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SOME ORNAMENTAL SHRUBS FOR THE TROPICS

By
EDWARD P. HUME
Horticulturist

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MAYAGUEZ, PUERTO RICO

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[1]In cooperation with the Government of Puerto Rico.

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By Edward P. Hume, *Horticulturist*[1]

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INTRODUCTION

During the past 40 years the Federal Experiment Station at Mayaguez, Puerto Rico, has introduced tropical and subtropical plants from many parts of the World for propagation and testing. In order to make the information obtained from this collection generally available, a series of circulars dealing with various classes of plants is being prepared. The first one entitled "Some Ornamental Vines for the Tropics" has already appeared as Circular No. 31 of this station (*6*).[2]

In addition to the shrubs in the station collection, those seen in the gardens of Puerto Rico have been included. Many of these shrubs are found in cultivation throughout the warmer sections of the World or in conservatories of the Temperate Zone. Some of these species are adapted to outdoor culture in regions experiencing occasional light frosts, such as southern Florida and southern California. A few can be grown even farther north.

[1]Formerly with the Federal Experiment Station in Puerto Rico.

[2]Numbers in parenthesis refer to Literature Cited, p.

No one collection can contain all the species adapted to the various tropical climates and soils. Many outstanding species have yet to be added to this collection, or are still too small to determine their habit, value, and uses. Palms, cycads, and other large-leaved plants have not been described because of their distinctive character and because they will be the subject of a separate circular. However, many of the cycads, cluster palms, and dwarf palms function as shrubs. No attempt has been made to include typically desert shrubs, such as cacti and leafless euphorbias, even though they are found in tropical regions.

It is impossible to describe *all* the shrubs of ornamental value that grow in tropical regions; only a brief reference can be made to a few in the scope of this circular (*3, 9, 11, 13, 14, 21, 22*).

VALUE OF SHRUBS IN THE LANDSCAPE

Shrubs are one of the most important classes of plant materials for tropical landscaping. In the regions of dense population, the size of the usual home yard is so small that there is no room for a variety of trees. To secure variety in color and form and to obtain pleasing color combinations in small areas it is necessary to have several different kinds of plants. Shrubs and vines are generally more prolific bloomers than trees and require much less room. Many shrubs bloom only during part of the year, but careful choice of plants will result in some color at all seasons.

Shrubs are commonly used in tropical regions, but the usual effect is rather monotonous because a high proportion of those planted are hibiscus, crotons, and bougainvilleas. There are 123 kinds of shrubs described in this publication. By choosing carefully plantings may be both beautiful and distinctive.

CONDITIONS LIMITING GROWTH

In tropical regions there is no great change in temperature with the seasons, but other factors may vary greatly. Rainfall is probably the most important. Not only the total annual precipitation, but the seasonal distribution and the intensity of this precipitation have a decided effect in determining the kind of plants that will grow in a given locality. The nature of the rainfall may change rapidly within a few miles, particularly when it is controlled by local topography.

Tropical soils also are extremely variable. All variations from heavy clays to coarse sands are found. The clays, which predominate in high rainfall regions, also vary widely in their drainage characteristics. Drainage is of considerable importance in determining the kind of plants these soils will support. Some regions contain so much alkali or are so close to the seashore that only the most salt-resistant types of plants may be grown. Table 1 contains a list of plants to use under special conditions.

The woody plants of the Temperate Zone have developed a reaction to prevent renewed growth during unseasonably warm

TABLE 1.—*Shrubs adapted to special conditions and uses*

Heavy wet soils	Sandy soils	Alkali soil or near the sea	Arid regions
Acalypha hispida	*Allamanda neriifolia*	*Caesalpinia pulcherrima*	*Bauhinia pauletia*
Bambusa multiplex	*Breynia nivosa*	*Lawsonia inermis*	*Caesalpinia pulcherrima*
Bixa orellana	*Cassia alata*	*Triphasia trifolia*	*Calotropis procera*
Clerodendrum fragrans	*Chrysobalanus icaco*		*Euphorbia cotinifolia*
Ehretia sp.	*Codiaeum variegatum*		*E. milii*
Hamelia erecta	*Flacourtia indica*		*Lawsonia inermis*
Hibiscus rosa-sinensis	*Hibiscus* spp.		*Plumeria rubra*
H. schizopetalus	*Ixora coccinea*		*Punica granatum*
Ixora acuminata	*Murraya exotica*		*Thevetia peruviana*
Malpighia coccigera	*Pedilanthus tithymaloides*		
Malvaviscus grandiflorus	*Plumeria rubra*		
Oncoba echinata	*Stenolobium stans*		
Stenolobium stans	*Vinca rosea*		
Thryallis glauca			
Vinca rosea			
Steep slopes	**Shady locations**	**Live fencing**	**Higher elevations**
Artabotrys uncinatus	*Beloperone guttata*	*Bauhinia pauletia*	*Bougainvillea*
Bambusa multiplex	*Clerodendrum nutans*	*Bougainvillea*	*Buddleia asiatica*
	Coffea arabica	*Caesalpinia pulcherrima*	*Dovyalis caffra*
	Dracaena godseffiana	*Carissa grandiflora*	*Euphorbia pulcherrima*
	Graptophyllum pictum	*Dovyalis caffra*	*Hydrangea macrophylla*
	Hamelia erecta	*Duranta repens*	*Ilex vomitoria*
	Muehlenbeckia platyclada	*Euphorbia milii*	*Ligustrum ovalifolium*
	Oncoba echinata	*Jatropha curcas*	*Rosa*
	Vitex negundo	*Lawsonia inermis*	
		Pyracantha crenulata	
		Triphasia trifolia	

TABLE 2.—*Shrubs grouped according to size*

Less than 3 feet	3 to 6 feet	6 to 12 feet	12 feet or higher
Barleria cristata	*Acalypha wilkesiana*	*Acalypha hispida*	*Acalypha hispida*
Beloperone guttata	*Ardisia humilis*	*A. wilkesiana*	*Bambusa multiplex*
Breynia nivosa	*Bauhinia petiolata*	*Allamanda neriifolia*	*Banisteriopsis cornifolia*
Euphorbia milii	*Breynia nivosa*	*Ardisia polycephala*	*Bauhinia pauletia*
Jatropha podagrica	*Brunfelsia americana*	*Artabotrys uncinatus*	*Bixa orellana*
Malpighia coccigera	*Calliandra* sp.	*Bambusa multiplex*	*Calliandra marginata*
Pedilanthus tithymaloides	*Clerodendrum nutans*	var. Chinese Goddess	*Carissa edulis*
Pentas lanceolata	*C. speciosissimum*	*Bauhinia*	*Cassia biflora*
Plumbago capensis	*Codiaeum variegatum*	*Bougainvillea*	*Cordia serrata*
Scutellaria ventenatii	*Euphorbia pulcherrima*	*Brunfelsia hopeana*	*Dovyalis caffra*
Vinca rosea	*Gardenia jasminoides*	*Buddleia asiatica*	*D. hebecarpa*
	G. posoqueroides	*B. davidi*	*Duranta repens*
	Grewia occidentalis	*Byrsonima crassifolia*	*Ehretia microphylla*
	Hamelia erecta	*Caesalpinia pulcherrima*	*Euphorbia cotinifolia*
	Hibiscus rosa-sinensis	*Calliandra surinamensis*	*Flacourtia indica*
	Hydrangea macrophylla	*Calotropis procera*	*Gardenia grandiflora*
	Ixora chinensis	*Carissa edulis*	*Gmelina elliptica*
	I. coccinea	*C. grandiflora*	*Hibiscus collinus*
	Jacobinia coccinea	*Cassia alata*	*H. tricuspis*
	Jatropha podagrica	*Cestrum diurnum*	*Holmskioldia sanguinea*
	Lawsonia inermis	*C. nocturnum*	*Ixora acuminata*
	Muehlenbeckia platyclada	*Chrysobalanus icaco*	*Jatropha curcas*
		Cipadessa baccifera	*J. multifida*
	Pedilanthus tithymaloides	*Clerodendrum fragrans*	*Kopsia fruticosa*
		C. indicum	*Lagerstroemia indica*
	Polyscias balfouriana	*C. japonicum*	*Malpighia glabra*
	P. filicifolia	*Codiaeum variegatum*	*Mussaenda philippica*
	Rosa	*Coffea arabica*	*Nerium oleander*

Russelia equisetiformis
Serjania glabrata
Strobilanthes isophyllus
Synsepalum dulcificum
Tabernaemontana coronaria
Thunbergia erecta

Dombeya natalensis
Dracaena godseffiana
Erythrina crista-galli
Euphorbia pulcherrima
Graptophyllum pictum
Grewia asiatica
Hibiscus rosa-sinensis
H. schizopetalus
H. syriacus
Ilex vomitoria
Ixora macrothyrsa
Lagerstroemia indica
Leea coccinea
Ligustrum indicum
L. ovalifolium
Malaviscus grandiflorus
Murraya exotica
Mussaenda erythrophylla
Oncoba echinata
Petrea kohautiana
Polyalthia suberosa
Polyscias filicifolia
Psidium littorale
Punica granatum
Randia formosa
Sambucus simpsonii
Stenolobium stans
Tabernaemontana panducaqui
Thevetia ahoui
T. peruviana
Thrygallis glauca
Tithonia diversifolia
Triphasia trifolia
Vitex negundo

Plumeria rubra
Polyscias guilfoylei
Pyracantha crenulata
Sambucus simpsonii
Stenolobium stans
Thevetia ahoui
Triphasia trifolia
Vitex negundo

TABLE 3.—*Shrub forms*

Upright, taller than wide	Globose, height and width nearly equal	Spreading, wider than high	Arching, long curving branches
Acalypha hispida	*Allamanda neriifolia*	*Bauhinia petiolata*	*Bambusa multiplex*
A. wilkesiana	*Ardisia humilis*	*Beloperone guttata*	*Bougainvillea*
Bambusa multiplex	*A. polycephala*	*Brunfelsia hopeana*	*Buddleia asiatica*
Banisteriopsis cornifolia	*Bauhinia pauletia*	*Byrsonima crassifolia*	*B. davidi*
Bixa orellana	*Brunfelsia americana*	*Calliandra marginata*	*Calliandra surinamensis*
Breynia nivosa	*Carissa edulis*	*Calliandra* sp.	*Ehretia microphylla*
Caesalpinia pulcherrima	*C. grandiflora*	*Chrysobalanus icaco*	*Euphorbia pulcherrima*
Calotropis procera	*Cassia alata*	*Cipadessa baccifera*	*Hibiscus schizopetalus*
Cestrum diurnum	*C. biflora*	*Cordia serrata*	*Holmskioldia sanguinea*
C. nocturnum	*Clerodendrum fragrans*	*Dovyalis caffra*	*Lagerstroemia indica*
Clerodendrum indicum	*C. nutans*	*D. hebercarpa*	*Lawsonia inermis*
C. speciosissimum	*C. japonicum*	*Erythrina crista-galli*	*Pyracantha crenulata*
Euphorbia cotinifolia	*Codiaeum variegatum*	*Euphorbia milii*	*Russelia equisetiformis*
Gardenia grandiflora	*Coffea arabica*	*E. pulcherrima*	*Sambucus simpsonii*
G. jasminoides	*Dombeya natalensis*	*Gardenia posoqueroides*	
Graptophyllum pictum	*Dracaena godseffiana*	*Gmelina elliptica*	
Hibiscus collinus	*Ehretia microphylla*	*Grewia asiatica*	
H. rosa-sinensis	*Excoecaria cochinchinensis*	*Hydrangea macrophylla*	
H. syriacus	*Flacourtia indica*	*Ixora coccinea*	
H. tricuspis	*Grewia occidentalis*	*Malpighia coccigera*	
Ixora acuminata	*Hamelia erecta*	*Murraya exotica*	

I. macrothyrsa
Jacobinia coccinea
Jatropha multifida
Kopsia fruticosa
Mussaenda philippica
Pedilanthus tithymaloides
Polyalthia suberosa
Polyscias balfouriana
P. filicifolia
P. guilfoylei
Punica granatum
Synsepalum dulcificum
Tabernaemontana coronaria
Thevetia ahoui
Tithonia diversifolia
Triphasia trifolia

Hibiscus schizopetalus
Ilex vomitoria
Ixora chinensis
Jatropha curcas
J. podagrica
Lawsonia inermis
Leea coccinea
Ligustrum indicum
Malvaviscus grandiflorus
Muehlenbeckia platyclada
Oncoba echinata
Pentas lanceolata
Plumeria rubra
Psidium littorale
Stenolobium stans
Strobilanthes isophyllus
Tabernaemontana panducaqui
Thevetia peruviana
Thunbergia erecta

Mussaenda erythrophylla
Plumbago capensis
Ricinus communis
Scutellaria ventenatii
Vinca rosea
Vitex negundo

Having a tendency to climb

Artabotrys uncinatus
Bougainvillea
Mussaenda erythrophylla
Plumbago capensis
Serjania glabrata

periods in the winter. It is called dormancy and prevents growth from buds until after a period of near-freezing weather. Since there is seldom cold weather in the Tropics except at considerable elevation, this inherent dormancy makes it difficult to grow most Temperate Zone woody plants. The buds which would normally sprout in the spring remain dormant. New growth, such as it is, comes from buds lower on the stem. Since many beautiful shrubs are naturally adapted to the Tropics it is generally not desirable to try growing Temperate Zone woody plants except at high elevations. Some species of *Buddleia*, *Ligustrum*, *Pyracantha*, and *Rosa* are relatively tolerant of tropical lowland conditions. However, the narrow-leaved evergreens are particularly unadapted to tropical lowlands. With very few exceptions this class of plants should not be used at an elevation less than several thousand feet in the Tropics. *Thuja orientalis* L. is the narrow-leaved evergreen most tolerant of lowland, tropical conditions.

SHRUB SIZE AND FORM

In the case of shrubs there are at least three separate distinctions. Many herbs are tall and stiff stemmed such as some of the species of *Costus,* yet they are not included because of their essentially herbaceous nature. Plants such as *Pentas, Plumbago,* and *Scutellaria* seem almost herbaceous but are included because they have definitely woody branches at the base.

Another distinction is to be made between woody vines and scandent or partially climbing shrubs. The distinction is more difficult because the environment may modify the habit of growth. Several of the plants described may have a climbing tendency particularly in shady locations. Furthermore different strains of the same species, such as *Mussaenda erythrophylla,*[3] for example, may behave entirely differently in their tendency to climb. In this publication those species which develop into a shrub without pruning have been included. Only the bougainvilleas which function as shrubs and also as vines are included both here and in Circular No. 31, "Some Ornamental Vines for the Tropics." Among the vine species which become shrublike are: *Adenocalymna alliaceum* (Lam.) Miers., *Allamanda cathartica* var. *williamsii, A. violacea* Gardn., *Arrabidaea pachycalyx* Sprague, *Bauhinia cumanensis* H. B. K., *B. galpini* N. E. Br., *Clerodendrum thomsonae* Balf. f., *Congea tomentosa* Roxb., *Cryptostegia madagascariensis* Bojer, *Jasminum dichotomum* Vahl, *J. pubescens* Willd., *Petrea volubilis* L., *Quisqualis indica* L., *Tecomaria capensis* (Thunb.) Spach., and *Uvaria lancifolia* Merr.

The third distinction is that made between tall shrubs and small trees. Here again environment plays an important role. In Florida and other regions experiencing an occasional frost many plants are killed back and rarely have an opportunity to exhibit their maximum size. In deep, fertile soil without competition or frost

[3] The authorities for plants described later are included with the description.

several of the tall shrubs described will eventually make small trees; such plants included here normally serve as shrubs for many years.

A number of plants considered for inclusion were finally omitted, since they become treelike in a relatively short time. Most of these are shrublike in poor soils or can be maintained as shrubs indefinitely, if so desired, by occasional pruning. Some examples of these are: *Brownea grandiceps* Jacq., *Coccolobis uvifera* (L.) Jacq., *Ehretia elliptica* D.C., *Faramea occidentalis* (L.) Rich., *Flacourtia rukam* Zoll. & Mar., *Garcia nutans* Rohr., *Licania rigida* Benth., *Pandanus* species, *Psidium guajava* L., and many citrus varieties.

In table 2 the various shrubs have been classified according to their normal height, based on their growth habit in Puerto Rico. The size indicated is normally attained only after several years of growth. On shallow or unfavorable soils the growth is slower and may never reach the height indicated. Under optimum conditions such plants may grow even taller. At higher elevations there is usually some stunting. If plant specimens of one kind of plant are commonly seen fitting into two size groups, that species has been listed under both headings.

The various plants described later fall into five general shapes or forms. There is considerable overlapping depending on the strain, local environmental conditions, such as wind direction and intensity, and plant age. The plants are listed in table 3 according to their most common habit at early maturity without crowding.

ORNAMENTAL VALUES OF SHRUBS

In order to select appropriate species one should know the characteristics which make each plant particularly useful for landscape planting. For this purpose the various species have been arranged in groups according to their desirable features. The accompanying tabulation lists plants with colorful flowers, according to their flower color and season of bloom in Mayaguez.

