

PART II

APPENDIX A

A. KEY SPECIES OF GRENADA

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A.1 Grenada's Vital Statistics

Grenada, located at the southern end of the Lesser Antillean Island chain (approximately 90 miles north of Trinidad), is the largest of the three main islands which make up the nation of Grenada; the other two being Carriacou and Petit Martinique in the Grenada Grenadines. There are also a number of small islands, islets and rocks which lie offshore from the main islands.

Location

Latitude: 11 degrees 58 minutes/12 degrees 13 minutes North

Longitude: 61 degrees 20 minutes/61 degrees 35 minutes West

Area

Grenada: 21 miles long, 12 miles wide; 120sq miles or 78 000 acres (312km² or 3 400ha)

Carriacou: (15 miles N of Grenada) 13sq miles or 8 500 acres (34km² or 3 400ha)

Petit Martinique: (2.4 miles E of Carriacou) 0.9 sq miles or 575 acres (2.3km² or 230 ha)

Total land area

133sq miles or 86 500 acres (346km² or 34 600ha)

Population

100 000, largely concentrated in the southwestern part of the main island near the capital of St George's. Largest villages: Grenville, Gouyave, Sauteurs, Victoria and Hillsborough (Carriacou).

Economic activities

Grenada: Agriculture, tourism, small manufacturing sector

Satellite islands: Inter-island trade, fishing, livestock raising, subsistence agriculture, boat building

Key species of Grenada

Primary crops

Cocoa, nutmeg, banana

Secondary crops

Coconut, sugar cane, citrus

Physical features

Grenada: Apart from limestone in the north, the island is volcanic. It is mountainous and thickly wooded, with numerous streams and rivers. The central mountain mass consists of a number of ridges, some of which contain crater basins. Mount St Catherine (2 749ft/ 840m) is the highest peak. There are several beaches.

Carriacou/

Petit Martinique: Both islands are volcanic mountain peaks with shallow and highly eroded soils.

A.2 Introduction

The island of Grenada, located 12 degrees north and 61.5 degrees west, is one of the Caribbean chain of islands. Being a tropical island, it has a resplendent verdant cover of many plant species. A complete inventory has not been made of all the plant species, but a number of publications have dealt with different aspects of local plant flora (Beard 1949; Howard 1974, 1977, 1979 and Groome 1970).

The state of Grenada includes two other islands, Carriacou and Petit Martinique.

Grenada, being an agricultural society, depends heavily on some major crops. The authors, having listed these for their economic importance, will venture to select other species which, because of their biological importance and other significance, may be listed as key plant species.

Even for a small island state like Grenada, the key plant species, (economically, culturally and ecologically important species), must be listed, known and conserved.

It may well be that for the agriculturally important crop species, the need for their conservation is more readily significant so that they may survive. However, for other species, where their biological significance does not immediately manifest itself, conscious efforts or systems will have to be enforced to guarantee their survival 4.

Conservation of key species of life support species is key in the conservation and survival of many other species. It must be noted also that all key species are primary producers, utilising energy from the sun for initial entrapment of energy to start the food chain.

The primary crops may be listed as nutmeg, cocoa and banana and the secondary crops as coconut, sugar cane and citrus.

Invariably, all varieties of these crops are key genetic resources for Grenada.

A.3 List of key ecological and economic species for Grenada

Plant Species (Common name in parentheses)	ECOLOGICAL FUNCTIONS				SOCIO-ECONOMIC FUNCTIONS					Reasons for inclusion
	Primary Production	Nutrient Accumulation	Organic Matter Production	Habitat Structuring	Colonisation	Commodity	Genetic Resource	Cultural	Environmental Management	
TREES										
<i>Acacia farnesiana</i> (Briars)	X	X		X	X	X		X	X	Coloniser Stabiliser of mud flats and N-fixing As above
<i>Acacia macracantha</i> (Briars)	X	X		X	X	X		X	X	As above
<i>Acacia</i> species (Briars)	X	X		X	X	X		X	X	As above
<i>Artocarpus altilis</i> (Breadfruit)	X					X	X	X		Important food source
<i>Bursera simaruba</i> (Lowland gommier, Naked Indian)	X		X	X	X	X			X	Important soil stabiliser, provider of organic matter and habitat structuring
<i>Cecropia peltata</i> (Bois canot)	X		X		X	X		X		Coloniser and provider of organic matter
<i>Ceiba pentandra</i> (Silk cotton)	X		X	X				X	X	Stabiliser of hill slopes and provider of organic matter
<i>Citbahexylum fruticosum</i> (Cutlette)	X		X	X	X			X	X	Coloniser and soil stabiliser
<i>Citrus</i> species (Citrus)	X					X	X			Important genetic resource
<i>Cola acuminata</i> (Kola nut)	X					X		X		Culturally valued species
<i>Cordia alliodora</i> (Cyp, cype)	X			X	X	X		X	X	Important soil stabiliser and wildlife food
<i>Cordia collococca</i> (Clammy cherry)	X			X	X				X	Important coloniser of muddy swamps

