima C F-E G I L
Calliandra haematocephala C E G I M.
Calliandra surinamensis C E G I M.
Callistemon lanceolatum B E G I L
Camellia japonica A E H J N
Canarium vulgare C E H I L
Carica papaya C E G I M
Carludovica palmata C D G J M
Caryota mitis C D G J N
Caryota urens C D G J N
Cassia fistula B E G I M
Cassia grandis B E G I M

Ceiba pentandra C E G I L
Cecropia peltata C E G I M
Cestrum nocturnum C E G I M
Chrysalidocarpus lutescens C D G J N
Clusia rosea C D G J M
Clerodendrum thomsonae C F J G M
Clerodendrum paniculatum C F J G M
Coccoloba Uvifera C D G I-J M
Cocos nucifera C F-E G I N
Codiaeum variegatum C E-F G I M
Coleus blumei C E G I M
Cordyline terminalis C E G J M
Costus sp. (varias especies) C D G J M
Couroupita guianensis C E G I L
Cryosáphyla warsewiczii C F G J M
Cupressus lusitanica B-C E G I L
Cycas revoluta B D G J L
Cycas circinalis B D G J L
Cyrstostachys renda C F-E G J M
Datura arborea C E G I N
Delonix regia B E G I M
Dillenia indica C E-F J M
Dracaena americana C D G J N
Duranta repens C E G I L
Enterolobium cyclocarpum
Enterolobium schomburgkii B E G I M-L
Erithyna crista-galli C E G I L
Eucalyptus cinerea B E G I M
Eucalyptus deglupta B E G I M
Eucalyptus globulus B E G I M
Eugenia uniflora B-C E G I M
Euphorbia cotinifolia C-B E G I L
Euphorbia pulcherrima C-B E G I L
Euterpe oleracea C F G J M
Ficus benjamina C D- E G J M
Ficus elastica C D-E G J M
Ficus lyrata C D-E G J M
Ficus pumila C D-E G J M
Gardenia jasminioides C E H I M
Hedychium coronarium C E G J N
Heliconia sp. (varias especies) C E-F G J M
Hibiscus rosa-sinensis C E G I M
Hibiscus tiliaceus C E G I M
Ixora coccinea C E-F G I M
Jacaranda mimosifolia C E-F G I L
Jacobinia carnea C E-F G J M
Juniperus sp A E G I M
Kigelia pinnata C E G I L
Lagersthoemia indica A E G I M
Licuala grandis C F-E G J M

Ligustrum japonicum A-BD-EGIL
Livistona chinensis B-C E-F G J N
Malphigia glabra B E G I L
Mangifera indica C E G I M
Monstera deliciosa C D G J M
Morinda citrifolia C F G J M
Mussaenda erithrophylla C F-E G J M
Nerium oleander B E G I M
Pachira aquatica C E G I M
Pandanus tectorius C E G J L
Petrea volubilis B- C E G J M
Philodendrum sp. C D G J M
Phoenix reclinata B-C D G I M
Pinus docarpa A E G I M
Pithecellobium arboreum C E G I L
Peltophorum inermis C E G I L
Plumeria rubra C E-F G J M
Polyscias fructicosa C E-F G I M
Polyscias guilfoylei CE-F G I M
Punica granatum B E G I M
Raphis excelsa C F G J N
Ravenala madagascariensis C E- F G I M
Rivina humilis B E= G I L
Rosa sp B- C E G I N
Roystonea regia C F G I N
Roystonea oleracea C F G I N
Sabal sp D E G I M
Salix sp A E G I N
Schefflera sp C E-E G J- I L
Scheelea zonensis C F G I N
Spathodea campanulata C E G I L
Sizigium sicycioides C E G I L
Tabebuia rosea C E G I L
Tabebuia guayacan C E G I L
Tecoma stans B E-F G I L
Terminalia catappa B E G I L
Thevetia peruviana C- B E G I M
Thuja occidentalis A E G I M
Washingtonia robusta B E G I M
Yucca elephantipes B E G I L

Jaúl (Alnus acuminata)

Silviculture has lately been oriented to the study and production of fast growing trees which shorten the pruning seasons and are economically productive on a short-term basis.