Plants grown primarily for colored, variegated, or peculiar foliage

Acalypha wilkesiana
Ardisia polycephala
(young foliage red)
Bambusa multiplex
(variegated varieties)
Breynia nivosa
Buddleia asiatica
Codiaeum variegatum
Dracaena godseffiana
Euphorbia cotinifolia
Excoecaria cochinchinensis
Graptophyllum pictum
Hibiscus rosa-sinensis
(variegated varieties)
Ilex vomitoria
Jatropha curcas
Leea coccinea
Ligustrum indicum
L. ovalifolium
Muehlenbeckia platyclada
Pedilanthus tithymaloides
Polyscias balfouriana
P. filicifolia
P. guilfoylei
Ricinus communis
Strobilanthes isophyllus

Plants with colorful flowers or bracts

Name	*Flower Color*	*Season*
Acalypha hispida	Bright red	Most of the year.
Allamanda neriifolia	Orange yellow	"
Ardisia humilis	Lilac lavender	"
Barleria cristata	Blue, pink, or white	"
Bauhinia petiolata	White	May-September.
Beloperone guttata	Pink and white	All year.
Bixa orellana	Lavender pink	Fall.
Bougainvillea	Various	Most of the year.
Brunfelsia americana	White to creamy yellow	"
Buddleia davidi	Various	"
Byrsonima crassifolia	Orange yellow	"
Caesalpinia pulcherrima	Orange red or yellow	"
Calliandra marginata	Dark red	"
C. surinamensis	Pink and white	"
Calotropis procera	Lavender purple	"
Carissa grandiflora	White	Summer and fall.
Cassia alata	Yellow	Fall and winter.
Clerodendrum fragrans	White, turning light pink	Most of the year.
C. indicum	Creamy white	Summer.
C. nutans	White	Fall.
C. speciosissimum	Scarlet	Most of the year.
Coffea arabica	White	In flushes during the spring.
Cordia serrata	"	Summer.
Dombeya natalensis	White or pink	Fall and winter.
Duranta repens	White or lilac	Early summer.
Erythrina crista-galli	Crimson	Fall.
Euphorbia pulcherrima	Red, pink, or white	Winter.
E. milii	Red	All year.
Gardenia grandiflora	White	In flushes late spring and summer.
G. jasminoides	"	Late spring and summer.
G. posoquerioides	"	Summer.
Gmelina elliptica	Yellow	Most of the year.
Grewia asiatica	Orange yellow	Summer.
G. occidentalis	Purple	"
Hamelia erecta	Scarlet	Most of the year.
Hibiscus collinus	Lavender, crimson throat	Fall.
H. rosa-sinensis	Various	All year.
H. schizopetalus	Red to pink	"
H. syriacus	White	Fall.
H. tricuspis	Yellow, changing to bronze	Fall and winter.
Holmskioldia sanguinea	Shades of orange and red	Summer and fall.
Hydrangea macrophylla	Blue, white, or pink	Most of the year.
Ixora acuminata	White	"
I. chinensis	Orange red	"
I. coccinea	Bright red	"
I. macrothyrsa	Deep red	"
Jacobinia coccinea	Bright red	"
Jatropha multifida	"	"
J. podagrica	"	"

Plants with colorful flowers or bracts — Continued

Name	*Flower Color*	*Season*
Kopsia fruticosa	White or light pink	Summer and fall.
Lagerstroemia indica	White, pink, red, lavender, purple	Summer.
Lawsonia inermis	White	Most of the year.
Leea coccinea	Red, except minute white petals	"
Ligustrum indicum	White	Fall.
L. ovalifolium	"	"
Malpighia coccigera	Pink to lavender	Most of the year.
M. glabra	"	Spring.
Malvaviscus grandiflorus	Scarlet	All year.
Murraya exotica	White	In flushes during summer.
Mussaenda erythrophylla	Scarlet and white	All year.
M. philippica	White and orange	Summer and fall.
Nerium oleander	White, pink, salmon, or red	Most of the year.
Pentas lanceolata	White, pink, or red	"
Petrea kohautiana	White or blue	"
Plumbago capensis	White, blue, or pink	"
Plumeria rubra	Pink with orange throat	"
Punica granatum	Various	Flushes in summer.
Randia formosa	White	Flushes in summer.
Rosa	Various	Most of the year.
Russelia equisetiformis	Coral red	"
Sambucus simpsonii	White	"
Scutellaria ventenatii	Bright red	"
Serjania glabrata	White	Summer.
Stenolobium stans	Yellow	Most of the year.
Tabernaemontana coronaria	White	"
T. panducaqui	"	"
Thevetia ahoui	Creamy yellow	"
T. peruviana	Bright yellow or orange	"
Thryallis glauca	Yellow, tinged red	Summer.
Thunbergia erecta	White, light or dark blue	All the year.
Tithonia diversifolia	Orange yellow	Fall and early winter.
Vinca rosea	Various	All year.
Vitex negundo	Blue, lavender	Summer and fall.

Plants with fragrance

Artabotrys uncinatus
Brunfelsia americana
B. hopeana
Cestrum diurnum
C. nocturnum
Clerodendrum fragrans
Gardenia grandiflora
G. jasminoides
Gardenia posoquerioides
Ixora acuminata
Lawsonia inermis
Murraya exotica
Nerium oleander
Plumeria rubra
Psidium littorale
Rosa

Plants with ornamental fruit

Name	*Color and size*	*Season*
Allamanda neriifolia	Yellow—1½ inches	All year.
Ardisia humilis	Deep blue or black—3-inch cluster	Winter.
A. polycephala	Black	"
Bixa orellana	Deep orange red or brown	"
Carissa grandiflora	Bright red when mature	Summer and fall.
C. spinosa	Blue—0.5 to 0.8 inch	"
Cestrum diurnum	Black—0.2 to 0.4 inch	Late summer and fall.
Cipadessa baccifera	Green, ripens red, then black—0.3 inch	All year.
Clerodendrum indicum	Dark red—0.4 inch	Late summer.
C. japonicum	Blue, scarlet sepals persist	Fall and winter.
Coffea arabica	Red—0.6 inch	Late fall and early winter.
Cordia serrata	Red—4 united, 5 inches	"
Dovyalis hebecarpa	Deep purple—0.8 inch	Summer and fall.
Duranta repens	Orange—0.4 inch	Summer.
Flacourtia indica	Red, ripening blue black—0.6 to 1 inch	Fall.
Gardenia grandiflora	Gray—2 inches	All year.
Gmelina elliptica	Yellow—1 inch	Most of the year.
Kopsia fruticosa	Dark blue—1 inch	"
Malpighia glabra	Red—1 inch	Early summer.
Murraya exotica	Orange red—½ inch	Fall and early winter.
Oncoba echinata	Yellow—3 inches	Most of the year.
Psidium littorale	Yellow or red—1 to 3 inches	Chiefly in the fall.
Polyalthia suberosa	Dark brown clusters—0.3 inch	Most of the year.
Punica granatum	Orange or red—3 to 4 inches	"
Pyracantha crenulata	Orange yellow—4 inches	Fall and winter.
Synsepalum dulcificum	Bright red—0.5 inch	Summer.
Triphasia trifolia	Red—1 inch	Most of the year.

Plants with economic fruit

Name	*Use*	*Season*
Bixa orellana	Seeds for flavoring and coloring	Winter.
Byrsonima crassifolia	Eaten raw or in soups or stuffings	All year.

Plants with economic fruit — Continued

Name	*Use*	*Season*
Calotropis procera	Seed plumes used for stuffing pillows, etc.	All year.
Carissa edulis	Eaten raw or for preserves	Summer and fall.
C. grandiflora	For jams and jellies	"
Chrysobalanus icaco	Eaten fresh	Summer.
Coffea arabica	Source of coffee	Fall.
Dovyalis caffra	For preserves	Intermittent.
D. hebecarpa	For preserves	Summer and fall.
Flacourtia indica	Fresh or in preserves	Fall.
Gardenia grandiflora	For stock plants in nematode-infested soils	All year.
Grewia asiatica	In preparing cooling drinks	Summer.
Jatropha curcas	Oil in seed used medicinally and industrially	Fall.
Malpighia glabra	For drink or preserves	Early summer.
Psidium littorale	Eaten fresh or in preserves	Fall.
Punica granatum	Eaten raw or for drinks	Most of the year.
Ricinus communis	Oil from seeds used medicinally, etc.	"
Synsepalum dulcificum	Used to sweeten the taste of fruit	Summer.
Thevetia peruviana	Seeds used for ornaments and charms	Most of the year.
Triphasia trifolia	For preserves	"

UTILIZATION OF THE PLANTS

Before making a planting it is wise to prepare a plan of the area drawn to scale with all the important features such as buildings, drives, walks, trees, and underground pipes. In locating the plants consideration should be given to the requirements to be met, such as the screening of unsightly views, privacy from the street or neighbors, and the uses to be made of the home grounds as, for example, allowing space for lawn games. Although a complete discussion of landscaping is beyond the scope of this work, several important general principles can be briefly stated:

Avoid too dense planting—Crowding the bushes is probably the most common fault in shrub plantings. When the plants are small, as they usually are when first planted, a proper spacing gives the appearance of being utterly inadequate. If the shrubs are planted for immediate effect, there will soon be severe competition between plants, intermingling of branches, and a tendency to develop long, irregular, and unsightly stems. By referring to tables 2 and 3, one can establish a safe minimum distance between plants that will prevent crowding.

In foundation planting, or planting around the base of a house, there is also a tendency to plant almost solidly except at doorways. Such a dense, continuous planting is usually not desirable because it limits the full-height effect of the house and may create a feeling that the house is floating in a sea of shrubs. Unsightly or poorly shaped plants often result from the frequent prunings necessary when spreading shrubs are planted close to walks or drives.

Choose plants whose size is adapted to the location—Another common mistake in landscaping is selecting plants which grow too tall for the site desired. This is particularly true when planting under windows. In the Tropics where growth is more or less continuous, the number of species which will remain below window level is limited. Taller shrubs unless pruned regularly not only obscure the view and darken the house but cut off the breeze so necessary in warmer regions. Height is also important in other parts of the grounds. The taller plants should be placed behind the medium and low ones so as not to hide them. It is generally a good practice to utilize the taller growing plants in the rear or to the sides of the house where more privacy is desired, leaving the front for lawn and medium or low shrubbery.

Choose plants whose flower colors harmonize—Tropical plants often have brilliant flower colors. Many of these combinations naturally harmonize, but a few, even among varieties of the same species, are discordant, particularly the reds with lavender, purple, or magenta.

Adapt plants to the spots chosen—If the location is shaded, some species will not grow satisfactorily. Others will flower less profusely. On the other hand full sunlight is equally undesirable for shade-loving species. Table 1 and information given in the description of the individual plants will assist in choosing those adapted to different locations.

After the plan is complete, the work should be transferred to the land. Stakes can be driven at the desired points to mark the centers of the holes to be excavated. The distance from conveniently fixed objects can be scaled from the plan and measured on the ground with a tape. If one is experienced at pacing, this method is usually sufficiently accurate. When all the stakes are located, minor adjustments may be desirable to take care of any irregularities in the plan.

OBTAINING AND PLANTING

The most rapid and usually most satisfactory way to secure material for planting is to purchase from an established nursery. If plants are unavailable they may be grown privately provided one has the interest and space required for propagation. A good propagating structure and medium for rooting cuttings is desirable, and essential for the more difficultly rooted species. This subject is more fully described in books and circulars on plant propagation (*1, 5, 7, 17, 18, 19, 20*).

Young plants are best grown in a nursery area where they can receive close attention and watering as necessary. When large

enough to transplant to a permanent location, the plants are dug with a ball of earth around the roots and the tops cut back to balance the inevitable loss of roots. The depth of planting normally should be the same as in the nursery, allowing for settling of any loose soil below. Topsoil, preferably enriched with some organic materials, should be forced down between the ball and the edges of the hole to fill empty spaces. The surface can be mulched if rains are irregular or deficient. A stake driven into the ground alongside of taller shrubs, with the plant loosely tied to it, will hold the top and aid new root growth, especially in windy locations.

As the plants grow it may be necessary to prune vigorous branches, to improve form or, in a few cases, to stimulate flowering. Pruning should be kept to a minimum when the plants are young, as pruning reduces total growth. When a branch is to be headed back, it should be cut flush with a side branch or bud to prevent the formation of a dead stub above a developing side branch. Old, many-stemmed shrubs can be rejuvenated and still remain strong by cutting a few of the older branches as low as possible at each pruning. Generally speaking it is best to prune shortly after flowering. Pruning should be done with pruning shears and pruning saws. Machetes or hatchets cannot be used satisfactorily as they leave dead and split stubs which not only look badly, but serve as an entrance for diseases and insects.

HOW THE PLANTS ARE DESCRIBED

The descriptions which follow have been prepared to give as much information as possible and still be brief. Technical terms have been eliminated insofar as possible. The ones retained are here given.

Leaves consist of a blade or flattened portion with a leaf stem or petiole to support it on the stem. Sometimes a stipule or small green structure appears on the stem on each side of the petiole at a joint or node on the stem. Flowers may occur singly or in heads or clusters of many sizes and shapes. Most flowers consist of a ring of small green sepals called the calyx, with an inner ring of showy colored petals, the corolla. In many plants the petals are more or less completely united, so that the corolla consists of a tube or funnel surmounted by lobes or segments that represent the individual petals. Within the corolla there is normally a series of stamens bearing pollen-containing structures called anthers on slender stalks called filaments. At the center is a pistil consisting of a basal ovary from which arise one or several styles, bearing at their tips the stigmas where the pollen is deposited.

Each shrub description gives its origin and present distribution insofar as known; the size and character of the plants, their chief uses, and adaptation to sunlight and soil; a brief description of flowers, fruits, and leaves; and method of propagation.

The headings list the plants alphabetically according to the accepted scientific name. Synonyms which appear in recent literature follow. English common names from several sources (*1, 8, 12*) then follow in bold-face type. The Spanish common names are

those used in Puerto Rico, as listed in Otero, Toro, and Otero (*16*) and Britton (*2*). The family name is listed last in roman type.

Scientific names and their synonyms are carried in the index. The English and Spanish common names are also indexed, with a cross-reference to the accepted scientific name under which the description may be found in the text.

DESCRIPTION OF THE SHRUBS

Acalypha hispida Burm. f.
Chenille Copperleaf, Redhot Cattail, Philippine Medusa Plant
"Rabo de Gato," "Berica" (fig. 1, *A*)
Euphorbiaceae

The berica, or chenille copperleaf, commonly planted in the gardens of Puerto Rico, has brilliant "cat tails" which adorn its deep green foliage. Native to the East Indies, it is now well established in the warmer sections of the world. It tolerates a variety of soil conditions. Growth is satisfactory in full sunlight or light shade reaching a height of 15 feet if unpruned. Older plants become somewhat irregular in shape unless pruned occasionally, but heavy pruning is not necessary or advisable. A shrub border or screen planting is brightened by the brilliant color of the flowering cat tails against the dark green foliage. Because of its size it is useful for hedges only if they are tall and wide. Acalyphas are frequently subject to attack by certain scale insects and mealybugs.

The gay flowers are produced in long, tight, drooping "spikes" which reach a length of a foot or occasionally more. They appear throughout the year but less prolifically when the soil is dry. A white-flowered variety has been reported.

The leaves are large and wide with small teeth along the margins.

Cuttings are easily rooted.

Acalypha wilkesiana Muell. Arg.
Painted Copperleaf, Jacob's Coat, Match-Me-If-You-Can
"Acalifa," "Capa de Obispo," "Primavera" (fig. 1, *B*)
Euphorbiaceae

The painted copperleaf is grown for the bright color of the leaves. Native to the Pacific Islands, it is now widely cultivated. Since it grows more slowly than its relative, the chenille copperleaf, it can be maintained at any desired size by occasional pruning. It is adapted to foundation planting and hedges as well as informal plantings. It is less tolerant of drought than *Acalypha hispida*. Whenever the moisture in the soil is deficient, the leaves roll and the branch tips droop.

The flowers are insignificant from an ornamental viewpoint and usually do not produce seeds. The flower stems are very slender and seldom exceed the length of the leaves.

The 4- to 8-inch leaves are varicolored. Red, yellow, bronze, and green appear in assorted arrangements depending on the strain or variety. The variety *marginata* has a thin marginal band of rosy carmine.

Plants are propagated from semi-hardwood cuttings.

FIGURE 1, *A*.—The chenille copperleaf, *Acalypha hispida*, is decorated with drooping, ropelike, red flower clusters the year around.

B.—The painted copperleaf, *A. wilkesiana*, is frequently used for hedging. This is a bright red-leaved variety with dark red flecks.

Allamanda neriifolia Hook.
Shrub Allamanda, Oleander Allamanda
"Cautiva" (fig. 2)
Apocynaceae

Most allamandas are vines. Some of these, such as *Allamanda cathartica hendersonii* or *williamsii* can be used as shrubs if grown in the open and pruned regularly. This species is one of the naturally shrubby allamandas. It has an upright growth habit reaching 8 to 10 feet in height, and makes satisfactory growth even in crowded locations. It is not adapted to the close shearing necessary for a hedge, but can be used as a specimen plant.

Flowers are produced in small terminal clusters of 3 to 12. Usually only one or two are open at one time. The brilliant orange-yellow color of the 2-inch flowers and the large number of clusters on a vigorous bush produce an attractive display, but not a solid mass of color. There is a tint of bluish red in the bud. Flowering continues throughout the rainy season.

FIGURE 2.—*Allamanda neriifolia* has no inclination to vine. It is the only allamanda fruiting regularly in Puerto Rico.

The fruit is spherical with long soft spines and has a total diameter of 1½ inches.

The leaves are usually in whorls of 5, and are dull dark green on the upper side. Their fine, stiff hairs create a rough texture. The margins are almost parallel, and there is practically no petiole.

Propagation is usually by seed, although cuttings will root.

Ardisia humilis Vahl
Synonym: *A. solanacea* Roxb. (fig. 3, *B*)
Shoebutton Ardisia
Myrsinaceae

This is one of many species of ardisia which should become more popular for landscaping in the Tropics. It is a native of India. The plant shape is rounded, remaining well foliated close to the ground. Since growth is slow, it is adapted to places where height must be restricted. The plants are in flower or fruit most of the year. They grow well in full sun or light shade and tolerate many soil conditions.