Plant Species (Common name in parentheses)	ECOLOGICAL FUNCTIONS				SOCIO-ECONOMIC FUNCTIONS					Reasons for inclusion
	Primary Production	Nutrient Accumulation	Organic Matter Production	Habitat Structuring	Colonisation	Commodity	Genetic Resource	Cultural	Environmental Management	
TREES continued										
<i>Crescentia cujete</i> (Calabash)	X					X		X		Highly culturally valued species
<i>Dacryodes excelsa</i> (Mountain gommier)	X			X	X	X	X		X	Dominant tree species in moist forest
<i>Erythrina corallodendrum</i> (Immortelle)	X	X	X	X		X		X	X	Fast growing soil stabiliser, provider of organic matter, water and N-fixing
<i>E. glauca</i> (Immortelle)	X	X	X	X		X		X	X	As above
<i>E. micropteryx</i> (Immortelle)	X	X	X	X		X		X	X	As above
<i>Erythrina</i> species (Immortelle)	X	X	X	X		X		X	X	As above
<i>Gliricidia sepium</i> (Glorisita gloriseda)	X	X	X	X	X	X	X	X	X	Fast growing multipurpose species
<i>Haematoxylum campechianum</i> (Campeche)	X	X		X	X	X			X	Coloniser, soil stabiliser and N-fixing
<i>Hibiscus elatus</i> (Blue mahoe)	X			X		X		X	X	Soil stabiliser, high value timber and watershed maintenance
<i>Leucaena leucocephala</i> (Wild tamaran, leucaena)	X	X		X	X	X	X		X	Very fast growing, source of fodder, coloniser, soil stabiliser and N-fixing
<i>Licania ternatensis</i> (Bois gris)	X			X	X	X			X	Valuable forest tree, a dominant species

Key species of Grenada

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	Primary Production	Nutrient Accumulation	Organic Matter Production	Habitat Structuring	Colonisation	Commodity	Genetic Resource	Cultural	Environmental Management	
TREES continued										
<i>Mangifera indica</i> (Mango)	X					X	X	X		Important genetic resource and fruit
<i>Melicoccus bijugus</i> (Skin up, genip)	X		X			X		X		Important for honey bees and organic matter production
<i>Micropholis chrysophyllodes</i> (Bois)	X					X				Dominant forest tree in montane thickets watershed areas
<i>Pachira insignis</i> (Wild breadnut, Chataigne marron, marron)	X						X	X		Insect control in cocoa
<i>Pithecellobium unguiscae</i> (Briar)	X	X		X	X	X			X	Coloniser, soil stabiliser and N-fixing
<i>Spondias mombin</i> (Hog plum)	X		X	X		X		X		Soil stabiliser and provider of organic matter
<i>Swietenia macrophylla</i> (Mahogany)	X		X	X		X		X		Most valued timber tree and good soil stabiliser and organic matter producer
<i>S. mahogani</i>	X		X	X		X		X	X	As above
<i>Tabebuia pentaphylla</i> (White cedar, pink poui)	X		X	X	X	X	X		X	Important lowhill forest species, soil stabiliser, organic matter provider, and timber for boat building
<i>Tamarindus indica</i> (Tambran, tamarind)	X	X	X	X		X			X	Important soil stabiliser and fruit

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	Primary Production	Nutrient Accumulation	Organic Matter Production	Habitat Structuring	Colonisation	Commodity	Genetic Resource	Cultural	Environmental Management	
SHRUBS										
<i>Cajanus cajan</i> (Pigeon peas)	X	X				X	X	X		Important protein food source and valuable genetic resource
<i>Clerodendrum aculeatum</i> (Bitter fence)	X								X	Underutilised in environmental management
<i>Cordia curassavica</i> (Black sage)	X			X	X			X	X	Coloniser and vigorous stabiliser of dry lands
<i>Croton</i> species (Bois bu)	X			X	X	X		X	X	As above
<i>Hibiscus sabdariffa</i> (Sorrel)	X					X	X			Important commodity and genetic resource
<i>Leucaena leucocephala</i> (Wild tamaran, leuceana)	X	X		X	X	X	X	X	X	Very fast growing, source of fodder, coloniser, soil stabiliser and N-fixing
<i>Moghania strobilifera</i> (Moghania)	X	X		X	X				X	Important coloniser and soil stabiliser, N-fixing
<i>Pandanus</i> species (Wild pine, screw pine)	X			X	X	X	X	X	X	Provides important source of income for women. Soil stabiliser
<i>Piper</i> species (Shining bush, Malestomache, candle bush)	X			X	X					Important animal fodder (goats and rabbits)

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	Primary Production	Nutrient Accumulation	Organic Matter Production	Habitat Structuring	Colonisation	Commodity	Genetic Resource	Cultural	Environmental Management	
HERBS										
<i>Abrus precatorius</i> (Jumbie bead, Gwen le glase)	X	X				X		X		Important in folklore and traditional medicine
<i>Aloe vera</i> (Aloes)	X					X		X		Very important in traditional medicine
<i>Amaranthus dubius</i> (Bhagee, Bhaji, Zephena)	X				X	X				An underutilised food
<i>Antigonon leptopus</i> (Coralita)	X		X		X	X				Important coloniser and nectar producing species
<i>Bidens pilosa</i> (Spanish needle)	X				X					Early coloniser on agricultural lands
<i>Commelina elegans</i> (Water grass)	X				X		X			Coloniser and important herbivore feed
<i>Desmodium</i> species (Sweetheart, Coeur de velot)	X	X			X			X		Early coloniser and nutrient accumulation on cultivated land
<i>Dioscorea</i> species (Bush yam)	X									Important food source in times of crisis
<i>Heliconia</i> species (Balizier)	X			X	X	X	X	X	X	Important coloniser, soil stabiliser and genetic resource
<i>Merremia</i> species (Rabbit vine, goat vine)	X				X		X			Important coloniser and herbivore feed
<i>Mimosa pudica</i> (Sensitive plant, maria hunt)	X	X			X			X		Important coloniser of agricultural lands and in nutrient accumulation

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HERBS continued										
<i>Momordica charantia</i> (Coolie pawpaw, corillie)	X				X			X		Important medicinal herb and coloniser
<i>Xanthosoma</i> <i>sagittifolium</i> (Tania)	X					X	X			Source of food
PALMS										
<i>Euterpe dominicana</i> syn. <i>E. hagleyi</i> (Cabbage palm, mountain cabbage, Hagley's palm)	X			X					X	Coloniser in moist forest areas
GRASSES										
<i>Cymbopogon citratus</i> (Lemongrass)	X			X		X		X	X	Soil stabiliser, valuable herbal tea commodity
<i>Cynodon dactylon</i> (Devil grass, fine grass)	X			X					X	Coloniser, soil stabiliser and fodder for herbivores
<i>Eleusine indica</i> (Pye poule)	X			X					X	As above
<i>Gynierium sagittatum</i> (Roseau)	X			X	X	X	X		X	Soil stabiliser and house decorating commodity
<i>Paspalum</i> species	X				X				X	Coloniser, soil stabiliser and fodder for herbivores
<i>Vetiveria zizanioides</i> (Khus-Khus, sweet root)	X			X		X		X	X	Soil stabiliser, essential for environment management in agricultural lands, a valuable craft commodity
<i>Zea mays</i> (Corn)	X					X	X	X		Important food and genetic resource