Jaúl is one of the species that is most studied because it has properties similar to the finest woods.

Geographic distribution:

Jaúl is found in Mexico, Central America, and part of South America.

Climate:

Jaúl grows mainly between 1500 and 2500 meters above sea level, at an average annual temperature of 16-18°C, usually where there is high humidity. It does not stand up very well to strong winds, and must thus be planted in areas that offer windbreaks.

Soil:

Jaúl grows best in soils that are well drained, light, and rich in organic material.

Light:

Due to the fact that Jaúl is a pioneer species, it needs a great amount of light for proper growth development. This is

very important if its natural regeneration is to be stimulated; in which case, the seedlings have to be sufficiently spaced for light to enter.

Rain:

Jaúl is capable of tolerating fairly long periods of drought. It can adapt to regions with scarce rainfall, but only when planted along river banks where relative humidity is high.

It has also been observed that Jaúl requires much rainfall, especially from May to November.

General characteristics:

Family: Betulaceae

Tree:

Of medium height, and grows fast (2-3 meters per year), reaching a height of 25 meters and a DAP of 1.30 meters (reaches 45-50 cm at 12-15 years). Its top has a conic form, the bark is of a dark brown color, sometimes grayish with an abundance of yellow spots.

Wood:

The wood is of a pale orange color, as is the sapwood and the duramen, i.e. the entire transversal section. When air dried, the wood takes on a lighter color, especially the sapwood.

The wood is light or moderately light, having a specific weight of 0.36 with a coefficient of variability of 6.91%.

Drying of the wood:

The wood is very easy to dry. In the dry season, sawed wood reaches a humidity level of 12-15% in 2 months. This being the percentage recommended for its utilization.

The wood must be stacked horizontally, and should be covered to protect it from direct sun and rain.

Preservation:

Jaúl is easily preserved, with creosote or pentaclorofenol dissolved to the 5% in diesel oil, for example.

Uses:

Jaúl has been mainly utilized as fuel, for light construction, and for making furniture, drawers, broom handles, women's shoe soles, and matches. With a preservative, the wood can be used for street light or telegraph poles, fencing, etc.

Easy to work with, Jaúl is perfect for cabinet making and craftsmanship.

Feasibility studies have been made on the use of Jaúl in the pulp and paper industry, and as raw material for the tanning industry.

Planting:

The most common planting method is transplanting. The seedlings should not be more than 2 years old; the preferred transplanting time is at 3-8 months when the seedlings are approximately between 0.5-1.0 meters.

Transplanting can be done either by leaving the root system intact in its surrounding soil, or by planting a bare root. The tree can also be reproduced by planting cuttings.

If Jaúl is cultivated on a plantation basis, the seedlings should be planted when 1-5 meters high. This allows for rapid shadow cover, which diminishes weed growth and makes for a better selection of trees in the first thinning.

Ensueing thinnings should be done in such a way that the final spacing between trees is 8-12 meters.

In Jaúl plantations where trees are spaced at 1.5 meters, thinning should begin at 2 years, or earlier if there is much competition.

A second thinning should be done at 5-7 years; and a third and last thinning at 10-15 years, giving a final spacing of 8-12 meters between trees.

Pruning:

When Jaúl is grown on pasture land, where spacing between trees is greater than on a pure plantation basis, the lower branches should be pruned up to half or more ($5/9$) of its total height. It is recommended that this pruning take place after the second thinning, preferably in the dry season. Pruning should be done level with the stem to prevent the wood from producing knots, and a fungicide rich in copper should be applied.

On plantations, the trees tend to self-prune due to density, so additional pruning is not necessary.

Male Cedar (Carapa guianensis)

Geographic distribution:

From the Southwest Indies to Tropical America.

The male cedar grows in areas of many different geological formations, does not require special soils, and is found in clayish and sandy soils alike. It also grows in areas where soils are dry but where rainfall is also abundant.