The lavender-pink flowers occur in clusters at the branch tips and in the axils of the upper leaves. The five, pointed petals spread to a diameter of about one-half inch. The stamens are yellow. The fruits mature a shiny black, 0.3 to 0.4 inch in diameter.

The leaves are 4 to 6 inches long, slender, pointed at both ends on short, two-ridged petioles.

Seeds are generally used for propagation. New plants can be produced quickly by air layering. Cuttings root with some difficulty, requiring a nearly saturated atmosphere.

Ardisia polycephala Wall. (fig. 3, *A*)
Myrsinaceae

This ardisia is a native of eastern India. The plant grows to a height of 10 feet but so slowly that they can serve at lower heights by occasional pruning. They are planted for their creamy white flowers and black fruits and for the bright red colored new foliage. Best growth occurs in full sun.

The flowers grow in short axillary clusters, are not conspicuous, and are partially screened by the leaves above. They have slender, pointed stamens. The fruit is red or pink when immature but ripens a dark-blue black.

The 4- to 5-inch leaves are widest towards the tip. The red color of the new leaves is retained longest in the petioles.

Plants are grown from seed.

Artabotrys uncinatus (Lam.) Merr.
Synonym: *A. odoratissimus* (Roxb.) R. Br.
Climbing Ylang Ylang
"Ilang-ilang Trepador" (fig. 4)
Annonaceae

The climbing ylang ylang is cultivated in countries of the Far East for the fragrant flowers and the ripe fruit. The scientific name is derived from two Greek words—artao, to suspend, and botrys, a bunch. The grape-like cluster of fruit is often suspended from tree branches by a prominent hook. One of these can be seen developing in the lower figure at the base of the flower cluster on the ruler. Another full-sized hook is partially obscured by the fruits in the cluster at the right. The branches climb if support is available. Otherwise the plants become tall shrubs whose branches droop to the ground even on steep slopes. It is useful for an in-

FIGURE 3, *A*.—The bright pink new leaves of *Ardisia polycephala* contrast strongly with the older, dark-green foliage. This difference does not show in a black and white picture. The flowers are white and the developing fruits red, turning black on ripening.

B.—*A. humilis* flowers in drooping clusters. Left shows a branch from below with lilac-lavender flowers and immature fruit; Right, a branch from above and the dark green upper surface of the leaves.

FIGURE 4.—*Artabotrys uncinatus* or climbing ylang ylang. *A*, A bush growing in the open. *B*, The lower side of a branch showing the greenish-yellow, fragrant flowers and a nearly ripe fruit cluster.

formal landscape since the branches are irregularly spaced. The flowers may be distilled for the perfume they contain, but not in sufficient quantity for commercial purposes. Best growth is made in neutral soils well supplied with organic matter or mulched.

The flower petals are yellow tinged a reddish brown. They are more tempting to the nose than the eye. They appear chiefly in the summer but never in great quantities. The fruit turns yellow at maturity.

The shiny leaves are 4 to 6 inches long with tapered points and short petioles.

Seeds are usually used to start new plants, but the stems can also be layered, and cuttings rooted in closed structures with bottom heat.

***Bambusa multiplex* (Lour.) Raeusch.**
Hedge Bamboo (fig. 5)
Gramineae

This species has many leaf forms and ranges in height from 10 to 35 feet. All of the types find a place in landscaping. They are intermediate in size between the extremes found in bamboo. The giant types of clump bamboo are too large for all but the largest home grounds. Running bamboos should never be planted except where the rhizomes can be confined, otherwise, they will spread rapidly and become difficult to eliminate. The types of *Bambusa multiplex* are particularly useful in a medium-size lot. The Chinese Goddess can also be used in smaller sized grounds. The fernleaf types are best adapted to close trimming for hedges. Only one or two trimmings are required each year. All the forms are adapted to most soil types. Adequate water supply helps maintain a dark green foliage. Heavy fertilization may make a change in growth character of the fernleaf types.

Bamboos are cumbersome to propagate. The underground stem is usually divided, the base and roots of one stem, or culm, being set where the new plant is desired.

A more thorough discussion of bamboo culture and utilization can be found in Puerto Rico Circular No. 29, "Bamboo Culture and Utilization in Puerto Rico."

A brief description of several types is as follows:

Typical.—Height 35 feet; many side branches varying from 3 at a node at the base to 25 near the top; leaves 1.5 to 5 inches long, green above, silvery waxy with a bluish-tinge below; the sheaths or covers at each node persist for some time but eventually fall.

Silverstripe.—Similar to the type but has green culms and branches, and the leaves have yellow-white stripes.

Alphonse Karr.—Similar to the type but the culms are yellow with green stripes.

Willowy.—Differs from the type in having drooping leaves and branch tips. The culms are only 20 feet high and less than 1 inch in diameter. They are thin walled in the upper portion, but almost solid at the base.

Fernleaf.—The 22-foot culms seldom exceed 2 inches in diameter. The leaves are much smaller and more numerous than the type and are arranged in 2 ranks on opposite sides of the culm rather than being evenly distributed all around.

FIGURE 5, *A*.—*Bambusa multiplex* takes many forms. It is the most useful of all bamboos for general landscape use. *B*, Foliage: *a*, Chinese Goddess, *b*, normal foliage, and *c*, fernleaf type.

Stripestem-fernleaf.—Combines the yellow, green-striped culm character of Alphonse Karr with the small, two-ranked leaf character of fernleaf. The height is about 18 feet.

Silverstripe-fernleaf.—Combines the silver-striped, green culm character with the finer, more numerous leaves and the shorter culms of fernleaf.

Chinese Goddess.—This most dwarfed of the group is possibly a separate species. For landscape purposes it can be included here.

FIGURE 6.—The *Banisteriopsis cornifolia* has yellow flowers followed by red-winged fruit.

The height is only 10 to 11 feet. The culms are solid. The leaves are even smaller and more numerous than those of the fernleaf types, usually not exceeding 1 inch in length.

Banisteriopsis cornifolia (H.B.K.) C. B. Rob. (fig. 6)
Malpighiaceae

This little-known plant from tropical America was introduced through the U. S. Department of Agriculture as a possible source of insecticide. It has grown well in a moist clay soil reaching a height of 12 feet. The growth habit is upright but with considerable spread.

It is attractive in summer for the small yellow flowers which develop terminally and on short stalks from the axils of the upper leaves. These are followed by the fruit, with long wings whose color changes from a light pink to deep red as they mature.

The side veins of the opposite, leathery leaves curve toward the leaf tip.

Propagation is by seeds.

Barleria cristata L.
Bluebell Barleria, Philippine Violet
"Enana" (fig. 7)
Acanthaceae

The bluebell barleria is native to India, Malaysia, and the East Indies. It is a common ornamental in Central America, and is occasionally cultivated in many other tropical regions. The plants are 3 to 6 feet tall. They are used for medium and low hedges,

FIGURE 7.—The bluebell barleria, *Barleria cristata*, is a low shrub used chiefly for hedges and foundation planting. Blue is the most common color, but pink and white varieties are also grown.

holding their shape best if regularly sheared. Plantings around the base of buildings are brightened by the almost continuous flowering of this shrub. It tolerates a considerable range of soils and light conditions.

The blue, pink, or white flowers grow singly out of a pair of large axillary bracts whose margins are tipped by large stiff hairs. The 2- to 2.5-inch corolla consists of a slender funnel and 5 lobes, one wider and more deeply cut than the others.

The opposite leaves are 2 to 4 inches long on short petioles. The leaf surfaces and young stems have very short hairs more easily felt than seen. A pair of needle-shaped stipules nearly half an inch long arise at the base of each leaf.

Propagation is by soft stem cuttings or seeds when available.

FIGURE 8.—The railway fence, *Bauhinia pauletia*, has peculiar greenish flowers with petals reduced to short threads, and sepals twisted into a spiral.

***Bauhinia pauletia* Pers.**
Railway Fence
"Araña Gato" (fig. 8)
Leguminosae

This bauhinia occurs in Central and northern South America and in some of the West Indies. It is normally a long branched, spiny shrub but occasionally reaches the proportions of a small tree. It is useful as a barrier if pruned to increase branching. Otherwise, it serves as background material and as a floral oddity. It is capable of growing in arid regions, and thrives in full sunlight.

The flowers form on the ends of branches in the fall. The slender buds are 2.5 to 3.5 inches long. On opening the calyx splits along one side and then rolls into a spiral. The petals are reduced to mere

threads 2 to 3 inches long. The prominent stamens at first carry anthers over 1 inch long, but soon drop them. The pistil is darker green than the stamens and longer. It swells into a 9-inch flattened pod if fertilized.

The 2.5-inch leaflet pairs are more nearly united in this species than in any of the other bauhinias observed. Only the blunt, half-inch tips are separated. A pair of short, stout spines grow at the base of each half-inch petiole.

Propagation is by seeds.

Bauhinia petiolata **(Mutis) Triana (fig. 9)**
Leguminosae

The plants of this Colombian species are 3 to 7 feet tall. On heavy, water-retentive soils the growth is poor, but where better drainage permits adequate growth the plants are a welcome addition to the shrub border.

The flowering period begins with the rains, usually in May, and may last through August in Puerto Rico. The flowers of a cluster open one at a time so no mass of color develops. The buds are slender and pointed, the five slender petals spread to a diameter of 3 to 4 inches. The pods are 4 to 6 inches long. Even at maturity they remain slender.

The paired leaflets are fused only near the base, a characteristic of bauhinias. The twin tips are pointed. At the top of the 1-inch petiole is a short swelling extending into the blade where the four principal veins of each side originate.

Propagation is by seeds.

Beloperone guttata **T. S. Brandeg.**
Shrimp Plant (fig. 10)
Acanthaceae

The shrimp plant is one of the best plants for partial shade. A native of tropical America, it produces white flowers from under large showy bracts. These form in close ranks at the tip of branches and range in color from greenish yellow to bright pinkish red. These clusters remotely resemble shrimps, which indicates the origin of the common name. The plants are ½ to 3 feet tall and rather open in structure unless pruned regularly. They are also adapted to pot or window box culture.

The flowers are slender and short-lived. The principal attraction is the showy bract covering its base.

The opposite leaves are dull green, 2 to 5 inches long, and tapered at both ends. The stem is slightly four-angled and woody only at the base.

The cuttings from softer portion of the stem root readily.

Bixa orellana **L.**
Anatto
"Achiote" (fig. 11)
Bixaceae

The anatto is a native of tropical America now widely grown in the Tropics for the red seeds which are high in vitamin A and are

FIGURE 9, *A*.—The flower of *Bauhinia petiolata* is 3 to 4 inches in diameter. *B*, The creamy-white flowers of this shrub *Bauhinia* appear for several months after the rains begin.

FIGURE 10.—The flowers of *Beloperone guttata* are white, with purple markings, and protrude from bright-colored bracts. They are short-lived.

used as flavoring and coloring for foods. The plants eventually become trees, but this growth requires many years. They can be maintained as shrubs by occasional cutting. The anatto is usually not considered an ornamental, but it functions as such. During the fall the lavender-pink flowers appear. In the winter the ripening red burs are also attractive. The plants are useful in informal plantings and for backgrounds or screens. The roots will tolerate considerable soil moisture and also resist drought.

Only a few flowers in a head open at one time. The brown capsules are covered with soft spines and open at maturity to scatter the fine, red seeds.

The leaves are large with a broad base on long petioles.

Propagation is by seeds.

Bougainvillea
Bougainvillea
"Trinitarias" (fig. 12)
Nyctaginaceae

Two species of *Bougainvillea* are commonly grown in tropical gardens. *B. spectabilis* Willd. includes most of the red, pink, and coral varieties, whereas varieties of *B. glabra* Choisy are chiefly

FIGURE 11.—The anatto, *Bixa orellana*, has lavender-pink flowers followed by spiny, red capsules.

purple or white. Some varieties are apparently hybrids. They come from South Africa, and are grown chiefly for the three brilliantly colored bracts surrounding each flower cluster. In fact, most casual observers think that the bracts are the flowers. *B. spectabilis* is somewhat more woody and shrublike than *B. glabra*. Another species, *B. warszewiczii* Hort. blooms only in the spring and has large bracts. Bougainvilleas are easily grown and thrive in many soil types. The stout spines make penetration difficult when grown

as a hedge, although the branches require frequent shearings in order to keep the hedge attractive. In informal borders or for covering very steep hillsides they produce an effective and continuous color display. In the warmer sections of the Tropics, more profuse flowering is obtained at middle elevations.

The flowers are small, and trumpet-shaped, seldom reaching 1 inch in length or ⅓ inch in diameter. They are open for only a few days, while the bracts which surround the base of each flower cluster hold their color for weeks unless cut.

The leaves are 2 to 5 inches long and tapered at both ends.

FIGURE 12.—The white bougainvillea is flowering in the center of this circle. The purple variety on the outside is used for a border. There are royal palms in the background and a dwarf date to the left.

The medium-diameter stem sections make the best cuttings. Some people find better rooting if the cuttings are permitted to callus in very slightly dampened charcoal, peat, or similar material for a few days before placing in the propagating medium.

Breynia nivosa **(W. G. Smith) Small**
Synonym: ***Phyllanthus nivosus*** **W. G. Smith**
Snowbush Breynia
"Carnaval," "Nieve," "Nevado" (fig. 13)
Euphorbiaceae

The Pacific Islands have contributed this snowbush breynia to our supply of ornamental plants. It is grown in most tropical regions and is apparently adapted to many kinds of soil. If unpruned, it has an upright slender growth eventually reaching a height of 6 feet. Because of its slow growth rate, it is usually employed for

FIGURE 13.—The snowbush breynia, *Breynia nivosa*, is used extensively for foundation plantings and low hedges because the new leaves are almost white.

low hedges. A height of as little as 2 feet can be maintained without difficulty.

The flowers are insignificant from a landscape standpoint and are seldom seen in Puerto Rico.

The young leaves are so showy that at a distance they resemble flowers. The new growth is almost white. In some strains the white areas are variously freckled with pink. As the leaves become older they turn a uniform green and reach a length of 1 to 2 inches.

It is propagated from tip cuttings.

***Brunfelsia americana* L.**
Franciscan Raintree, Rain-Shrub (fig. 14, *B*)
"Aguacero," "Alhelí Falso," "Trompeta de Angel," "Tulipán Sencillo"
Solanaceae

This brunfelsia comes from the West Indies where it grows 6 to 10 feet tall. It is commonly grown for the fragrant flowers. The plants have a somewhat irregular form which can be improved by occasional pruning of over-vigorous branches. They grow best in full sun for at least part of the day. The roots are not exacting in their soil requirements.

The flowers appear in small terminal clusters. They are light yellow to creamy white in color and consist of a tube 3 to 6 inches long, with five wavy lobes at the top. The yellow, globose fruits have a diameter of about ½ inch.

FIGURE 14, *A*.—*Brunfelsia hopeana* is a twiggy shrub with purple-stained yellow flowers.

B.—The rain-shrub, *B. americana*, has white to creamy yellow flowers that are fragrant, especially at night.

The dark green, sharp-pointed leaves are closely spaced on the stems with short, winged petioles.

They can be grown from seeds or cuttings.

Brunfelsia hopeana **Benth.**
Manaca Raintree (fig. 14, *A*)
Solanaceae

The much-branched plants grow to 10 feet and are rather irregular in shape. The flowers are fragrant at night. For full enjoyment of the fragrance the plants should be located on the side of the house from which the night breezes blow.

The flowers appear throughout the year at the branch tips. The 2-inch corolla tubes are purplish yellow. The purple color extends up into the veins of the central part of the lower petal surfaces. Otherwise, the petals are a uniform yellow. The fruits are 0.6 to 0.8 inch in diameter with a prominent groove which indicates the separation of the two cells, each of which contains from 6 to 10 seeds.

The leaves are 2 to 3 inches long and half as wide. The leaf surfaces and very young stems are covered with fine, dense hairs. Propagation is by seeds.

Buddleia asiatica **Lour.**
Asian Buddleia, Asian Butterflybush (fig. 15, *A*)
Loganiaceae

This vigorous grower from the Far East reaches 7 feet but fails to set flowers near sea level in Puerto Rico. Its behavior at higher elevations in the Tropics is unknown. The leaves are whitish underneath and larger than those of *Buddleia davidi*. Its chief function under tropical lowland conditions is as a background for smaller flowering plants, but the silvery under-surface of the leaves attracts interest.

Plants are grown from cuttings.

Buddleia davidi **Franch.**
Synonym: *Buddleia variabilis* Hemsl.
Orange-eye Butterflybush, Summer Lilac (fig. 15, *B*)
Loganiaceae

One of the few Temperate Zone flowering shrubs which seems adapted to tropical lands is this species of *Buddleia*. It is a garden favorite in North America and Europe. Through breeding and selection there are now many horticultural varieties. It is free flowering even at sea level in Puerto Rico. The plants grow 6 to 8 feet tall with graceful curving branches. They are particularly well adapted to shrub borders as the arching branches hide the base.

FIGURE 15, *A*.—The Asian buddleia, *Buddleia asiatica*, does not flower in tropical lowlands, but the white stems and lower leaf surfaces attract considerable interest.

B.—The orange-eye butterflybush, *B. davidi*, will flower at lower elevations in the Tropics. In this variety the orange eye is very small.

Many flowers are clustered along the slender terminal spikes. The wild type is lilac with an orange-yellow throat. In the varieties the flowers differ in color and size. The orange-yellow throat may become more colorful or almost disappear. They are mildly and pleasantly fragrant. The fruits are slender and tapered at both ends.