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	Primary Production	Nutrient Accumulation	Organic Matter Production	Habitat Structuring	Colonisation	Commodity	Genetic Resource	Cultural	Environmental Management	
BAMBOO										
<i>Bambusa vulgaris</i> (Bamboo)	X			X		X		X	X	Important in soil stabilisation, construction and craft
SEDGES										
<i>Cyperus rotundus</i> (Welcome grass, Nut grass)	X			X				X		Important early coloniser of agricultural lands
<i>Cyperus surinamensis</i>	X				X				X	Early coloniser
<i>Mariscus fuliginus</i>	X			X	X				X	Stabilises soil
<i>Mariscus meyenianus</i>	X			X	X				X	As above
FERNS										
<i>Cyathea</i> species (Tree fern)	X			X	X					Important in soil stabilising and habitat structuring
<i>Dicranopteris pectinata</i> (Grand Etang fern)	X		X	X	X				X	Important soil stabiliser in disturbed hillslopes
MOSSES	X									Important in soil formation, soil stabilisation and water retention
FUNGI		X								Important decomposers

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	Primary Production	Nutrient Accumulation	Organic Matter Production	Habitat Structuring	Colonisation	Commodity	Genetic Resource	Cultural	Environmental Management	
COASTAL SPECIES										
MANGROVES										
<i>Avicennia nitida</i> (Black mangrove)	X	X	X	X	X	X	X	X	X	Important in coastal protection, island fringing
<i>Conocarpus erectus</i> (Button mangrove)	X	X	X	X	X	X	X	X	X	Fisheries and wildlife habitat
<i>Laguncularia racemosa</i> (White mangrove)	X	X	X	X	X	X	X	X	X	Fisheries and wildlife habitat
<i>Rhizophora mangle</i> (Red mangrove)	X	X	X	X	X	X	X	X	X	As above
TREES										
<i>Chrysobalanus icaco</i> (Fat pork)	X			X		X			X	Important stabiliser of sandy soils on coastal fronts
<i>Coccoloba uvifera</i> (Sea-side grape)	X			X		X			X	As above
<i>Hippomane mancinella</i> (Manchineel)	X		X	X					X	As above
<i>Terminalia catappa</i> (Sea-side almond)	X		X	X		X			X	As above
<i>Thespesia populnea</i> (Sea-side mahoe)	X		X						X	As above

Key species of Grenada

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	Primary Production	Nutrient Accumulation	Organic Matter Production	Habitat Structuring	Colonisation	Commodity	Genetic Resource	Cultural	Environmental Management	
HERBS										
<i>Ipomoea pes-caprae</i> (Sea-side potato, creeping vine)	X			X	X				X	Important coloniser and stabiliser of sandy soils on coastal fronts
GRASSES										
<i>Sporobolus</i> species (Crab grass)	X			X	X				X	Important coloniser and stabiliser of sandy soils on coastal fronts
ALGAE (Marine)										
<i>Gracillaria</i> <i>crassissima</i> (Sea moss)	X					X		X		Widely used as food, potential source of agar
<i>Gracillaria debilis</i> (Sea moss)	X					X		X		As above
<i>Gracillaria</i> <i>domingensis</i> (Sea moss)	X					X		X		As above
<i>Gracillaria</i> species (Sea moss)	X					X		X		As above

A.4 Brief Species Details

Trees

Acacia species (plus others)

Briars

In some lowland areas of Grenada, especially the southern, south-eastern, east and north-eastern, on flat lands that tend to be flooded in the rainy season and parched in the dry season, a number of prickly-stemmed, fine-leaved leguminous shrubs and trees abound. Also found bordering mangrove swamps in Carriacou. These are collectively called briars or briar pickers. About seven regular species appear to make up these patches. There are five acacias, three unidentified and the other two being *Acacia farnesiana* and *A. macracantha*. The other two species are *Pithecellobium unguisati* and logwood or campeche, *Haematoxylum campechianum*.

These species are particularly adapted for this habitat which they help to structure. They possess hard, woody stems, very pliant branches bearing numerous fine leaves broken up in many leaflets, an aid to low transpiration, especially in the dry season. The stems and branches are prickly and thus are usually avoided by herbivorous predators. The roots are deep, extensive and tolerant of brackish water.

In dry season, along with mangrove and other coastline species, the briars represent the only patches of significant greenery in the dry lowland areas. These significant species colonise and help to reclaim swamp lands. Being leguminous, they bind nitrogen in the soil. Bees are attracted to the flowers for nectar and pollen. The briars are the nesting grounds for many species of birds.

Their hard-wooded nature makes them very attractive for coal burning and thus these species are under pressure from human exploitation.

However, these species must not be overlooked since they are key in habitat formation in the dry areas, key for effecting nutrient movements and key for certain wildlife.

These species also spread into the low hills but there they are widely mixed with a number of different trees. They prevent erosion.

Artocarpus altilis (plus others)

Some crucial food crops and fruits

Locally, there are certain plant species that are crucial as foods or nutrients in a normal Grenadian diet. In the case of a crisis in imported food supplies, these may become key survival species. In any event, it should not be necessary to wait for a crisis to appreciate the importance of these species. The species mentioned here occur in many varieties and it is this genetic diversity that qualifies them as genetic resources.