In general, it can be said that this cedar is typical of tropical rain forest areas where rains accumulate between 2000 and 3000 mm.

Seed Germination:

Germination takes place during the first 6 weeks, but in order for germination to be optimal, the seeds have to be covered by 2 cm of soil and too much watering or periods of drought should be avoided. The seeds should be planted immediately after being collected because their germinating capacity decreases very rapidly. In the event immediate planting is not possible, it is recommended that the seeds be laid out in a shaded area.

The first leaves appear when the stem (deep red) is some 25 cm high. The first growth is very fast, and in the first year reaches to 75 cm in height.

Climate:

It must be taken into consideration that the cedar needs a lot of humidity. There should be a minimum of 1500 mm of rainfall per year.

Soil:

The cedar does not need any special type of soil. It adapts well in clayish soils as well as in sandy or rocky ones. It also grows well on hills or plains, and even in flooded areas.

Light:

The seedlings require shade during their first growth period, and then need plenty of light for satisfactory development.

Planting:

The best time for planting is when the leaves of the seedlings have changed from a reddish color to a deep green and the main stem is sturdy.

It is a good idea to prune the roots two months before transplanting, leaving a 13 cm root system. The roots resprout and the leaves become sturdier. The seedlings can be transplanted with the root system intact in its surrounding soil, or from bare root.

Spacing between trees is usually 2 x 2 meters. During the first years, the cedar does not develop branches, and may grow to 6 meters high.

It is recommended that the cedar be planted in conjunction with other species. According to estimates, the male cedar grows 1-5 meters per year.

Uses:

Cedar wood is reddish brown, semi-hard, not too heavy, durable, easy to work with, and has a fine finish.

It is most commonly used as plywood, for making furniture, and in general construction.

Cedar wood tends to split. To avoid this, it is recommended that the tree be girdled, and then felled once the wood is dead.

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Phytourbanism

It is of great importance that green areas be developed in the city of Panama, without exceeding in exotic species, to exalt the country's natural beauty and riches. This development would be a positive breakthrough and be felt in various ways:

- a. There would be ecological harmony in that there would be an increase in natural fauna and a greater esthetic complexity;
- b. Native species of great beauty would be known, and would enhance national awareness of the need to protect forest areas;
- c. It would provide an alternative to scientifically studying species with agrosilvipastoral potential;
- d. It would spark the interest of tourists not familiar with these species, making tourism a possible commercial interest, among other things.

Without doubt, the exotic and native species would cool off the environment, significantly reducing the temperatures which tend to increase because of industrial activity. Light would be subdued, helping vision. The vegetation would capture some of the toxic gases and increase the oxygen. It would also help to capture dust particles which affect vision and the respiratory system, and also carry virus and microorganisms

that directly or indirectly affect people and in many instances contaminate food. Finally, this would make for a more relaxed environment, freeing people from the psychological tensions so common to city life.

Towards this enrichment, multipurpose species should be used, for example, those having medicinal, comestible, and dyeing properties. However, one should be careful to never use species that are potentially harmful due to their poisonous thorns, saps, fruits or any other plant organ with toxic properties.

Some dangerous species are difficult to detect. For instance, the species of the genus Vochysia produce a beautiful yellow flower, but they periodically prune themselves and could therefore pose a danger to the pedestrian. The species should not be planted in areas where there are pedestrians. Nor should they be planted in wide spaces between highways. Fruit trees should also not be planted in these areas, for the same reasons.

A very decorative and beautiful tree, Hura crepitans - Euphorbiaceae, is often recommended as an ornamental, but it should not be used because of its toxic seeds, and also because its sap can cause severe dermatitis and its branches and trunk are covered with thorns.

The ensuing tables show a series of characteristics that are important and should be considered in phytourbanistic planning. For example, the characteristics of a given species' root system are important to keep in mind, to prevent roots

from destroying a sidewalk, road or building or from breaking water lines. The species should volumetrically concord with available space, etc.

Regarding magnitude, I refers to those species which have a height of 20 meters and over; II, between 10 and 20 meters; and, III, between 5 and 10 meters.