The leaves are slender with fine marginal teeth, and are whitish on the under-surface.

Plants may be propagated by seeds or cuttings.

Byrsonima crassifolia **(L.) H.B.K.**
"Maricao Cimarrón" (fig. 16)
Malpighiaceae

The native home of this plant is in the lands near the Gulf of Mexico and the Caribbean Sea. It is common in Puerto Rico and some other West Indian islands. The plants are able to thrive on unproductive soil if drained. With fertilization and pruning they may become small trees but they usually function as shrubs. The main branches are nearly horizontal and create a layered appearance. Flowering continues for most of the year. The fruit, called "Nanche" in Mexico, is used there in soups or meat stuffings or is eaten raw. Another species, *Byrsonima spicata* (Cav.) DC., a common plant in Puerto Rico, also has edible fruits which are too acid for general popularity.

FIGURE 16.—In *Byrsonima crassifolia* the yellow-orange flowers are in slender terminal spikes.

The orange-yellow flowers form on slender, erect, terminal spikes, 4 to 8 inches long. The inner half of the petals are contracted to a slender filament. The round fruits are a half inch in diameter.

The variably shaped leaves are usually formed in whorls of three. Sometimes they are opposite. The base of the blade is more slender than the tip. The lower surface of the midvein and the young stems are covered by short brownish red hairs.

Seeds are used for propagation.

FIGURE 17.—The flowerfence, *Caesalpinia pulcherrima*, has orange-red or yellow flowers. The plants can grow in dry regions or close to the sea.

Caesalpinia pulcherrima (L.) Swartz.
Synonym: *Poinciana pulcherrima* L.
Flowerfence, Barbados Pride
"Clavellina" (fig. 17)
Leguminosae

The flowerfence is generally distributed in the Tropics, although the country of its origin is unknown. The common name refers to its use for fencing. The plants may reach 16 feet in height, but are more effective when pruned back occasionally. They are adapted to all sorts of soil and will withstand considerable dry weather. Since they will tolerate seashore conditions, they are particularly useful in locations near the ocean. They grow best in full sunlight. When planted close together and pruned when young to encourage branching, they form an effective fence. The branching is too open at the base for attractive hedging.

The long, terminal flower stem may carry flowers in all stages, from tiny buds at the tip to developing seed pods at the base. The flowers are a bright orange red with orange-yellow margins on the 4 large petals. The color changes to red as the flower ages. A completely yellow variety is also fairly common. The 10 stamens are more than twice the length of the petals. The seeds are carried in flattened pods 3 inches long and one-half inch wide.

The leaves are twice compound, with 10 to 16 pairs of leaflets on each branch of the leaf stem and 6 to 12 pairs of these branches in each leaf.

Seeds are used for propagation.

Calliandra inaequilatera Rusby (fig. 18, *A*)
Leguminosae

This species grows to a height of 5 to 6 feet with a spread almost twice as great. While all calliandras have an irregular form, this species is somewhat more uniform than the others described in this publication. It does not have the glossy dark-green foliage of *C. surinamensis* and some others, but is nevertheless attractive even when vegetative in the summer.

The axillary heads consist of 20 to 30 flowers whose chief attraction is the numerous red stamens. The small petals and sepals are hidden under the mass of stamens. The leaves divide about an inch from the stem. Each half carries 5 to 7 pairs of prominently veined leaflets that are not symmetrical. All parts of the leaf and young stem have a clothlike texture resulting from many, very short hairs.

It is grown from seed.

Calliandra marginata Griseb. (fig. 18, *B*)
Leguminosae

This calliandra comes from Venezuela and Trinidad. It differs from *C. surinamensis* in having shorter, all-pink flowers and a peculiar leaf form. It is a tall shrub, and, unless pruned occasionally, may become a small tree with age. It is most useful for background plantings.

FIGURE 18, *A*.—The red flowers of *Calliandra inaequilatera* are 2 to 2½ inches in diameter, appearing throughout the winter.

B.—The deep pink flower heads of the *C. marginata* are attractive against a green leafy background.

C.—The lavender and white flowers of the Surinam calliandra, *C. surinamensis*, are produced freely at irregular intervals throughout the year.

About 25 flowers in a head grow on 3-inch flower stalks from the leaf axils. The short sepals and petals are dark red, and serve

only as sheaths around the base of the stamen tube. The 1-inch stamens are bright scarlet, creating the chief flower color.

The leaves consist of a main stem which divides above a pair of small leaflets into two equal stems. Each branch is terminated by a much larger pair of incurved leaflets; the terminal leaflet is reduced to a small soft spine.

Propagation is by seed.

Calliandra surinamensis Benth.
Surinam Calliandra (fig. 18, *C*)
Leguminosae

As the name indicates, this calliandra is a native of northeastern South America. It is rarely found outside of its natural range. Plants reach a height of 10 feet in Puerto Rico. They are very open and irregular in form with long arching branches. The flowers form at the tips of spurs along the upper side of the stems. The plants should be used in naturalistic plantings where sufficient space is available. They will tolerate light shade.

The flowers occur in tight clusters on 1.5-inch flower stems. The small petals and sepals are yellow green. The showy part consists of the stamens which originate as a white tube, but soon separate and turn pink. All the flowers of a cluster open at the same time so they resemble a colored paint brush. They have a light fragrance which spreads rapidly and scents the surrounding area when the air is still. Only the central flower is fertile. It develops into a brown pod 2.5 inches long, widest near the tip, with a long tapering base. The pod margins are thickened.

The compound leaves are clustered on short spurs from the main stem. The leaves are branched near the base with 8 to 12 pairs of leaflets on each fork. They are wider near the tip and dark, shiny green above. The bark is light grey.

Seeds are used for propagation.

Calotropis procera (Ait.) R. Br.
Faftan Calotrope, Giant Milkweed
"Algodón de seda," "Bomba," "Mudar," "Tula" (fig. 19)
Asclepiadaceae

This Persian species is well established in many parts of the world. It grows wild in the driest parts of Puerto Rico and other islands of the Antilles, reaching a height of 9 to 12 feet. A close relative is used in India as a source of fiber and as a substitute for kàpok for use in stuffing pillows and mattresses. The branches are used for mulching.

The algodón de seda grows best in dry regions, but a specimen at Mayaguez receiving an average annual rainfall of 88 inches has made good growth. It can be used for informal shrub borders or background planting. Some low-growing plants located in front will hide the none too graceful base. The plants may suffer from aphid attack.

The flowers are lavender-purple, but a white variety is described. The fruits are green, 4 to 5 inches long, and contain many seeds, each with feathery, silky hairs to carry the seed in a wind. This

FIGURE 19.—The faftan calotrope is well established in many dry sections of Puerto Rico. The lavender flowers are displayed during most of the year.

plume is the reason for the Spanish common name which, translated, means silk-cotton.

The leaves are 4 to 8 inches long, blunt tipped, with two short lobes near the base. The under surface is covered with a waxlike substance. The fruit and stem contain a milky juice.

The seeds are used for propagation.

***Carissa edulis* Vahl**
Egyptian Carissa (fig. 20, *A*)
Apocynaceae

Carissa edulis is a good plant for barrier planting because of the sharp thorns. It is also useful as a source of fresh fruit even

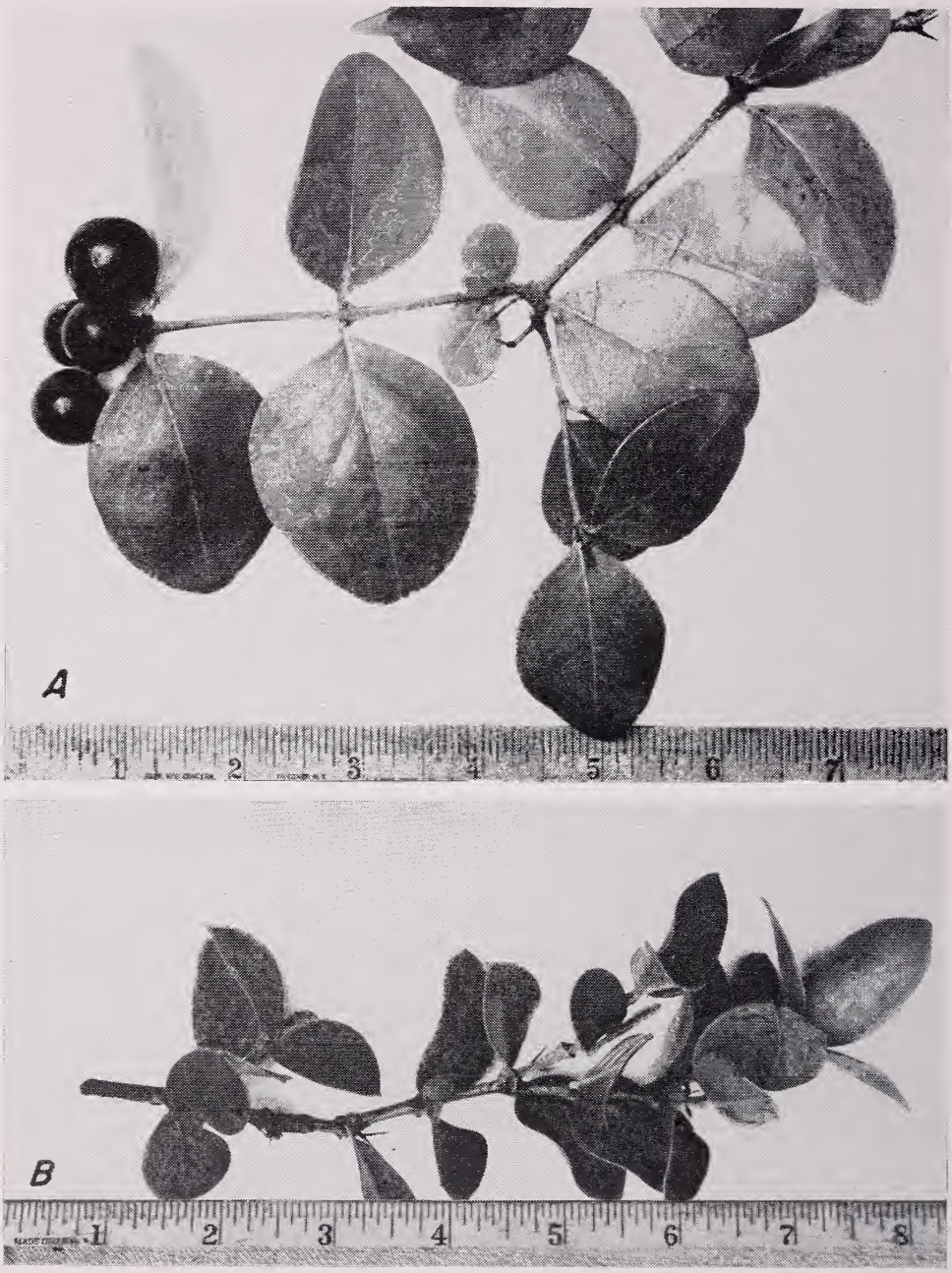

FIGURE 20, *A*.—The dark-blue fruits of *Carissa edulis* contain a milky juice. They are edible and not as sour as those of *C. grandiflora*.

B.—The Natal plum, *C. grandiflora*, has edible red fruits and sharp spines. The fruits turn red on ripening.

though the flesh contains a milky sap. The plants may grow to 12 feet or more. They tolerate considerable soil moisture and partial shade.

The small, white flowers, less than an inch in diameter, form in terminal clusters of 10 to 20. The spherical fruits, 0.5 to 0.8 inch in diameter, are dark blue with red-tinted flesh.

The opposite leaves, in some strains, are wide in proportion to their 2- to 3-inch length.

Propagation is by seed.

Carissa grandiflora DC.
Natal Plum (fig. 20, *B*)
Apocynaceae

As the common name implies, this species is a native of Africa. It is frequently used as living fences because the strong, sharp spines make the plants well suited for a barrier. Since the leaves hold well almost to the ground, and the plants tolerate clipping, they are also useful as an ornamental hedge.

The white corolla reaches a diameter of 2 inches at the top of its slender tube. Severe pruning may reduce the quantity of flowers produced. The fruits are red when mature, about 1.5 inches long, the shape of a small egg. They are useful in jams and jellies which resemble those made from cranberries; the fruits are generally too sour to be eaten raw.

The 1.5- to 2-inch leaves are thick and shiny with a sharp tip. They are attached to the stem between a pair of spines with little or no petiole.

Propagation is usually by seeds.

Cassia alata L.
Synonym: *Herpetica alata* Raf.
Ringworm Senna, Candle Bush
"Talántala," "Talantro" (fig. 21, *A*)
Leguminosae

A native of the West Indies and continental tropical America, the ringworm senna has been introduced into India, Ceylon, Burma, and other tropical regions of the Old World. It is a tall shrub occasionally becoming a small tree in the wild. The common name comes from the use of the leaves in treating skin diseases, particularly ringworm. It is a vigorous grower on many kinds of soil, thriving in full sunlight. Sand bars in rivers are a favored habitat of this species. The flowers appear during the late fall and winter. Even small plants will flower. If cut back each spring the plants are more attractive and more floriferous.

The flowers form on terminal spikes which resemble thick orange-yellow candles because of the yellow bracts which cover the buds and overlap those above until the flowers open. The sepals are deep yellow with smooth margins and fall soon after the flower opens. The petals are a lighter yellow with ruffled margins. The 4- to 6-inch pods have broad wings.

The 12- to 18-inch compound leaves have 6 to 12 pairs of oblong leaflets. The end pairs are larger and somewhat wider beyond the middle.

The seeds are used for propagation.

FIGURE 21, *A*.—The ringworm senna, *Cassia alata*, gets its common name from the use of the leaves in curing skin diseases. The yellow bud is covered by bracts that overlap those above so that the flower spike resembles a yellow candle. *B*.—The two-flowered cassia, *C. biflora*, is a tall rounded shrub with showy, yellow flowers.

FIGURE 22, *A*.—*Cestrum diurnum* is an upright grower. The trumpet-shaped white flowers and dark blue-black fruits are formed in long clusters.

B.—The dama de noche or nightblooming cestrum is valuable for its fragrance during the night. The greenish-white flowers are produced in abundance at irregular intervals.

Cassia biflora L.
Two-flowered Cassia (fig. 21, *B*)
Leguminosae

The two-flowered cassia is a native to northern South America and lower West Indies and is seldom seen elsewhere except in plant collections. The shrubs are 8 to 10 feet tall with rounded form. Plants grow well even in a clay soil with a high moisture content. Nearly full sun appears favorable.

Flowering begins in the fall and continues until spring. The yellow flowers make a good display and are eagerly sought by honey bees. The pods at first are thin and narrow, but later reach a width of almost 1 inch.

The leaves consist of 6 to 10 pairs of leaflets with a spurlike gland at the base of the lowest pair. In dry periods the leaves may fall.

Seeds are used for propagation.

Cestrum diurnum L.
Day Cestrum, Day-Jessamine
"Dama de Día" (fig. 22, *A*)
Solanaceae

This attractive cestrum has large numbers of creamy-white flowers. The growth is upright, reaching 12 to 14 feet. This species is not only fragrant but attractive, both for the masses of white flowers and for the clusters of blue-black fruits. It is suited to screening because of its rapid growth.

Flower stems develop in the axils of the leaves and carry the flowers in clusters on short side branches. The half-inch corolla tubes and curled-back lobes resemble miniature trumpets. The green spot in the center of the flower is the stigma surrounded by five brown stamen dots. Many black oval fruits follow the flowers in the fall.

The shiny foliage is attractive. The leaves are 4 to 5 inches long with petioles less than a half inch.

Seeds are the easiest means of propagation.

Cestrum nocturnum L.
Nightblooming Cestrum, Lady-of-the-Night
"Dama de Noche" (fig. 22, *B*)
Solanaceae

Probably the best known cestrum is the dama de noche or *Cestrum nocturnum* which is cultivated because the flowers are intensely fragrant at night. They are neither large nor beautiful and the plants tend to be irregular in form. So the plants should be located in an inconspicuous position.

The slender, tubular flowers are 1 inch in length with short corolla lobes which seldom curl back like those of the day cestrum. The fruits are white in contrast to black-fruited day cestrum. They are a favorite food of birds. Seeds distributed by this means may result in occasional "weed" plants. Some other native cestrums have similar flowers but blue-black seeds.

The 3-inch leaves are frequently chewed by insects.
Propagation is by seed.

Chrysobalanus icaco L.
Icaco Cocoplum
"Hicaco," "Icaco," "Jicaco" (fig. 23)
Rosaceae

The icaco cocoplum is common in many parts of the western tropics. It occasionally becomes a tree but far more frequently remains a shrub from 3 to 8 feet high, whose lower leaves extend downward to the ground. It grows equally well in almost pure beach sand and heavy clay, and is particularly useful in poor soils where more showy plants will not survive.

FIGURE 23.—*Chrysobalanus icaco* is a spreading, low shrub which grows wild in many sections.

The white flowers are not significant in the landscape, but the fruits are both ornamental and edible. Several varieties are distinguished for their fruit color—one has dark-blue, olive-shaped fruits; another has larger, reddish, and more rounded ones; and a third has creamy white fruits. The seeds of the white-fruited variety are said to be roasted as a nut.

The opposite leaves are glossy and smooth, with very short petioles.

Propagation is by seeds or division.

Cipadessa baccifera (Roth) Miq. (fig. 24)
Meliaceae

This plant was introduced from Yung Hsien, China, by explorers of the U. S. Department of Agriculture, where it was found growing at an elevation of 6,000 feet. It has grown well in south

FIGURE 24, *A*.—The fruits of *Cipadessa baccifera* appear in long clusters from the leaf axils. *B*, The irregularly shaped shrub grows to a height of 9 feet.