Key species of Grenada

Species in this list are:

Tannia (*Xanthosoma sagittifolium*, an edible aroid; bush yams (*Dioscorea* species)): a large variety of underground tubers found growing on hills and mountain sides. Apart from improving yam yields and disease resistance in the yam varieties, there may be potential for new products, eg steroids.

Breadfruit (*Artocarpus altilis*): a starch food with the potential for many different agro-products. This species is underutilised.

Pigeon peas (*Cajanus cajan*): a high protein legume. The major legume utilised locally. The many varieties constitute an important genetic resource.

Corn (*Zea mays*): its importance as a locally grown staple is declining even in Carriacou where it was the major staple. It is the major grain that can be grown here so all genetic varieties should be preserved.

Sorrel (*Hibiscus sabdariffa*): The mature calyces are used to prepare a popular local drink. The diverse varieties that grow locally should be conserved.

Bursera simaruba

Lowland gommier, Naked Indian

In the low hills of the drier regions, one of the dominant tree species is the smooth, reddish bark tree, *Bursera simaruba*. These trees, though dominant on the hillside, are never seen to form close clusters. Instead, they occur almost regularly distanced from each other with mixed species in between. They are very deep rooted and deciduous, losing all their leaves in the dry season and thus are providers of organic matter of the forest floor. In structuring this low hill habitat, the gommier functions in soil conservation by lessening erosion. The green leaves are used as goat feed. Particularly in the Mount Hartman area, this species helps to structure the habitat where one of Grenada's declining endemic species, the Grenada Dove, (*Leptotilia wellsi*) is found. The prolific clusters of flowers are visited by honey bees for pollen and nectar.

Cecropia peltata

Bois Canot

The species *Cecropia peltata* occurs in a wide range of habitats, from dry forests to wet mountain sides. It is a prolific coloniser, and an early species to arrive on cleared grounds. This soft-stemmed, deciduous species, sheds its leaves regularly. The leaves are said to be rich in potash and local farmers have incorporated these with white lime in treating acid soils. The hollow, soft wood is used as floats by fishermen. The tea from the dried leaves is a popular local remedy for hypertension.

It is said locally that bad weather is heralded by the green leaves turning over, thus exposing their lower silvery surface.

Ceiba pentandra

Silk cotton

The gigantic, thorn-stemmed *Ceiba pentandra* is a deciduous tree which grows on steep slopes. In these locations, the large and extensive buttress roots as well as the extensive underground root system function to prevent erosion and major slides of the steep slopes. The seeds are readily dispersed by wind and in the dry months the tree sheds all its leaves providing good ground cover with organic matter. The flowers are visited by honey bees.

Culturally, it features in local folklore as the tree the devil visits at midnight.

Citharexylum fruticosum

Cutlette

Citharexylum fruticosum is a popular interspersing tree species in the low hills and dry land forest. It is an early coloniser, being dispersed by birds. It functions in soil stabilisation. The shed leaves provide organic matter and the herbal tea from the leaves is used as an expectorant for colds. Further, the flowers are popularly visited by honey bees.

Citrus species

Citrus

The species of concern here are not the regular and common citrus species, but varieties like sour orange or gospo. There may be valuable local genetic resource for resistance to pests, etc. here. These species form stocks to which scions of other desirable citrus species are grafted. Such stock are very resistant to fungal attack.

Cola acuminata

Jumbie bead and Kola nut

The red and black seeds, jumbie beads, of the legume *Abrus precatorius* and the brown seeds of the kola nut, *Cola acuminata* are used in the folkloric rituals of Shango. Both species therefore continue to be culturally significant.

Further, both species are used in herbal preparation for folk medicine. The leaves of *A. precatorius* are drunk as a herbal tea for colds, whereas the ground seeds of *C. acuminata* are boiled and the herbal extract used a tonic.

Cordia alliodora

Cyp, cype

At its climax *Cordia alliodora* is a medium height, soft-wooded tree, with layers of horizontal branches separated by a straight stem. It establishes itself quite readily in the drier end of swampy coastland close to mangroves, and extends in distribution

Key species of Grenada

up to the dry forest. Its extensive root system is known to lead to accumulation of moisture as well as helping to loosen the soil. Some trees of this species are usually left growing on agricultural lands.

The red, sweet, ripe berries produced are the popular food of the national bird, the ramier. The affinity of these birds to this food make them easy prey for human hunters who stalk the birds in the vicinity of the cyp trees. Birds also afford ready disposal of fruit seeds. The young shoots are fed on by goats. As a commodity, the timber is used in furniture manufacture and the peculiar trimeric branching system of young shoots make it a popular choice for swizzle stick manufacture. No attempts have been made to utilise this species in any structured environmental management system.

Cordia collococca

Clammy cherry

In some swampy areas, especially around Levera Lake in the northeast, the species *Cordia collococca* abound as small patches of short tree forest. Though this species occurs in other habitats, it flourishes in the brackish swampy areas, where it actually leads to habitat structuring and swamp reclamation. These forest patches are homes for many species of birds, and the ripe fruits are fed on by wildlife. This is an important species bordering the seashore mangrove species.

Crescentia cujete

Calabash

Short, sturdy trees of *C. cujete* are found growing isolated in small patches all over the islands, except in the upper mountain area. This species is key for its cultural value. The slender growing branches are very pliant and strong and are used as fishing rods.

The roundish or oblong hard exterior fruit finds many uses. They are used as vessels for carrying, storing and dipping water; also as utensils for eating or drinking, storing and carrying planting seeds, for lanterns, crafts and as musical instruments. Culturally, in our folklore, the calabash is key to the Shango ritual. It holds the food for the spirits, water for sprinklings and is fashioned into shaking musical instruments. The calabash fruit is also used in making many craft items. It is very important therefore, that the numerous varieties of this species be conserved since mode of utilisation depends on the size and shape of the fruit.