Florida and also in Puerto Rico near sea level in a heavy clay as well as at 600 feet elevation in a well-drained soil. It is a much branched, irregularly shaped shrub growing to a height of 9 feet with an even wider spread. The small flowers are creamy white and not important for their ornamental effect. Clusters of fruits in different stages of maturity appear along the stem throughout the year. They are green at first, changing to red and ripening a very dark blue or black.

The leaves are compound, consisting of a central leaf stem, a terminal leaflet, and 3 to 4 pairs of lateral leaflets. Fine hairs, more easily felt than seen, cover all parts of the leaf.

Plants can be grown from the abundant seeds.

Clerodendrum fragrans Vent.
Fragrant Glorybower, Wild Jasmine
"Flor de Muerto," "Jazmín Hediondo" (fig. 25, *D*)
Verbenaceae

China and Japan are the original home of this clerodendrum, but the plant has become naturalized after introduction in the West Indies, Florida, Ceylon, and other tropical regions. In rich soils it becomes a mild weed. The plants vary in height from 2 to 5 feet. The taller plants grow in moist, shady locations, but good specimens develop in full sun. In Puerto Rico they are often planted in cemeteries. This use resulted in the Spanish common name, "flor de muerto," or flower of the dead. The flowers are mildly fragrant and appear throughout most of the year. Since it grows without attention and is tolerant of both sun, shade, and wet soils, this species deserves more attention in landscape planting.

The compact, fragrant flower heads are hemispherical, 3 to 4 inches in diameter, and contain 15 to 30 flowers. They are usually double, up to 1 inch in diameter, and resemble little roses. The petals open white and later become flushed with pink. The bluish to pink sepals remain conspicuous after the petals have fallen.

The leaves reach 1 foot, and are coarsely toothed, on long petioles.

It is propagated by suckers, which are produced in abundance.

Clerodendrum indicum (L.) Kuntze
Synonyms: *Siphonanthus indicus* L., *Clerodendron siphonanthus* R. Br.
Tubeflower, Turk's Turban (fig. 25, *A*)
Verbenaceae

A native of Ceylon, the tubeflower is grown in India, Hawaii, and occasionally elsewhere. It is reported to be hardy in Florida.

It is a very open shrub reaching 10 feet in height. The form is quite irregular unless pruned during early growth to induce branching. The plants are best suited to informal designs or for planting behind shorter shrubs which hide the base. They can also be used in front of light-colored walls to accentuate the long slender branches.

The flowers are borne terminally and in the axils of the upper leaves. The slender, creamy-white, hanging tubes are 3 to 4 inches

long expanding into 5 lobes of the same color, with a spread of 1.5 inches. The flowers are effective in bud and hang on for quite a while; nearly a hundred may cover the tip of each branch. The fruits also are showy, consisting of a persistent dark red or purple berry.

The leaves are usually in whorls of three or four reaching a length of 8 inches. The tips are slender and drawn out. The upper surface is dark green except for a yellow-green midrib.

Propagation is by seed.

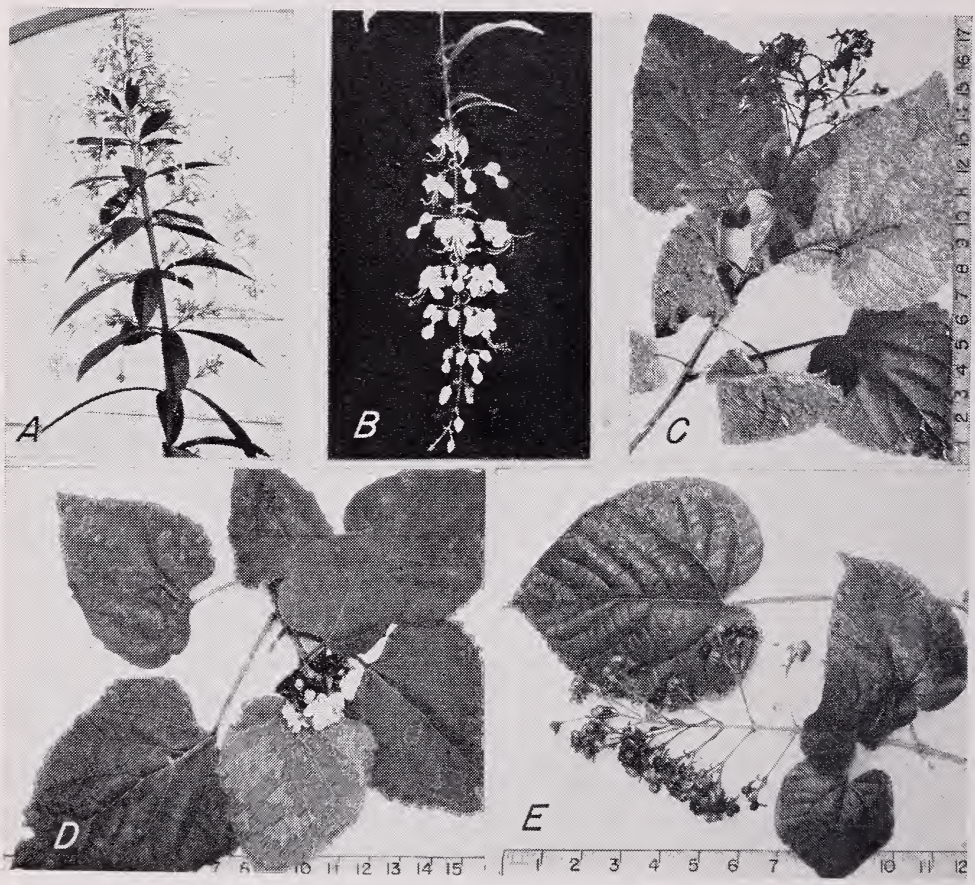

FIGURE 25, *A*.—The tubeflower, *Clerodendrum indicum*, has long creamy-white flowers in long heads. The stems are long with few branches.

B.—*C. nutans* flowers in long drooping panicles.

C.—The bright scarlet flowers of *C. speciosissimum* are showy throughout most of the year.

D.—The fragrant glorybower, *C. fragrans*, flowers profusely during most of the year. The flowers resemble little double roses, white at first, later flushing pink.

E.—The sepals of *C. japonicum* persist with the ripening fruit. Their rich red color contrasts well with the blue of the fruit.

Clerodendrum japonicum (Thunb.) Sweet
Synonym: *Clerodendron squamatum* Vahl
Japanese Glorybower (fig. 25, *E*)
Verbenaceae

This bright scarlet-flowered shrub comes from China or Japan and grows to a height of 6 to 10 feet. It is similar to *Clerodendrum speciosissimum,* but that species has a dense hairy cover on the leaves, petioles, and young stems, and the flowers may also be somewhat longer. The leaf blades of *C. japonicum* have larger basal lobes which sometimes almost touch below the petioles. The scarlet sepals persist after flowering and make a pleasing color contrast with the ripening blue fruit. The plants become straggly with age and should be cut nearly to the ground after the fruits mature. They are somewhat bothered by scales and chewing insects.

The flowers grow in many flowered heads with a pair of bracts at the base of each branch of the flower stems. The scarlet, 1-inch flowers appear during the early part of the rainy season. They are followed by 2- to 4-lobed fruit, depending on the number of seeds maturing. Their color is green at first, changing to light blue which deepens with maturity.

The heart-shaped leaves are carried on petioles longer than the blades when fully grown. The surfaces are practically hairless.

Seeds are used for propagation.

Clerodendrum nutans Wall.
Synonym: *C. jackianum* Wall.
Weeping Clerodendron (fig. 25, *B*)
Verbenaceae

A native of Assam and adjacent regions, *Clerodendrum nutans* is sparingly cultivated in a few other tropical countries. It is a beautiful plant which grows to a height of 6 feet. A well-formed plant is nearly circular, with drooping stem tips that end in long, drooping flower clusters. The plants tolerate moderate shade, but flower more freely in light shade or in the open. They are useful in several ways but are most effective in small groupings. They may also be grown in large pots.

The terminal, pendulant flower heads are often more than a foot long with up to a dozen flowers open at a time. Flowering occurs chiefly in September and October in Puerto Rico. The flowers are quite irregular. The flower diameter is less than an inch but the stamens are more than twice the length of the longest petals.

The opposite, dark-green leaves are slender with long tapered tips. The margins extend along the petiole to the square stem.

Plants are grown from seeds or cuttings.

Clerodendrum speciosissimum Van Geert
Synonym: *Clerodendron fallax* Lindl.
Java Glorybower
"Coral," "Tripa de Coral," "Santo Domingo" (fig. 25, *C*)
Verbenaceae

The Java glorybower is rather common in some tropical regions. It is occasionally seen in the gardens of Puerto Rico from sea level

to at least 1,500 feet elevation. It grows in sun or light shade and reaches a height of 6 feet. The chief attraction is the bright scarlet flowers which are produced during most of the year if the plants are not trimmed. It can be used as a center of interest in the landscape plan. It is one of the best of the shrub clerodendrums.

FIGURE 26.—An infinite combination of leaf shapes and color can be found among the crotons. *A*, Used for foundation planting. *B*, Individual leaves from various varieties.

The flowers occur in large numbers on loose terminal clusters that are often a foot long. In Puerto Rico the tubes are usually split down the side by insects in search of nectar. New buds continue to form at the tip of the flower head after the lower flowers have withered.

The opposite leaves are almost round and may reach 1 foot in length. The petioles may be even longer. The square, young branches, leaf stems, and leaf blades are covered with hairs.

This clerodendrum is usually propagated by cuttings.

***Codiaeum variegatum* (L.) Blume**
Croton
"Periqueto" (fig. 26)
Euphorbiaceae

Crotons have been widely cultivated for many years. By selection from the natural variation common in this species, many forms or horticultural varieties are now available. These vary in leaf color from solid greens, yellows, and reds to many combinations in variegated patterns. The leaf form may be narrow, or wide and flat, or twisted, and the margins may be smooth or variously lobed. The classification and description of the many varieties is beyond the scope of this publication. Good growth occurs in both sandy and clay soils if sufficiently drained. The plants make excellent hedges because they are tolerant of moderate pruning and are not particularly fast growers. Foundation plantings and shrub borders also benefit from occasional pruning to maintain good form and are enlivened by the color of the croton leaves. Because of the year-round coloring they are one of the most common tropical ornamentals.

The flower heads are infrequent and consist of small white balls less than a half inch in diameter on slender stems.

The plants root fairly easily from cuttings.

***Coffea arabica* L.**
Arabian Coffee
"Café" (fig. 27)
Rubiaceae

Coffee is one of the most important economic crops of the Tropics, yet the flowers are so fragrant and the fruit so colorful that it also justifies a place as an ornamental in tropical landscaping. It has been cultivated for so long that its original home is difficult to determine. In warmer regions of the Tropics it is confined to medium and higher elevations, but further from the Equator it can be grown down to sea level. There are many varieties of coffee, which differ not only in the taste but also in plant size, tolerance of light intensity, and amount of fruit. Most coffees can stand considerable pruning. Arabian coffee is generally more productive under some shade, but excessive shade will reduce flowering and fruiting. Coffee plants as ornamentals are most effective under tall, open trees and should not be crowded for best flowering.

FIGURE 27.—The fruit of the Arabian coffee, *Coffea arabica*, is green at first but ripens to red in the fall.

The white flowers are formed in tight clusters close to the branches. In Puerto Rico they appear in flushes several times during the spring. Each flush lasts from 3 to 5 days. The interval between flushes depends on the moisture content of the soil and varies from 2 to 4 weeks. The fruits are berries 0.6 to 0.8 inch long which are at first green but ripen to a dark red. The flesh is thin, most of the interior consisting of a pair of seeds from which, after processing, the coffee beans are prepared. The opposite leaves are 3 to 5 inches long, slender pointed, and glossy.

Coffee is commonly propagated from seed.

***Cordia serrata* Juss.**
Sawtooth Cordia
"Bombón Capitán," Haitan name "Fluer Dent" (fig. 28)
Boraginaceae

This species was obtained from Haiti; its home and range are unknown. A tall shrub, the sawtooth cordia may eventually make a small tree. It is not adapted to close shearing or pruning, but can be maintained under 12 feet by occasional heading back. It can be used as a specimen or even grouped in large areas. The spacing should not be closer than 30 feet. Good soil drainage and full sun are preferred.

The 1-inch flowers grow in tight clusters on a slender common stem 2 to 3 inches long. They consist of a white slender tube and a circle of white lobes connected about half the distance to the wavy margins. The fruits are composed of four lobes fused at the base which ripen a bright red color.

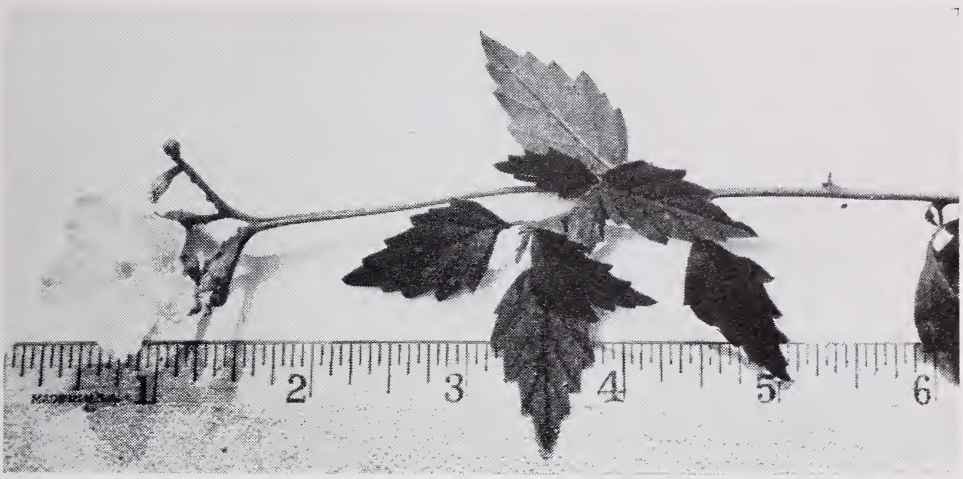

FIGURE 28.—The sawtooth cordia, *Cordia serrata*, is covered with a mass of white flowers followed by bright red fruit.

The leaves seldom exceed 3 inches and have toothed margins, the teeth pointing toward the tip. The petioles are characteristically curved and thickened at the base. There are occasional spines on the stems.

Propagation is by seed.

Dombeya natalensis **Sond.**
Weddingflower Dombeya (fig. 29)
Sterculiaceae

This dombeya is a winter-blooming shrub from South Africa which reaches a height of 10 feet. The plants appear best in background groups since the old, brown flowers cling to the branches and detract from the appearance of the shrubs. Dombeyas tolerate considerable soil moisture. They thrive in full sunlight; even a light shade reduces their growth and flowering. The plants are highly susceptible to attack by ground termites.

Pure white and light- and dark-pink-flowered varieties are grown. The axillary heads carry 6 to 12 flowers that open almost at the same time. Short, velvety hairs cover the leaves, young stems, and all flower parts except the petals. The heart-shaped leaves on 3-inch petioles are more or less lobed with slender tips and toothed margins.

Propagation is from seed.

Dovyalis caffra **(Hook. & Harv.) Warb.**
Synonyms: *Doryalis caffra* (Hook. & Harv.) Warb., *Aberia caffra* Hook. & Harv.
Umkokolo, Kei-apple (fig. 30, *A*)
Flacourtiaceae

This plant is known as kei-apple in its home in southwestern Australia. Perhaps it should be considered more as a subtropical than as a truly tropical species as it grows best in the cooler parts of the Tropics, or at elevations of 2,000 feet or more in warmer

FIGURE 29.—The flowers of *Dombeya natalensis* form in axillary clusters at the tip of a common stem longer than the petioles. There is a pair of slender, needlelike bracts below the flowers.

sections. The plants may grow to a height of 14 feet. They carry strong spines up to 3 inches long. A barrier fence of these plants is almost impenetrable, but the shrubs should be headed back frequently when young to encourage low branching.

Plants in partial shade flower sparingly. High rainfall and wet soils are also thought by some to retard or inhibit flowering. The flowers are small and insignificant for ornament. The fruit is very acid but can be used for preserves when liberally sweetened.

FIGURE 30, *A*.—The kei-apple or umkokolo, *Dovyalis caffra*, is a large shrub which is better suited to higher elevation in the Tropics.

B.—The kitembilla, *D. hebecarpa*, is a tall wide-spreading shrub. *a*, *A* branch with ripe fruit; *b*, a branch carrying female flowers; and *c*, male flowers produced on separate plants.

The leaves are dark green, up to 3 inches long, and are widest near the tips where there is a minute notch. They form singly or on short spurs along the stem. The smooth-barked stems may bend slightly away from the spine at each node.

Plants are grown from seed.

Dovyalis hebecarpa (Gardn.) Warb.
Synonym: *Aberia gardneri* Clos.
Kitembilla, Ceylon-Gooseberry (fig. 30, *B*)
Flacourtiaceae

The kitembilla is a native of Ceylon. It is occasionally cultivated in other tropical regions primarily for its fruit which is high in pectin and useful in making preserves. The flavor is rated too strong for fresh consumption by most people. The plants are useful for background planting, growing to a height of 15 feet. They have long spreading branches when mature which cover almost twice the height of the shrubs. A planting of lower shrubs may be desirable to cover the exposed, gray-barked stems.

The male and female flowers appear on separate plants. Both kinds are too small for ornamental interest. The fruits are spherical but slightly flattened, approaching a diameter of 1 inch. The color is dark purple when ripe with a velvety surface resulting from many fine short hairs.

The leaves are 2 to 4 inches long on petioles not exceeding a half inch. Both surfaces are covered by very fine hairs. The side veins branch from the midvein at a narrow angle and curve toward the slender pointed tip.

Propagation is easiest from seeds. Superior strains may be grafted or cuttings rooted, although the percentage "take" is not high.

Dracaena godseffiana Hort. (fig. 31)

Of the many dracaenas in cultivation, this species is one of the few with a shrubby habit, quite different from the large-leaved, thick-stemmed dracaenas most commonly grown. It is adapted to medium or light shade. The plants reach a height of 8 to 10 feet.

They flower in winter but the light-green color of the corolla attracts little attention. They are grouped in threes in a terminal flower head of 20 to 30 flowers each 1 inch long.

The leaves have parallel veins with smooth margins. The irregularly shaped, rounded, whitish dots are distributed over the entire leaf surface but are somewhat more dense in the center.

Propagation is by cuttings.

Duranta repens L.
Synonyms: *D. plumieri* Jacq., *D. ellisia* Jacq.
Pigeon-berry, Skyflower (fig. 32)
"Azotacaballo," "Lila," "Lluvia," "Cuentas de Oro"
Verbenaceae

This duranta grows wild in Florida, the West Indies, and parts of northeastern South America. It is used in gardens in many parts of the Tropics because it is an attractive ornamental. In India it is recommended for planting between 2,000 and 4,000 feet elevation, while in the West Indies the plants grow well down to sea level. The habit of growth is spherical or wider than high. It occasionally reaches the proportions of a small tree, but is easily restrained by pruning. In fact, it is recommended for hedges and

living fences in India because of its occasional spines. The plants are rather free flowering in favored locations and the orange, beadlike fruits are an additional attraction. The plants are tolerant of many soil conditions, but grow poorly when shaded.

FIGURE 31.—The white mottling on the leaves of *Dracaena godseffiana* accents a location where this species is growing.

FIGURE 32.—The white or violet flowers and orange fruit makes *Duranta repens* a valuable plant for sunny locations. *A*, Close-up of flowers and fruit. *B*, A large plant growing in a home ground.

The wild type has lilac-colored flowers. There is also a cultivated white variety. The half-inch flowers form on slender spikes from the leaf axils near the branch tips. The tubes are short, opening into five rounded, slightly frilled lobes. The fruits are 0.6 inch long with persistent sepals at the flower end and contain a single seed.

The leaves are variable in form, seldom exceeding 2 inches in length, but are sometimes almost as wide as long. The margins are occasionally slightly toothed near the tip. The stems are spiny or unarmed depending on the strain.

Plants may be grown from seed or cuttings.

Ehretia microphylla Lam.
Philippine Tea, Falsetea Ehretia (fig. 33)
Boraginaceae

This ehretia reaches a height of 14 feet. Long arching branches give a somewhat irregular appearance. A more uniform growth can be obtained by occasional pruning. The plants at Mayaguez grow in heavy soils with a high moisture content. They flower throughout the year but the flowers and fruits are of insufficient size and profusion to create much of a landscape effect. They function best in a background planting but can also be used for specimens.

The ¼ inch, pinkish-white flowers occur in short clusters from spurs or along side branches. The spherical fruits, less than ¼ inch in diameter, turn from green to red and finally dark blue as they ripen. There is a hard, nutlike seed beneath a thin succulent layer which the birds enjoy.

The leaf margins are smooth; the blades are 1½ to 2½ inches long, on very short petioles. The leaves are clustered at the tips of branches and spurs. On drying they turn a dark brown with minute dots over their upper surface. Both the leaves and flowers are subject to attacks by several insects, particularly green aphids.

Plants are grown from seed.

Erythrina crista-galli L. var. *nana*
Cockspur Coralbean (fig. 34)
Leguminosae

This erythrina is a native of Brazil. While the typical plants of the species become small trees, a dwarf variety, *nana,* remains shrubby. These plants are sprawling shrubs sometimes twice as wide as high. They grow well in full sun but in shade are more irregular. They are adapted to informal shrub borders.

The brilliant crimson flowers grow in groups of three along the upper part of the stem. They are 1 to 1.3 inches long on slender stalks of the same length. The 4- to 6-inch pods are deeply constricted between seeds.

The leaves consist of three leaflets 3 to 4 inches long. Sometimes a small thorn is found about midway along the lower midvein of the leaflet and on the petiole. Thorns are also distributed along the stems.

Propagation is by seed. Cuttings taken with a heel will root.

FIGURE 33.—*A*, *Ehretia microphylla* is a tall, irregularly shaped shrub. It has white flowers and small clusters of fruit, *B*, which turn from green to red and finally blue-black on ripening.

FIGURE 34.—The dwarf cockspur coralbean is a spreading shrub with crimson flowers.

***Euphorbia co tinifolia* L.**
Synonyms: *Aklema petiolare* (Sims.) Millsp., *Euphorbia sanguinea* Hort.
"Carrasco," "Muerte" (fig. 35)
Euphorbiaceae

This plant is grown for its colored leaves and makes a good background plant. Its growth is tall and slender unless pruned to force branching. It seldom flowers and then only in December or January. The flowers are greenish white on terminal heads. They are 0.2 to 0.3 inch in diameter with appendages reduced to narrow, minutely toothed fringes.

FIGURE 35.—The leaves of *Euphorbia cotinifolia* are bluish-red on top and have more color in full sun. The flat-faced flowers are greenish-white and appear only in winter.

THE MILKY SAP IS POISONOUS, SOMETIMES CAUSING BLINDNESS IF SPLATTERED IN THE EYES, AND SHOULD BE HANDLED WITH CAUTION PARTICULARLY IF THERE ARE CHILDREN IN THE FAMILY.

The leaves are in whorls of three and show various shades of red on the upper surface, depending on the amount of sunlight, whereas the lower surface is a velvety white. The petioles are longer than the blades and may reach a length of 4 inches. They are also deeply colored. The 3-inch blades are wider near the base and taper to a blunt tip with bright red midveins. The stems are thickened at the nodes with a pair of small glands between each leaf in the whorl.

Plants are grown from cuttings.

***Euphorbia milii* C. Des Monl.**
Synonyms: *Euphorbia splendens* Bojer, *Sterigmanhe splendens* Kl. Garcke
Crown of Thorns
"Corona de Cristo," "Corona de espinas" (fig. 36)
Euphorbiaceae

The crown of thorns originally came from Madagascar, but is now grown in many parts of the Tropics. The common name comes from a legend that this plant was used to make Christ's crown. According to the story, the flowers, formerly white, have been red ever since the first Good Friday. The plants are low growing, sel-

FIGURE 36.—The bright red flowers of the crown of thorns, *Euphorbia milii*, appear throughout the year. They contrast well with the bright green foliage.

dom exceeding 3 feet. A hedge of this species makes a low but effective barrier because of the numerous spines. It is well adapted to planting under windows as the plants remain low. This species covers poor, rocky soil, and resists considerable drought.

The true flowers are insignificant for display but a pair of wide, bright-red-colored, waxy bracts encircle the flower and carry out the usual function of petals. The flowers grow in small clusters on flower stems up to 3 inches long that originate near the branch tips.

The leaves grow in clusters along the stem and reach a length of about 1 inch. They are wider near the tip, bright green, and rather thin. The spines are 0.5 to 0.7 inch long, often well hidden in the leaves.

Plants are propagated by cuttings.

Euphorbia pulcherrima Willd.
Synonyms: *E. poinsettiana* Buist, *Poinsettia pulcherrima* R. Grah.
Poinsettia (fig. 37)
"Flor de Pascua"
Euphorbiaceae

The poinsettia is a native of Central America and southern Mexico. It is grown as a pot plant in greenhouses in the Temperate Zone and in the open in many regions which seldom experience frost. The plants, which prefer full sun, may exceed a height of 12 feet, although most of them are smaller; they are adapted to both mass and specimen planting. The roots are easily damaged by poor drainage. In dry seasons they go dormant until the soil is moistened. The stems seldom branch, but smaller, more compact plants may be developed by pinching off the tips of the new spring growth to encourage branching and greater flower production. After flowering the tops should be cut back severely.

The true flowers are small, orange structures close to the branch. The bracts, or modified leaves, carry the color and are usually considered as part of the flower. A number of varieties are colored red, pink, or white, and several bract forms include a so-called double variety. Poinsettias normally begin to flower in November and may last until March.

The leaves are quite variable in size and shape.

The plants are grown from cuttings or air layers.

Excoecaria cochinchinensis Lour.
Synonym: *E. bicolor* Hassk. (fig. 38)
Euphorbiaceae

This native of Java is also naturalized in Burma. The plants are cultivated in India, Egypt, and some other warmer sections of the world for the unusual color of the under surface of the leaves. Under Mayaguez conditions, *E. cochinchinensis* is a slow grower that is easily restricted in height. It does not thrive in heavy, wet soils.

MANY SPECIES OF *EXCOECARIA* CONTAIN A POISONOUS MILKY SAP THAT IS SEVERELY IRRITATING TO THE SKIN AND CAN CAUSE SERIOUS TROUBLE IF SPATTERED INTO THE EYE.

FIGURE 37.—*A*, The true flowers of the poinsettia, *Euphorbia pulcherrima*, are small and yellow at the base of the colored bracts. A white variety is illustrated as the more common red varieties do not photograph well. *B*, The poinsettia supplies a mass of color during the winter months and a green background for summer flowers.

The flowers form directly in the leaf axils near the branch tips. They are barely visible in the accompanying illustration. Fruits are rare in Puerto Rico.

FIGURE 38.—*Excoecaria cochinchinensis* has leaves colored bronze-red on the lower surface. The flowers at the tip of the branch are insignificant for ornamental purposes.

The 3- to 5-inch leaves are finely toothed on the margins and terminate in a slender tip. The upper surface is green, or yellow-green in full sun, whereas the under surface is bronze-red.

Propagation is by stem cuttings.

***Flacourtia indica* (Burm. f.) Merr.**
Synonym: *Flacourtia ramontchi* L'Her.
Governor's Plum, Ramontchi (fig. 39)
Flacourtiaceae

This species is a native of Madagascar occasionally grown for its edible fruit and as an ornamental in the warmer sections of the world. It is a slow grower but will eventually become a small tree if unrestrained. However, it develops a bushy character for many years even without much pruning. It can be used for medium and tall hedges and live fencing, and will tolerate medium shade.

The small yellowish flowers are insignificant as landscape decorations. The fruits ripen in the fall and darken as they mature from red to almost black. Various strains differ in the acidity of the fruit, and in size from 0.6 to 1 inch in diameter.

FIGURE 39.—The governor's plum, *Flacourtia indica*, has pleasant-tasting as well as ornamental fruit.

The leaves are alternate on the stem and closely spaced. The margins have fine to very fine teeth. Spines are found on the stems of some strains.

Propagation is by seed.

Gardenia grandiflora Lour.
Large-flowered Gardenia (fig. 40)
Rubiaceae

This species seems to be closely related to *Gardenia thunbergiana*, but grows taller and has larger flowers. It is reported grown as a stock for the double-flowered gardenias because it is resistant to nematode infections which prevent satisfactory growth of *G. jasminoides* and related species on many sandy soils. The plants grow well on heavy soils also. They reach a height of 12 to 14 feet with a generally upright, slender form. Older plants, or those in moist soil may have longer drooping side branches. They make excellent screens and background plantings because the shiny, green leaves are attractive at all seasons.

The individual terminal flowers are white with a 6-inch tube from which a single whorl of 8 to 10 slender lobes radiate, with a spread of 4 to 6 inches. The calyx may be malformed consisting

FIGURE 40.—*Gardenia grandiflora* is a tall, upright shrub, *A*. The tubular flowers, *B*, are frequently 6 inches long and the fruits need 2 years or more to ripen.

of an irregularly toothed sheath around the base of the tube. Flowering in Puerto Rico begins in May and continues as late as July or August depending on the season. Flowers do not appear continuously during this period but in flushes every 2 or 3 weeks. Usually those in June or early July are most floriferous. The 2-inch fruits are egg-shaped with a circular flower scar at the blossom end. They are hard and greenish grey with minute dots on the surface. It requires 2 years or more for the seeds to mature.

The opposite or whorled leaves are 3 to 5 inches long. The veins are prominent with a small gland in the axil of each side vein.

Plants are grown from seed.

Gardenia jasminoides Ellis.
Cape-Jasmine
"Jazmín," "Tulipa" (fig. 41, *A*)
Rubiaceae

This is probably the best known of all the gardenias, having been grown for centuries in many parts of the world. Plants reach a height of 6 or 7 feet and are usually upright in growth. Most of the plants grown in Puerto Rico flower only for 1 to 2 months at the beginning of the rainy season. Even the so-called perpetual-flowering varieties are highly seasonal under lowland Puerto Rican conditions. At higher elevations the season is longer. They can be used for hedges although they are grown chiefly as a source of cut flowers. The habit of growth is somewhat irregular unless pruned. They prefer a well-drained, somewhat acid soil, high in organic matter, and a lightly or partially shaded situation.

The flowers are solitary on the ends of short side branches, and are usually double, ranging from 2½ to 4 inches or more in diameter. They are white, fragrant, and useful in flower arrangements, corsages, and other forms of personal adornment.

The leaves are opposite, dark green, and glossy.

The plants are grown from cuttings which are not easily rooted, but the majority will eventually develop roots if carefully firmed and watered.

Gardenia posoquerioides S. Moore (fig. 41, *B*)
Rubiaceae

This gardenia was collected in the Mount Silinda forest of Southern Rhodesia and brought to the Western Hemisphere by the U. S. Department of Agriculture. Records show that the plants had a tendency to climb in shaded locations but remained shrubby in the open. In Mayaguez, the plants are always shrubs even in shaded locations. They are very slow growers in poorly drained soils or where deeply shaded. A maximum height of 6 feet and about the same width have been recorded. They are adapted to mixed plantings such as a shrub border.

The flowers appear in July. The tube is 5 to 6 inches long while the six lobes spread to an equal diameter. Only the tips of the very large anthers are visible, but they are actually almost an inch long

FIGURE 41, *A*.—The most common landscape *Gardenia* is *G. jasminoides* which flowers from May to July.

B.—*G. posoquerioides* is a low, much-branched shrub which flowers in July and August in Puerto Rico.

and attached directly to the tube. The flowers resemble *Gardenia grandiflora* but the six petals are longer.

The 4- to 6-inch leaves are bright green and shiny with an uneven surface. The bark is light gray.

Propagation is by cuttings.

Gmelina elliptica J. E. Smith (fig. 42)
Verbenaceae

This plant is widely used medicinally in India and Ceylon, the native home of the *Gmelina*. It is a tall shrub spreading to almost twice its 15-foot height. In the young stages it is quite spiny but the spines are practically lost when the plants reach maturity. Flowers and fruits appear during most of the year. Because of its spreading nature it should be used only in places permitting sufficient spread in all directions. It can be grown in light shade but has better form in full sunlight. The plants are adapted to regions of relatively high rainfall and grow well in a heavy clay soil. If pruned or sheared frequently, when small, a hedge can be maintained. It should be pruned wider than most hedges, especially at the base, in order to hold the foliage near the ground.

FIGURE 42.—*Gmelina elliptica* is a yellow-flowered shrub with greenish fruit which becomes yellow on ripening.

The 1½- to 2-inch flowers are yellow, somewhat resembling a goblet but irregular. The edges are sometimes chewed by insects. They appear in slender clusters at branch tips. Only one to three open at a time. The 1-inch fruits appear in drooping clusters. Their color changes from green to deep yellow on ripening.

The 2- to 3-inch opposite dark green leaves are prominently veined on the upper surface. The lower surface is covered with minute glands which give it a lighter cast. The usual leaf outline is variable sometimes having distinct lobes. The tip is bluntly pointed. The seedling foliage is quite different with deeply lobed leaves.

Gmelinas are propagated from seed. In fact, volunteer seedlings spring up in mats under mature shrubs.

Graptophyllum pictum **(L.) Griff.**
Synonym: *G. hortense* Nees
Caricature Plant
"Café con Leche," "Café de Jardín" (fig. 43)
Acanthaceae

The caricature plant comes from New Guinea. The plant is well established in many warmer sections of the world. The name *Graptophyllum* is derived from two Greek words meaning writing and leaf referring to the endless variations in the yellow-white markings on the leaves. Some strains also have red variegations. In partial shade it tends to be somewhat spindly, but in the open it forms an attractive spreading shrub reaching a height of 8 to 10 feet. It is poorly adapted to close pruning.

FIGURE 43.—"Café con leche" or *Graptophyllum pictum* is a variegated leaf shrub. The purplish flowers shown in this photograph are shortlived and ineffective for display but branches last well in water.

The flowers are dark bluish red or crimson. They grow in tight terminal clusters and in the axils of the upper leaves during the summer. The individual flowers are 1½ inches long with a slender base. In Puerto Rico the flowers are eaten by insects so that entire flowers are seldom seen nor do they set seed. In countries where fruit is set, it is reported to be a hard, oblong capsule.

Each leaf has different markings; the whiter areas are more or less centrally located and include most of the midvein. When the red color is present it gives a reddish tinge to the green parts of the leaf, but a pink in the nongreen sections.

The better strains are propagated from cuttings, but seed can be used if available.

Grewia asiatica L.
Phalsa (fig. 44, *B*)
Tiliaceae

As the specific name indicates, this plant is a native of Asia. It is grown to a very limited extent in India for the agreeable, subacid fruit, which is used in preparing cooling drinks during the hot season. It appears occasionally in collections in other parts of the Tropics.

The slender branches may grow to a length of 12 feet without dividing which gives an open character of growth. Cutting old branches close to the base will stimulate flowering. The plants may be used in informal shrub borders and as a source of an edible fruit.