Dacryodes excelsa

Mountain gommier

The mountain gommier *Dacryodes excelsa* is the principal dominant tree in the lowland tropical evergreen moist forest and other mountain forest in Grenada. It is estimated to comprise 40% of the trees present. It is therefore one of the key mountain species for maintaining forest cover and a water enhanced watershed.

Historically, it was the tree used for making dugout canoes by the Amerindians. The gum exudate was used for kindling fires and also burned as incense. Economically, the wood of *D. excelsa* could be used for charcoal, furniture, boat-building, produce crates, house construction, farm construction and handicraft. However, its value to the natural forest of Grenada is far more important than the benefits from any economic exploitation. Since the species is well-established and flourishes in that habitat, it should be conserved.

Erythrina species

Immortelle

A number of immortelle species grow in Grenada, but the three most popular species are *Erythrina corallodendrum*, *E. glauca* and *E. micropteryx*. These fast growing, deep-rooted soft wood trees, provide shade for essential crops as well as the function of humidity modifiers. They draw water from deep down and thus help replenish the upper soil layers. Being legumes, they accumulate nitrogen in the soil and they shed copious quantities of leaves, a valuable source of organic matter. They conserve river banks and since they are fast-growing, or better still, pieces of stem always grow when planted, they are useful species in environmental management. When in bloom, they cover the valleys and hillside with resplendent shades of yellow, gold, orange and red, and these flowers are a valuable source of nectar and pollen for honey bees.

Euterpe dominicana

Mountain cabbage, cabbage palm or Hagley's palm

E. dominicana syn. *E. hagleyi*, is a tall palm found abundantly in the lower montane moist forest. It is an important coloniser of mountain sides with landslide areas, sometimes forming a palm brake. In some areas they outgrow the stunted forest trees.

Gliricidia sepium

Glorisita, Gliriseda

This is a fast growing leguminaceous tree which binds nitrogen in the soil. It also produces copious organic matter in the dry season from the dried, fallen leaves. Numerous herbivores feed on the green leaves, and the flowers are known to produce the choicest nectar and pollen which provide the best flavoured honey. This species also grows readily in low rainfall areas. Being very fast growing, it is utilised in environmental management.

Hibiscus elatus

Blue Mahoe

After the severe Hurricane Janet in 1955, the species *Hibiscus elatus* was

Key species of Grenada

introduced to help with the reafforestation programme. This species has become well established and is now a key species in the protection of some watersheds. It is also a key forest commodity, the wood being used for fencing, telegraph poles, furniture, boat building, produce crates, house construction, farm construction and handicraft.

Though a key commodity species, it must be realised that its benefits to the forest should be carefully considered, so that exploitation can be avoided.

Leucaena leucocephala syn. *L. glauca*

Wild tambran, *Leucaena*

This is a far-ranging species, extending from swamp or coastline fringes to low hill tops. In habit it may be shrubby or a small tree. The seeds of this fast-growing legume are easily dispersed by wind and birds, and this species is an early coloniser of cleared lands. Being a legume, it leads to nutrient accumulation by binding nitrogen in the soil. The leaves are fed on by many herbivores, especially sheep and goats.

This species and other similar species have been given consideration for forest cultivation for wood and fodder because they are fast-growing.

Licania ternatensis

Bois gris

This hardwood tree represents the second most abundant tree species in the rain forest or lower montane rain forest of Grenada. In this habitat, it is a key forest species. It is not used popularly for timber because the wood is very hard and difficult to work. The dominance of this species decreases down the mountain side. This species never extends to be dominant forming the canopy.

Mangifera indica (and other honey producers)

Coralita and skin up

The herbaceous vine *Antigonon leptopus* (Coralita) covers exposed ground forming a thick mat of green and dried leaves. It occludes other herbaceous species growing in the vicinity. The white or pink flowers are popularly visited by honey bees for nectar. It is thus a key species for honey production.

Two other species that are heavily visited by bees during other flowering periods are the fruit trees, skin up (*Melicoccus bijugus*) and mango (*Mangifera indica*). There are a number of varieties of mangoes locally. This constitutes a valuable genetic resource. All varieties must therefore be considered for conservation. Mango trees are widely used as windbreaks for field crops. Some varieties have also assisted in thrips control in cocoa plants. *Melicoccus bijugus* produces an edible fruit and generates copious organic matter from shed leaves.

Micropholis chrysophylloides

Bois

This is a dominant species in the main watershed areas or montane thicket area, and

it is said to make up just over 40% of forest trees. In this habitat, this species is established as a very big tree, averaging 6 feet in girth.

Pachira insignis

Wild breadnut, Chataigne marron

Split branches from this tree are used as a natural attractant for the cocoa beetle (*Steirastoma breve*), a serious pest of the cocoa plant.

Spondias mombin

Hog plum

Scattered on the lower hills of Grenada is a rough-barked deciduous tree *Spondias mombin*. The trees have become established on some of the slopes and their extensive root systems help to control soil erosion. The shed leaves provide a fair quantity of organic matter to the dry forest floor. The cluster of flowers are visited by honey bees. The fruit, though not popularly eaten locally, is made into jams, wines and preserves. Culturally, the leaves are used as a herbal tea for sore throat.

Swietenia macrophylla

Mahogany

Trees of the species *Swietenia macrophylla* and *S. mahogani* have declined drastically in number. This species must be conserved and the planting of new trees is absolutely essential. The sturdy rough-barked, hardwood mahogany tree is very deep rooted, deciduous and grows well on flat lands or inclines. It is a provider of organic matter since it sheds copious leaves, flower petals, fruits and seeds. It is an excellent stabiliser of soil on sloping ground. Culturally, it is the most valuable timber tree processed locally and the wood is used in construction, furniture, crafts, boats and vehicles, and burial caskets. This wood is not easily attacked by termites, etc. Conservation of this species and replanting in carefully selected areas can enhance the timber industry as well as afford environmental management.

Tabebuina pentaphylla

White cedar, Pink poui

This is a prolific hardwood, deciduous tree found growing on low hills and hill ranges in the southeastern, east-central and north-eastern areas of Grenada and the hillsides of Carriacou. On both islands, the extensiveness of this forest has rapidly declined, but this species continues to be a great producer of organic matter since it sheds all its leaves and flower petals to the forest floor in the dry season. It is very deep-rooted and readily establishes itself as the dominant species in the low hill habitat. Dispersal is by winged seeds and thus it establishes early colonies on cleared patches of ground.

Key species of Grenada

As a commodity, this is the most significant and best used species in boat building for the three islands, a feature which has contributed to its decline. Construction works on low hills have also led to this species' decline. It needs to be recognised as a key species and steps should be taken for its reintroduction and cultivation. The forest species provided soil stabilisation and retention of water in the low hill areas it populated. In many locations the white cedar stands have become interspersed with lowland hardy dry forest trees.

Tamarindus indica

Tambran, tamarind

This sturdy, hardwood tree is best known for the highly acidic fruit which is used for making jams, jellies, preserves and sauces. The tree can grow in a variety of habitats but it does very well in the drier areas of Grenada and Carriacou.

There is potential for a tree that could be cultivated in the drier areas. The extensive deep root system firmly binds the tree in the soil and some trees actually prosper in precipitous areas. Advantage could be taken of this characteristic and species may be planted to control precipitous areas. This qualifies tamarind as a key leguminous fruit species with environmental management potential. It is also a provider of organic matter from leaves shedding.

Shrubs

Clerodendrum aculeatum

Bitter fence

This fast-growing, thorny shrub is underutilised. It is potentially a very useful species for soil stabilisation in environmental management. It grows readily from cuttings, forming a strong shrub. If planted closely, then a sturdy, almost impenetrable fence develops. This is a key species that could be utilised for roadsides, where soil conservation is needed, as well as for protection in precipitous areas. It is one of the most popular fencing plant used. Its fast growth permits it to be trimmed and trained. The leaves of the plant are used as bitter herbal tea.

Cordia curassavica

Black sage

This is a persistent hardy shrub found growing mainly in the drier areas of Grenada, Carriacou and Petit Martinique. Its distribution is island-wide with decreasing numbers at higher, wetter elevations. Its extensive root system, shrubby nature, roughened leaves, as well as the fact that it is not eaten by herbivores, have provided adaptations for its survival in the dry areas. This species functions as a natural soil stabiliser. It grows quite readily from cuttings, but currently is not used in environmental

management. It must be noted that the authors are of the opinion that this species should be utilised in selected areas to control landslides or soil movement, etc. The yellow leaves of this plant are popularly used as herbal teas for fever and stomach aches. Chewing bits of stem cleans the teeth.

Croton species

Bois buc

In the dry lowland areas of Grenada, these species abound as hardy, deep-rooted, variegated shrubs, essential as natural soil management agents. They also occur on neighbouring islands. The most popular species are utilised locally for yard brooms. It is well adapted for survival in the drier areas and is not fed on by herbivores.

Moghania strobilifera

Moghania

This legume is usually found growing profusely on abandoned fields and riversides. It helps to colonise cleared ground, binds nitrogen in the soil and prevents soil erosion. A wild growing species which may be utilised in soil conservation or environmental management by planting in desired areas.

Merremia species

Rabbit vine, goat vine, shining bush

Feed for livestock is crucial in any country's survival. For Grenada, the smaller livestock (goats, sheep and rabbits), are important sources of meat, and this importance may well grow in the future. Two natural species that are important as animal feed are the vines *Merremia* species and the shrubby *Piper* species. Among most of the other feed plants, these two are key for the extensiveness with which they are used.

Pandanus species

Wild pine, Screw pine

These species constitute the plants that contribute most to the economic and social life of the villagers of the eastern seaboard villages of Soubise and Marquis. This is particularly so for the women-folk who are involved in the harvesting, processing and preparation of craft products and craft items. These include plaited straw, straw hats, bags, slippers, table mats, etc. The plants are not cultivated but have colonised and structured a habitat in the low lying semi-swamp lands of the surrounding river basins. Thus this species has functioned in swamp reclamation. This constitutes a species whose genetic material is a valuable resource.

Herbs

Aloe vera

Aloes

This is an outstanding multipurpose herbaceous plant. Although not cultivated in Grenada or Carriacou as such, it grows in areas with not too high rainfall. Where the plants grow, they afford soil conservation. This species is esteemed for its cultural value and is a popularly used medicinal herb, the juice being used on burns and bruises or ingested for certain stomach ailments. A plant growing in the yard is supposed to bring good luck to the family within. Its use as a cosmetic is recognised and the juice is used as a shampoo and cleansing body wash locally. This plant holds good economic potential for cultivation, processing and exportation of gel.

Amaranthus dubius

Bhagee, Bhaji

This amaranth is a fast-growing, easily dispersed, herbaceous plant, found growing as a weed in most pasture lands. This species is fed to animals, especially hogs. It is sometimes used as a spinach. This wild species and other close varieties may well be considered for cultivation for use as a vegetable rich in fibre and iron. They are very fast-growing and easy to grow. Close species may also be cultivated for their food seeds.

Commelina elegans

Water grass

Though called water grass, this species is in fact a herbaceous, monocotyledanous, flowering plant of the family Commelinaceae. This species grows prodigiously where there is water and decaying organic matter. In fact some farmers use its growth to tell that the soil is rich in organic matter. This luxuriant soft stemmed herb is used as feed for sheep, pigs, cattle, rabbits, and fowls. It may be the genetic resource for an edible vegetable herb for humans – an area that needs investigation.