The flowers are yellow-orange appearing in small clusters in the axils of the leaves. The sepals are longer than the petals and are also brightly colored. Because of their habit of curling, the flowers are less than ½ inch in diameter. The flowers appear during May and June and continue into July at Mayaguez. The fruits are approximately ½ inch in diameter.

The leaves are wider near the base, reach a length of 6 to 8 inches when mature, and have finely toothed margins. The veins are depressed below the surrounding tissue.

If seeds are available, they can be used for propagation. In India the better fruited strains are layered.

Grewia occidentalis L.
Starflower Grewia (fig. 44, *A*)
Tiliaceae

The starflower grewia is a native of Africa, introduced into the United States by the U. S. Department of Agriculture. It grows poorly on heavy, highly moisture-retentive soils. The height seldom exceeds 5 feet, making it useful in locations where the height must be limited and also in mixed plantings if the flower colors harmonize.

The purple flowers grow in small, axillary clusters 1 to 1.5 inches in diameter. The yellow pollen produced by numerous stamens contrasts nicely with the purple petals. No fruit have been

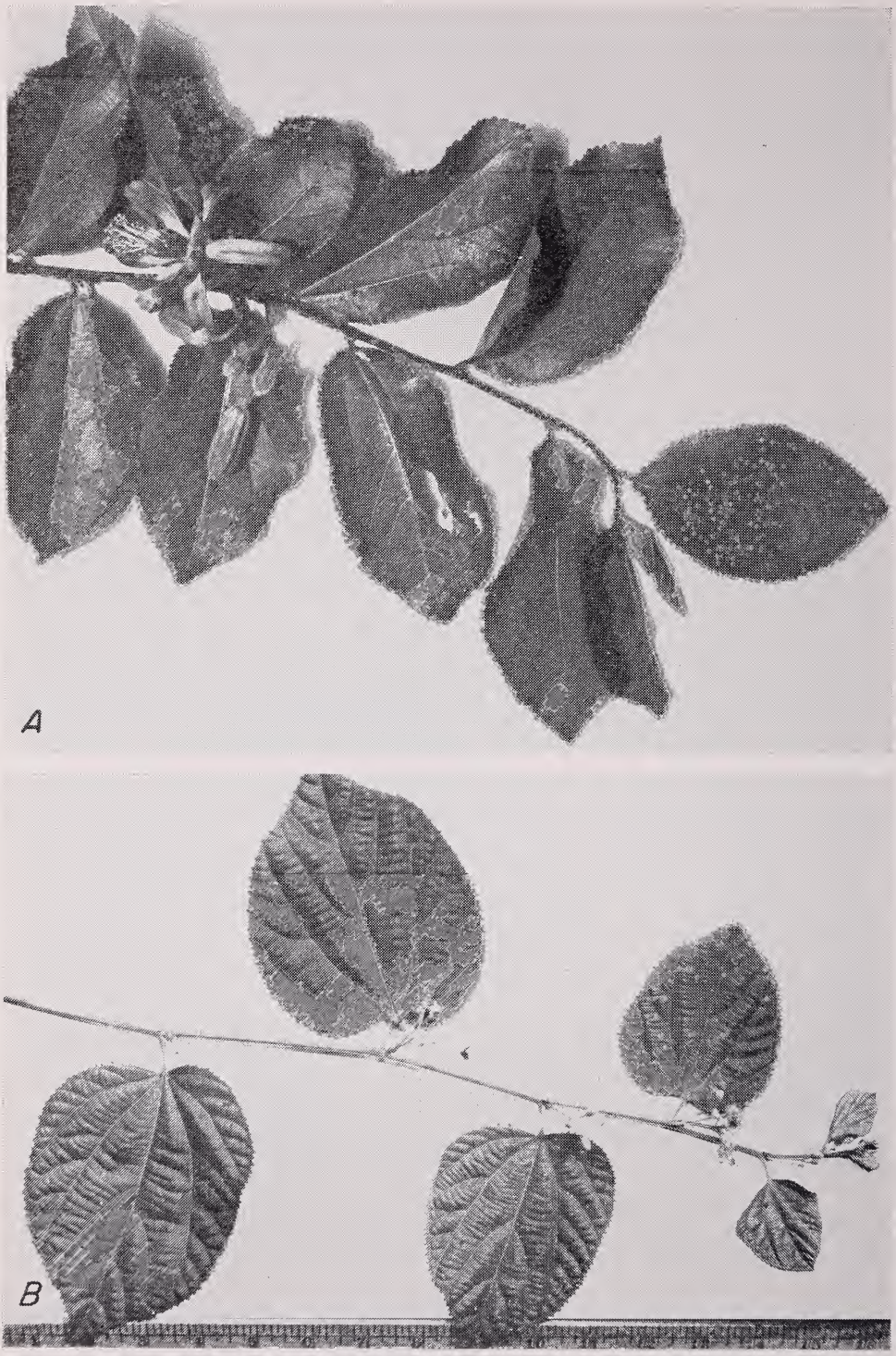

FIGURE 44, *A*.—The lilac-blue flowers of *Grewia occidentalis* grow in small clusters in the leaf axils.

B.—*G. asiatica* has small clusters of orange flowers in the leaf axils.

observed in Puerto Rico, but in Africa the four-lobed purple fruits are the size of a small pea. The 1- to 2-inch leaves have a few stiff hairs on the lower surface, creating a rough texture. Similar hairs appear on the petioles and young stems.

When seeds are available they can be used for propagation; otherwise, hormone-treated cuttings should be used, as rooting is difficult.

Hamelia erecta Jacq.
Synonym: *H. patens* Jacq.
Scarlet Hamelia
"Bálsamo" (fig. 45)
Rubiaceae

The scarlet hamelia is native to the warmer regions of the Western Hemisphere. It is occasionally grown in collections and conservatories elsewhere. For landscape purposes it seldom exceeds 12 feet. It can be used to bring color into partially shaded locations. The flowers are orange-scarlet and even the leaves are sometimes tinged red. In Puerto Rico the plants are frequently seen in the woods, but they are seldom cultivated even though they flower throughout the year and require no special care. There is often the feeling among people of a region that common, wild plants are of no ornamental value. Consequently, they have a tendency to close their eyes to the value of native plants. The scarlet hamelia, for example, is well adapted to regions of high rainfall. In moderate shade the branching is open.

The flowers grow in terminal branching heads. They consist of a 5-sided corolla tube 0.6 to 0.8 inch long, with very short, nonflaring lobes. The sepals are even shorter, persisting over the developing fruits, which ripen a dark blue or black 0.4 inch long.

The thin opposite or whorled leaves reach 8 inches in length and have 1-inch petioles which are often tinged pink. The color may extend into the midvein. The prominent side veins curve toward the tip. The leaves, petioles, and young stems carry a cover of fine, short hairs.

It grows from cuttings or seed.

Hibiscus collinus Roxb.
Hill Hibiscus (fig. 46, *A*)
Malvaceae

The plants grow tall with an upright habit, eventually becoming trees in favorable locations unless pruned. They are well foliated, serving as good background for other plants when not in flower. The flowers appear in the late spring and again in the fall under Puerto Rican conditions. Woodrow (*22*) reports it as flowering in August in India. They grow rapidly in heavy soil and are apparently adapted to sunny conditions.

The flowers are 4 to 5 inches in diameter. The petals are 2 inches wide, and light lavender except at the base which is crimson. The many white stamens are scattered along the entire length of the 1-inch column. The flowers are carried singly in the axils of the

FIGURE 45.—The scarlet hamelia, *Hamelia erecta*, has orange-scarlet flowers in open clusters. The petioles and even the leaf blades sometimes turn reddish.

top leaves on 2- to 3-inch stems. The fruits are five-sided and hairy, remaining green until nearly ripe.

The leaves, particularly on the lower surface, and the young stems are covered with short white hairs. The leaf blades are deeply cut into 3 to 5 lobes, each with a prominent vein.

Propagation is by cuttings.

FIGURE 46, *A*.—The hill hibiscus, *Hibiscus collinus*, has light lavender flowers with a deep crimson throat.

B.—There are many thousands of hibiscus varieties. Here are a few samples showing something of the range in form, size, and color available.

***Hibiscus rosa-sinensis* L.**
Rose-of-China, Chinese Hibiscus
"Amapola," "Candelaria," "Pavona" (fig. 46, *B*)
Malvaceae

Probably the most commonly cultivated shrub throughout the Tropics and subtropics is this hibiscus. It has been extensively hybridized in Hawaii, Florida, Puerto Rico, and other tropical countries. Many attractive flower forms and colors have been developed.

Hibiscus plants are quite variable in vigor; some strains grow so rapidly that they require frequent pruning to maintain a desired size, although others such as most of the yellow and white varieties are extremely slow growers. The more vigorous kinds are useful for screens and hedges whereas the slow-growing hibiscus is suitable for foundation planting.

The individual hibiscus flowers are open only one day, but during this period they will stand rough handling and remain in good condition out of water. Most varieties close at dusk but a few, particularly the double reds, will stay open into the evening. Other varieties can be used for evening decoration by cutting early in the morning and storing in a refrigerator during the day.

Most varieties have an upright habit of growth which produces plenty of leaves for good screening. The foliage is relished by goats, rabbits, and other animals and where necessary must be protected from these animals for satisfactory development.

The foliage is normally dark green, but there are several variegated forms; at least one is flecked with pink. These variegated forms are shy bloomers but are valued for their ornamental leaves.

The more vigorous strains are easily propagated from cuttings which, under good conditions, may be rooted directly in the soil where they are to be grown. The yellow and white varieties are much more difficult to root, but rooting can be accomplished by grafting a vigorous single red hibiscus above the desired variety until it is established, after which the red stock is removed. Treating the leafy cuttings with a relatively high concentration of a root-promoting hormone, such as indolebutyric acid, will also assist in root development. The kinds difficult to root may also be grafted or budded onto other root stocks, but stock plants tend to sprout below the union. If these shoots are not removed, they will outgrow the scions.

***Hibiscus schizopetalus* (Mart.) Hook.**
Fringed Hibiscus, Coral Hibiscus
"Lira" (fig. 47, *A*)
Malvaceae

The fringed hibiscus comes from tropical Africa. The plants grow from 8 to 12 feet tall with slender, arching branches. It is not a good screening plant because of its open nature, but is useful where one wishes to emphasize the line rather than the mass effect of a planting. The flowers are also interesting as an oddity as well as in flower arrangements. Plants will grow in full sun or light shade and thrive in many kinds of soils.

FIGURE 47, *A*.—The flowers of the fringed hibiscus have deeply cut petals with a red throat and veins. The tips fade to pale pink.

B.—The double white althea, *Hibiscus syriacus*, is a slender upright shrub, grown both in the temperate regions and in the cooler portions of the Tropics down to sea level.

The flowers hang near the branch tips in the leaf axils. The petals at first open like other hibiscus, but continue to curl back until they touch the flower stem. The color is coral red at the base but fades toward the tip except in the veins. The flowers are deeply cut giving a fringed appearance, which is reflected in the common name. The central column is longer than the petals with stamens clustered near the tip.

The leaves are 2 to 6 inches long.

The plants are grown from cuttings.

Hibiscus syriacus L.
Shrub-Althea, Rose-of-Sharon (fig. 47, *B*)
Malvaceae

This species is not a native of Syria, as indicated by the specific name, but probably came from China. Although common in temperate regions, it can also be grown in the Tropics. The slender upright growth of this species may reach 10 to 12 feet in height. The foliage is subject to several kinds of insects which reduces its popularity. Unless insect control measures are employed, the leaves turn yellow and fall, leaving bare stems. The stiff nature of growth makes the plants better suited to specimen planting than for mixed planting or hedges.

The 3-inch double flowers are produced singly in the axils of the upper leaves during the rainy season. Below the sepals there is a ring of narrow, green, half-inch bracts.

The leaves are dark green and wavy with bluntly toothed and slightly three-lobed margins. Three main veins branch from the base of the blade. Slender threadlike stipules up to 0.4 inch grow near the base of the petioles. On the lower portion of the stems the leaves are usually clustered on short side branches or spurs.

Propagation is by cuttings.

Holmskioldia sanguinea Retz.
Mandarin Hat, Parasol Flower
"Paraguita Chino," "Patillo" (fig. 48)
Verbenaceae

The Himalayan region of southern Asia is the home of the Mandarin hat. It is frequently found in cultivation in tropical regions. Most plants grow 10 to 15 feet tall with long arching branches whose tips may reach the ground. They are best suited for specimen planting.

Flowers are numerous during late summer, fall, and winter; in some cases they appear throughout the year. Small flower clusters form in the leaf axils or from branch tips. The long-lived calyx consists of 5 sepals joined together into a saucerlike disk which reaches a diameter of 1 inch. Its color is variable from creamy green to orange or orange red. The trumpet-shaped corolla tube which lasts only a short time is bright red. Better colored flowers develop on plants in the mountainous regions in Puerto Rico.

The leaves have square bases and slender tips, with finely toothed margins.

Stem cuttings are used for propagation.

Hydrangea macrophylla (Thunb.) DC.
Synonyms: *Hydrangea opuloides* Koch, *H. hortensis* Smith
Hydrangea
"Hortensia," "Bella Hortensia" (fig. 49)
Saxifragaceae

Hydrangeas are widely distributed throughout the world, particularly in temperate regions. In India an elevation of 4,000 feet or more is necessary for successful growth. They are grown almost to sea level in Puerto Rico but do not flower as well under these conditions. The plants are normally pruned severely in the fall to insure good flowering the following summer. Thus they seldom exceed a height of 3 or 4 feet. At lower elevations best development is obtained in partial shade. Their most common usage is as specimen plants in lawns but they can be utilized for borders and foundation planting. Most flowers are blue, a result of acid soil increasing the availability of aluminum to the roots. Pink flower color can be obtained by sufficient liming of acid soils. Sulfur mixed into most soils at the rate of 3 to 5 pounds per 100 square feet, or applications of iron or aluminum sulfate at 2 to 3 times this rate, will usually acidify neutral or alkaline soils sufficiently for the production of blue-colored flowers.

FIGURE 48.—The mandarin hat, *Holmskioldia sanguinea*, has sepals fused in the shape of a saucer and an irregular, bright-red corolla tube.

FIGURE 49.—The hydrangeas grow best at rather high elevations in the Tropics. This small plant is scarcely 3 feet tall.

The flowering begins after new shoots develop in the spring and continues until late fall. The large-flowered types are most commonly grown because they are more showy.

The leaf blades are coarsely toothed with slender, drawn-out tips and rounded base.

Since the double-flowered types are sterile, it is necessary to propagate these from stem cuttings.

Ilex vomitoria Ait.
Yaupon, Cassena (fig. 50)
Aquifoliaceae

This native of the South Atlantic and Gulf Coast States may become a tree in its natural environment, but for use in the Tropics it functions chiefly as a shrub. It is seldom used in tropical horticulture. Plants in Puerto Rico in several locations near sea level have never flowered, but the upright, rounded growth indicates its usefulness as a vegetative background for more floriferous species. It can be sheared for use in hedges. At higher elevations or a different climate flowers may form.

The alternate leaves are oval shaped with minute teeth along the margins. The blades seldom exceed 1 inch in length or a width slightly more than half the length. The young stems are light gray. The Indians of Florida used the leaves to make a purgative tea.

New plants are obtained by rooting hardwood or semihardwood cuttings. Seeds, if available, require stratification or a long germination period.

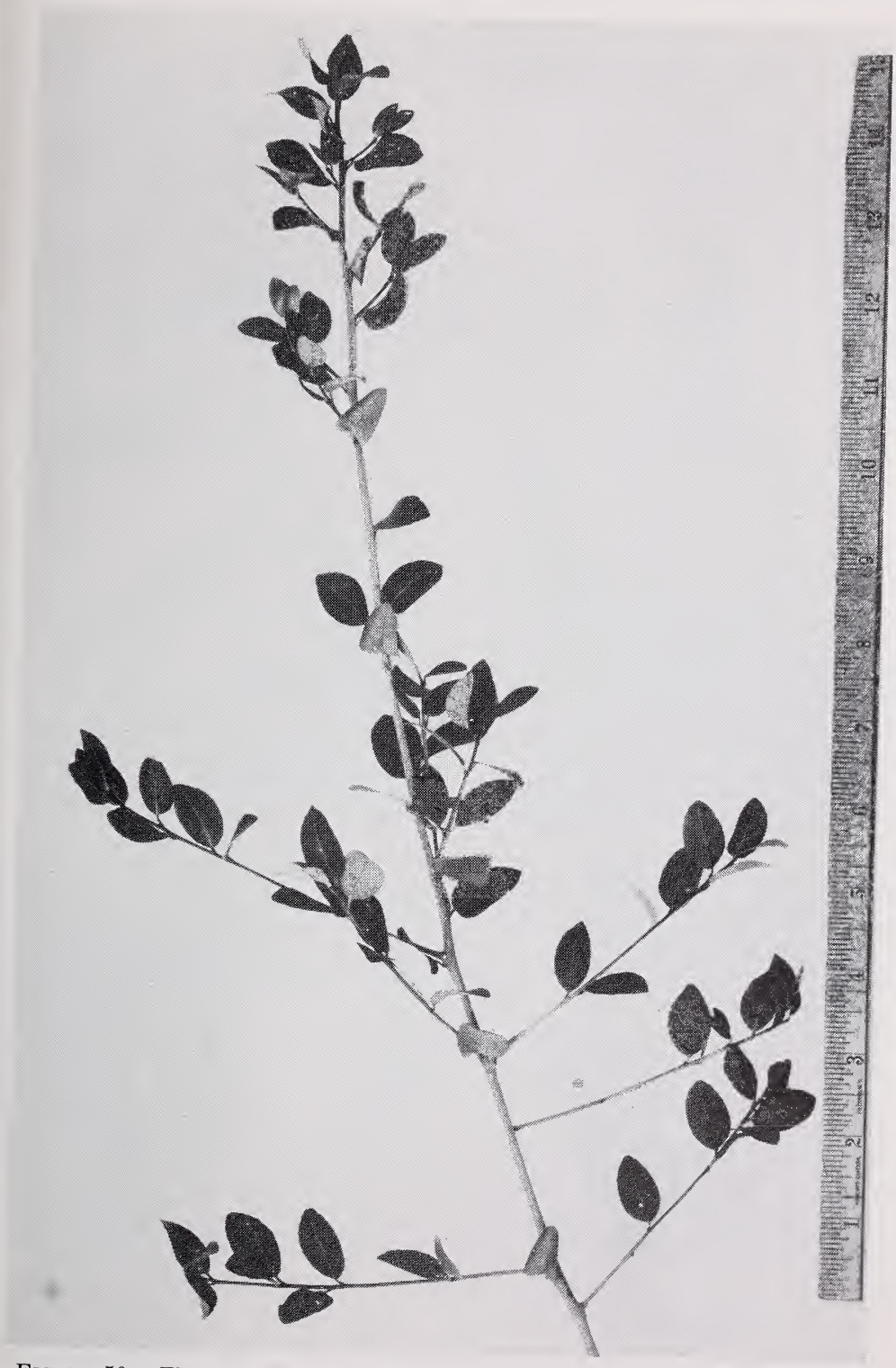

FIGURE 50.—The yaupon, *Ilex vomitoria*, is an open branching shrub in the Tropics. It has attractive silvery bark on the young branches.