Desmodium species

Sweetheart, Coeur de velot

Locally, there are many species of *Desmodium*, a short vine-like herb with sticky pea-like fruits. These plants occur in many different habitats, but especially so as a wild species on cultivated soils. Their sticky fruits adhere to most surfaces and are readily dispersed. They are one of the early herbaceous colonisers of freshly cut or newly cultivated lands. As early and rapid colonisers they cover exposed land, thus reducing erosion. Further, being legumes, they lead to nutrient accumulation by binding nitrogen in the soil. Also used as a medicinal herb for dysentery.

Heliconia species

Balizier

There are as many as seven *Heliconia* species found growing naturally in the lower montane moist forest of Grenada. This diversity constitutes a very important genetic resource. Herein may be the resource for successful cultivation and, thus supported, agricultural diversification which may include cut flowers. In their natural habitat, the balizier is a significant coloniser of mountain slopes that have become exposed due to falling or cut trees, and land slides. It grows and spreads very rapidly, thus controlling erosion, returning plant cover for water capture, and reinstatement of forest trees. A key species in habitat structuring in the moist forest. Leaves useful as disposable plates.

Mimosa pudica

Sensitive plant, Spanish needle

The sensitive plant (maria hunt) *Mimosa pudica* and Spanish needle, *Bidens pilosa* are key early herbaceous colonisers on tilled agricultural lands, helping to lessen soil erosion. *Mimosa*, being leguminous, binds nitrogen in the soil. *Mimosa* extends on the soil surface by producing runners. Both species produce numerous seeded fruits which are easily dispersed. The herbaceous *Mimosa* is used in herbal medicines.

Momordica charantia

Coolie pawpaw

The herbaceous vine is the most popularly used species in local herbal medicine. A bitter tea made from the herbs is drunk for diabetes, hypertension and fevers. Extracts from the herbs are used in patches for certain skin ailments. The large-fruited variety of this species is cooked as a vegetable. This prolific growing vine, found on the three islands, constitutes a culturally significant species. The herbaceous vine is an early coloniser of pasture land, dry areas and most lowland and hills.

Grasses

It is very difficult to select the key species of grasses for the three island State. More work needs to be done on the grasses for a more comprehensive appreciation of their functioning in the various ecosystems and their habitats. Their importance in soil cover is undeniable, especially so in the drier areas or areas devoid of many trees or shrubs, where grasses are the major ground cover species.

For the farmers, some grasses may constitute serious weeds. Because they are easily dispersed, as well as having persistent seeds, they are early colonisers, a feature that leads to quick plant cover of exposed grounds. Grasses are therefore good natural soil stabilisers and could be managed to this end. Some species that are early colonisers are *Eleusine indica*, *Cynodon dactylon* and *Paspalum* species.

Grenada does not have a thriving livestock industry as such. The few cattle around

Key species of Grenada

are reared by small farmers. Such cattle will feed on a mixture of wild grasses, cane tops and other herbs, etc. There are few species of grasses that are specifically cultivated for livestock feed, but these include elephant grass, para grass and pangola.

Gynerium sagittatum

Roseau

The tall hard-stemmed grass, *Gynerium sagittatum*, grows in river beds, on river banks and on swamp fringes, especially around river mouths. The extensive fibrous roots bind the soil, thus controlling erosion as well as helping in swamp reclamation. The slender bamboo-like stems are used in farm construction and mainly in decoration in homes or bars. The large plumous flower is used in interior decoration. Currently, this species grows wild. Controlled cultivation may yield better use of its environmental management potential coupled with commodity use.

Elephant grass

This tough, solid-stemmed grass is a useful cattle feed especially in the dry season when most grasses have dried back. Very important also is its use in soil stabilisation. This species is grown on the steep hillsides to prevent slides and in areas where bush fires have removed vegetation covering. A key species in environmental management.

Cymbopogon citratus

Lemon grass

This is a tufted grass. It is not cultivated in large acreage, but a stool or two may be found in most rural yards. It is culturally important as a herbal tea, just a pleasant hot tea, or for fevers. It is also used to control soil erosion. Small quantities are now exported as herbal tea preparations. This species can assist in soil conservation as well as being economically important.

Vetiveria zizanioides

Khus-Khus, Sweet root

This is utilised in environmental management as a soil stabiliser to lessen or control erosion. The same fibrous binding roots are the source of essential oils valued for cosmetics and an insect repellent. The leaves provide a valuable commodity for craft.

As Grenada diversifies and intensifies its agriculture, this will be a necessary species for hillside conservation. Also on the islands of Carriacou and Petit Martinique.

Bamboo

The thickly clustered, fibrous-rooted *Bambusa vulgaris* is one of the most popular species found growing along river banks or watercourses where it functions to

prevent landslips, slides and soil erosion. It may be found growing naturally or directly introduced for soil management. The bamboo is very important in preventing sedimentation of streams and rivers. Consideration should be given to cultivation of this or allied species. As a commodity, the hard stems find utilisation as building materials, construction aids, craft items, furniture, sports, fishing rods, stakes for bananas and farm or livestock house construction.

Sedges

The sedges are members of the family of Cyperaceae. A number of species are crucial in Grenada. One of the fastest colonisers on newly cut ground is the pernicious welcome grass or nut grass, *Cyperus rotundus*. Once established, it is a very difficult species to get rid of.

The corms are used in herbal medicine as a tea for colds. An accompanying colonising sedge is *Cyperus surinamensis*.

Sedges are found growing abundantly in river beds and on river banks. On the banks they help to control or reduce soil erosion. Two popular species in this regard are *Mariscus fuliginus* and *M. meyenianus*.

Ferns

Of the many species of fern in Grenada, growing in many different habitats, two species stand out as being key. These are the Grand Etang fern, *Dicranopteris pectinata* and the tree fern *Cyathea* species. In the mountain areas where deforestation has taken place, either through natural action or the interference of man, *D. pectinata* has successfully recolonised these areas and now extends as a thick mat covering and protecting the soil from further erosion, increasing the soil's organic matter as well as the water retention properties; and thus allowing for the reestablishment of forest trees. The fern does not harbour any critical pest and is not fed on by herbivores. A highly valuable species in habitat structuring and natural environment management. The tree fern occurs in a similar habitat and also functions in habitat structuring.

Mosses

On some of the mountain peaks of Grenada, in the region classified by Beard (1949) as the cloud cover forest or elfin woodland, mosses abound on the rock and soil surface. Here they function in top soil formation and stabilisation. Lower down the mountain sides, mosses now occur on the tree barks. The species of mosses have not been identified. Similar unidentified species occurring in this habitat are algae and lichen.

Fungi

On the forest floor and in rotting trees, myriads of fungi exist as decomposing agents. Here, too, species have not been identified.

COASTAL SPECIES

Trees

Avicennia nitida (plus others)

Mangroves

In the mangrove stands remaining around Grenada and Carriacou, the four species usually coexist showing a progression from the sea to dry land in the order of species, *Rhizophora mangle* (red mangrove), *Avicennia nitida* (black mangrove), *Laguncularia racemosa* (white mangrove) and *Conocarpus erectus* (button mangrove). The major remaining mangrove stands are small patches of shoreland around Prickly Bay, Mt Hartman Bay, Clarkes Court Bay, Petit Caliviny Harbour, Caliviny Harbour, Westerhall Bay, Petit Bacaye Bay, Conference Bay, Antoine Bay and Levera Bay. Mangrove locations are dotted from southeast to the northeast along the coast. Total acreage of remaining mangrove is about 470 acres. In Carriacou, the two major mangrove stands are at Tyrrel Bay and at L'Esterre Bay.

Mangrove are important in coastal protection, fisheries and wildlife. On the coastline they function in organic production, habitat structuring and colonisation and stabilisation of the zone between dry land and sea. They therefore provide natural environmental management. It is important to realise that mangrove forest are zones of significant nutrient accumulation since there is no direct leaching into the sea and direct washing of land by the sea. They also buffer sea-wave and wind energy. The fact that mangrove is a useful commodity for coals, wood and tannin materials, should be de-emphasised locally. This will then lead to the longer survival of key contributing species. The long term benefits from these species far outweigh any immediate economic gain.

In the mangrove ecosystem, fishes and other wildlife abound and the mangroves of Tyrrel Bay in Carriacou are well known for their oyster beds in the roots. A significant observation is that most of the beautiful sandy beaches of Grenada and Carriacou are juxtaposed to a thriving mangrove patch or a swampy area.

Coccoloba uvifera

Sea-side grape

This deep and extensive rooted, multi-branched, thick-leaved tree is naturally adapted to withstand salty sea spray and salty underground water. It is a significant species in beach-front habitat formation, sand binding, as well as guarding the less well adapted inland plants from salty sea spray and wind energy. Additionally, the fruit is edible. Because of its ecological importance, the use of the hardwood as a commodity for fuel should be discontinued.

Dry Evergreen Forest Species (Coastal)

The following tree species will be best treated as a group since they all occur in the dry evergreen forest or salt spray zone. They all tend to have a deep or extensive root

system which is tolerant of salty underground water, and they are resistant to salt spray and high winds. It may be worthwhile to predict that they serve as a frontal barrier against physical, chemical and also biological agents. Leaf modifications protect these species from excessive direct sun rays as well as dry atmosphere.

These key species are important in habitat structuring, protecting and conserving the coastline and protecting the close inland plant species, be they natural or planted crops. The species include sea-side grape (*Coccoloba uvifera*), sea-side mahoe (*Thespesia populnea*, *Hibiscus tilaceus*), Machineel (*Hippomane mancinella*), sea-side almond (*Terminalia catappa*), fat pork (*Chrysobalanus icaco*) and coconut (*Cocos nucifera*). The indiscriminate clearing of all or some of these species in certain eastern coastline areas has already led to serious coastline erosion as well as disastrous effects on what used to be protected inland crops.

The seaside almond produces a utilisable fruit and an edible seed, and both the fruit and seed (when parched) of the fat pork are edible. The economic importance of the coconut in the tropics is well known and this species is not restricted to a coastline habitat. The other species are also found inland and the almond is popular along some river courses.

The machineel must be noted for its intense dermal toxicity to humans. One should not get into contact with the milky latex of the leaf, stem or fruit. However, it is an excellent provider of organic matter from falling leaves.

Herbs

Ipomoea pes-caprae

Seaside potato, Creeping vine

The succulent creeping herbaceous stem of *Ipomea pes-caprae* forms a mat lying close to the ground. Its highly branched roots hold fast to the sand, thus preventing shifting of sand. The thick leaves are well insulated from salt spray, halophytically adapted. This species is an ample coloniser of upper beach sand, just above the high tide mark and it functions to prevent shifting of sand. A key species for controlling erosion of upper beach sand in the pioneer zone.

Grasses

Sporobolus species

Crab grass

This rhizomatous grass is an early coloniser of the pioneer zone usually growing close to or intermixed with *I. pes-caprae* in similar habitats. It is a key species for binding sand in the zone just above the high tide mark.

Algae

Edible seaweeds/sea moss

There are four species of agar-producing seaweeds that are utilised in Grenada, Carriacou and Petit Martinique as a food item. These are *Gracillaria crassissima*, *G. debilis*, *G. domingensis* and a *Gracillaria* species. These are all marine algae found growing in the waters of these islands and are commonly referred to as sea moss.

In some habitats, two or more species may co-exist, whilst in others, one dominant species occurs. The species *G. crassissima* is found growing flat on rocks from the intertidal zone to depths as much as 25m (80 ft). *G. debilis* establishes itself on rough waters on rocky shores. The more delicate *G. domingensis* survives best in sheltered areas such as protected bays near river outflows, a similar habitat for the unknown *Gracillaria* species. This species, however, shows a little more extended range to rougher or muddier waters.

Gracillaria represents key natural sea weed species with the potential for cultivation and expanded utilisation as a food commodity.

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