Ixora acuminata Roxb.
Sharpleaf Ixora
"Bola de Nieve," "Nevado" (fig. 51, *A*)
Rubiaceae

This ixora is a native of India and is now widely distributed in the Tropics. The plants are tall, slender shrubs which may eventually develop the proportions of a small tree. They are

FIGURE 51, *A*.—The *Ixora acuminata* will eventually make a small tree but can be maintained as a shrub by pruning.

B.—One of the best of the ixoras is this large-clustered, deep-crimson variety.

C.—A dwarf variety of *I. coccinea* bordering an entrance drive. The plants are growing in sandy soil near the sea.

D.—*I. chinensis* has orange-crimson flowers with wide, pointed petals.

adapted to heavy moist soils, but will withstand considerable drought. Since ixora is not easily restrained, it should be planted only where there is plenty of room for growth. The flowers are not only beautiful but fragrant and useful in flower arrangements.

The white flowers are carried in branching, flattened heads, at the branch tips, which may reach a diameter of 5 or 6 inches. The individual flowers have slender corolla tubes, 1.5 inches long, with four spreading lobes at the top. When the flowers open the stamens have already discharged the pollen into the corolla tube. They soon curl under the petals where they are difficult to see. The 2-lobed style growing up through the tube becomes covered with pollen previously deposited there from the stamens and resembles, at first glance, two stamens. Later the pollen is washed away, but seeds seldom develop.

The 4- to 7-inch green leaves are smooth on top but not shiny and tapered at both ends with petioles up to ½ inch.

Propagation is by stem cuttings which root slowly.

Ixora chinensis Lam.
Chinese Ixora (fig. 51, *D*)
Rubiaceae

This favorite in conservatories has been confused with *Ixora coccinea*, but differs from it in the wider petals and much smaller, rounded leaves.

The cultural requirements are more rigid than for most other ixoras. Heavy wet soils are not satisfactory nor are sandy soils in regions experiencing prolonged dry seasons unless irrigation is available. Partial shade is desirable particularly in the early stages of growth. Incorporating considerable organic matter into the soil facilitates growth. It is intermediate in height between the dwarf *Ixora coccinea* and the taller growing types. The plants can be used for hedges or mixed plantings.

The 1-inch flowers are orange red in small terminal clusters. The petals reach a width of 0.3 inch and the stamens do not curl under the petals.

The leaf blades are attached directly to the stem and are usually bluntly tipped. They seldom exceed 2 inches in length.

Like most ixoras, this species is propagated by cuttings.

Ixora coccinea L.
Jungleflame Ixora, Burning Love
"Amor Ardiente," "Bola de Coral," "Cruz de Malta" (fig. 51, *C*)
Rubiaceae

From the East Indies comes the "cruz de Malta," as it is commonly called in Spanish-speaking countries. It is probably the most commonly cultivated of the ixoras. The usual form is dwarf, but larger forms up to 8 feet belong to this species also. The tall forms can be used for hedges and shrub borders. The dwarf form is useful in foundation planting and around the base of taller shrubs with unsightly branches. It thrives in partial shade but will tolerate full sun and most soil types. The only characteristic

which detracts from the usefulness of this species is the tendency of new vegetative growth to hide the flowers. This condition is accentuated by applications of nitrogenous fertilizer; therefore, fertilization, if necessary, should be confined to occasional top dressing with well decomposed vegetable matter.

The bright red flowers occur in flattened clusters 2 to 4 inches in diameter. A single flower has a long slender tube seldom exceeding 2 inches. The four corolla lobes are pointed at the tip and are only slightly constricted at the base.

The blunt-tipped leaves are attached directly to the stem.

Stem cuttings root readily if given partial shade.

Ixora macrothyrsa (Teijsm. & Burm.) Moore
Malay Ixora (fig. 51, *B*)
Rubiaceae

The name Malay ixora indicates its East Indian and Malayan origin.[4] Although rated as one of the finest of ixoras, it has not achieved such world-wide popularity as the two previously described.

The Malay ixora becomes a large shrub, well foliated with dark green leaves. In Puerto Rico it does not appear well adapted to clay soils and is seldom seen in the gardens of the island. In Hawaii the flowers are popular for making leis.

The flowers appear in flattened, well-branched clusters reaching 8 inches in diameter at the ends of branches. Each deep red flower has a slender corolla tube 1 inch long with 4 flaring, sharp-pointed lobes not constricted at the base.

The leaves are opposite or occasionally whorled and may reach a length of 12 inches. The stipules, or small scalelike attachments on the stem beside each leaf base, are needle-shaped, 0.2 inch long.

Propagation is usually by stem cuttings, although seeds can be used in regions where they develop.

Jacobinia coccinea (Aubl.) Hiern.
Synonym: *Justicia coccinea* Aubl.
Blackstick Cardinalsguard (fig. 52)
Acanthaceae

The plant is a native of Brazil and seldom exceeds 6 feet in height. It grows readily in many soil types and has a dense upright growth which adapts it for hedging, but the stems are too soft to use as a barrier.

The flowers appear near the top of the plants throughout most of the year. They grow on slender spikes sometimes branched at the base. Occasionally the flower stems are wide and flat as the result of abnormal development. The flower is a bright red, slender corolla tube 1 inch long, increasing in diameter toward the tip where the five small irregular-sized lobes separate. No seeds are produced under Puerto Rican conditions.

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[4] Nicholson *(15)* states its origin as the South Pacific islands.

FIGURE 52.—*Jacobinia coccinea* is a red-flowered shrub with large leaves useful for hedges and around homes.

The opposite leaves are thin and slender at both ends and may reach a length of 12 inches from tip to base of the winged petiole. The stems are squarish, green, and succulent except near their bases.

Cuttings root fairly easily.

Jatropha curcas L.
Barbados Nut, Physic Nut
"Tártago" (fig. 53, *A*)
Euphorbiaceae

The Barbados nut is grown throughout most tropical countries, especially the West Indies, Central America, Portuguese East Africa, and some sections of the Far East. The plants are grown for the seeds which contain considerable oil that is useful in medicine and for the manufacture of soaps, paints, and lubricating oil. *It is poisonous except in minute quantities.* The plants reach a height of 15 feet and are used for live fencing because of their rapid growth. Neither the flowers nor the fruits are particularly spectacular. However, the foliage is dark green and makes good background material. The plants are capable of satisfactory growth on soils too poor for many of the more attractive tall shrubs. Sometimes they are planted near doorways, as local superstition holds that they are able to keep evil spirits away from the door.

The tiny yellow flowers appear in the spring and are followed by the 3-seeded green fruits which grow to a diameter of 1 inch during the summer.

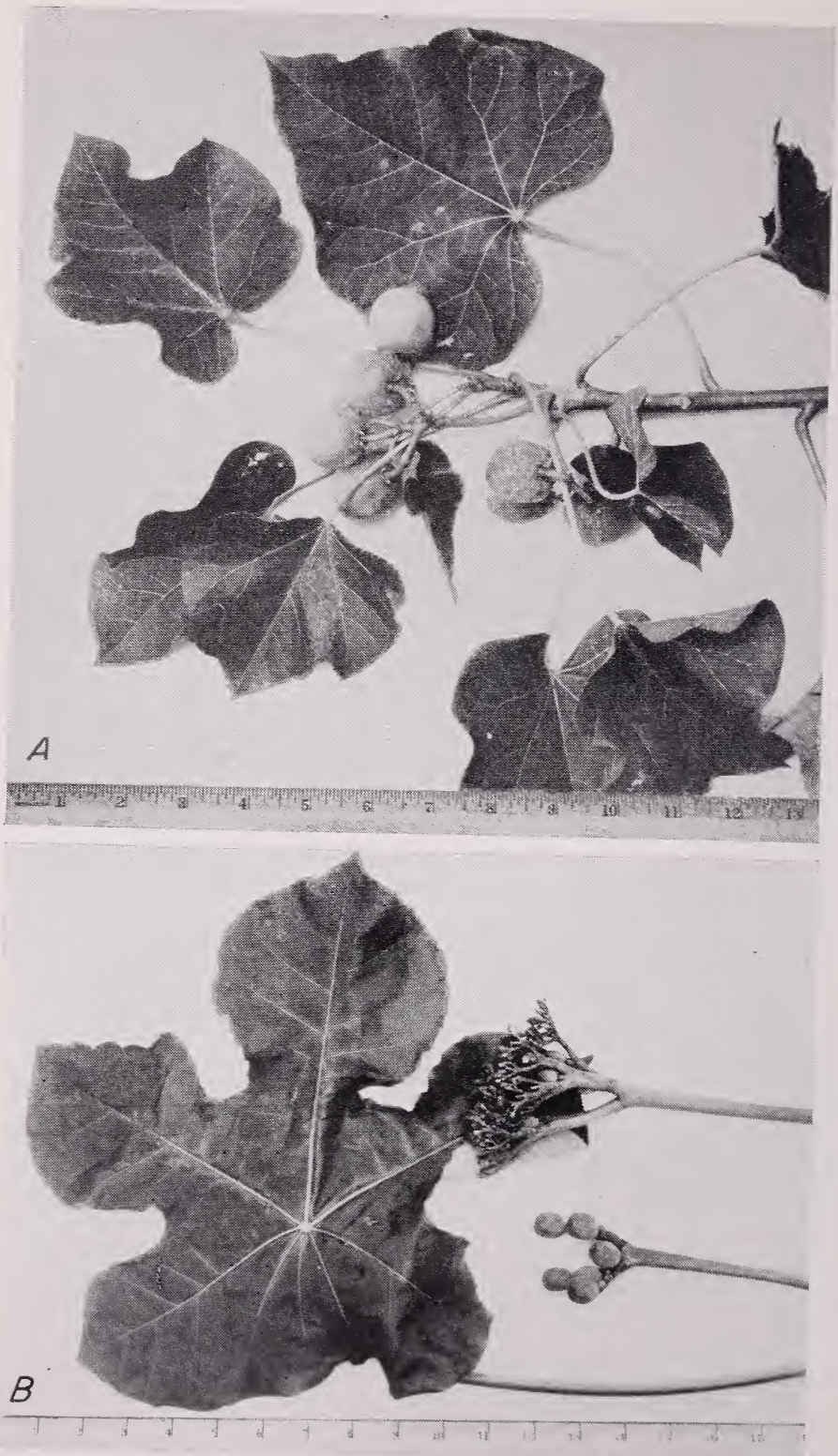

FIGURE 53, *A*.—The fruits of *Jatropha curcas* are shaped like an elongated ball. The sepals remain at the base of the developing fruit.

B.—The tartogo nettlespurge, *J. podagrica*, has orange-red flowers in flattened heads. The leaves are deeply lobed, and the petiole is attached to the undersurface instead of to the base of the blade.

The 6-inch, alternate leaves are heart-shaped and often somewhat 3-lobed. They are prominently veined, branching directly from the top of the 4- to 6-inch petioles.

Plants can be propagated easily from long stem cuttings or seeds.

Jatropha podagrica Hook.
Tartogo Nettlespurge, Gout Stalk
"Tinaja" (fig. 53, *B*)
Euphorbiaceae

This Central American plant is used chiefly as a novelty because the stem is swollen like a gouty foot, the meaning of the specific name. It seldom exceeds 2 feet in height, but the leaves rise more than a foot more. The flowers are also decorative. The plants grow well in full sun but tolerate moderate shade and are particularly adapted to small areas or locations requiring limited height.

The bright, orange-red flowers grow in flattened heads on a long common stalk. They open a few at a time during most of the year. The fruits are a scant inch long and contain three seeds.

The large deeply lobed leaves have 12- to 18-inch petioles which are attached to the whitish undersurface of the blade. Fringed stipules grow on either side of the petiole.

It is usually grown from seed.

Jatropha multifida L.
Coral Plant (fig. 54)
Euphorbiaceae

The natural range of the coral plant extends from Texas to Brazil, but it is grown as an ornamental shrub in India, Ceylon, and many other warm sections of the world. It tends to be a rather tall, straggling shrub, as indicated in the accompanying photograph, unless pruned occasionally in its younger stages. Even then it is more useful in informal plantings than where symmetrical shapes are desired.

The flower heads are bright red except for the clusters of yellow stamens. Only a few of the 0.4-inch diameter flowers in a head open at a time, hence the effect is predominantly red. The fruits are 1.5 inches across, 1 inch deep, and triangular.

The 11-lobed leaves are prominently veined. The longer lobes may reach 7 inches and are also partially divided. The petioles are almost as long as the blade with stipules consisting of hairlike clusters on either side of the stem where the petiole originates.

Plants may be grown from seed or cuttings.

Kopsia fruticosa A. DC.
Shrubby Kopsia (fig. 55)
Apocinaceae

The shrubby kopsia is a native of the Far East. It is rarely grown in other sections of the Tropics. Under Puerto Rican conditions the plants are tall and eventually approach the size of a small tree if unpruned, but in regions experiencing occasional frost

FIGURE 54.—The coral plant, *Jatropha multifida*, makes rapid irregular growth when not pruned as shown in *A*. The leaves are compound, *B*, and the flowers crimson with yellow stamens.

they remain small. The general habit is more upright than spreading. The flowers of a cluster open a few at a time. The dark blue fruit are also attractive. Since best growth is obtained in full sun, these plants can be used in medium- and large-sized, open areas, individually or in small groups not closer than 25 feet apart.

FIGURE 55.—*Kopsia fruticosa* has white flowers in clusters, followed by dark blue, olive-shaped fruit.

Their flowers, fruits, and attractive foliage are not only useful in the landscape but can be cut for indoor arrangements. A few flowers continue to open for several days and the leaves of the cut branches sometimes turn various shades of red.

The flowers are white or a very light pink and appear in small, tight clusters at the ends of branches. The slender corolla tube, 1 to 1.5 inches long, expands at the tip into 5 slender lobes overlapping at the base. The olive-shaped fruit is about 1 inch long.

The opposite leaves reach 8 inches in length with slender points and prominent veins. The petioles are ridged by the extension of the leaf margins. The bark slips easily from the wood if the branches are broken.

Kopsias are propagated by seeds or cuttings.

***Lagerstroemia indica* L.**
Crapemyrtle
"Astromelia," "Astromero" (fig. 56)
Lythraceae

This native of southern China has been planted in many countries for its showy flowers. It is doubtful if it is anywhere more abundant than in the southern United States. The shrubs reach 8 to 14 feet. Since their natural habit is frequently too open, it is usually desirable to head back vigorous shoots after flowering. If left alone they produce few flowers and become leggy. Growth is good on many soil types from sandy loams to heavy clays if sufficiently well drained. Crapemyrtles are used for bordering driveways, screening unsightly objects, and informal shrub borders.

The flowers are carried in large terminal heads which grow as long as 9 inches and almost as wide. White-, pink-, rose-, red-, lavender-, and purple-flowered varieties are known. The petals are curled and crimpled; their abundance compensates for their small size. The stamens are yellow and add to the color display. Flowering is most profuse in the early part of the rainy season, followed by winged seeds in inconspicuous capsules later in the year.

The leaves are opposite, 2 to 3 inches long, and attached to a 4-angled stem without petioles.

The crapemyrtle can be propagated from seed, hardwood cuttings, and root cuttings.

***Lawsonia inermis* L.**
Synonym: *L. alba* Lam.
Henna
"Mignonette," "Reseda" (fig. 57)
Lythraceae

The henna plant has a world-wide distribution in the Tropics. Henna dye is obtained from the leaves. This dye is used particularly by Mohammedans to give their beards, hands, feet, nails, and hair an orange color. The plant is adapted to dry regions and tolerates a relatively high salt content in the soil. In more humid regions it is a rapid grower. Henna is well suited for hedges or live fencing. The creamy white flowers of the white variety are

FIGURE 56.—The crapemyrtle, *Lagerstroemia indica*, is available in white and shades of pink or lavender. It blooms freely during the summer.

the most desirable, while rose and cinnabar-red varieties are recorded. The flowers have a delightful, penetrating odor, but the petals do not last long after cutting for flower arrangements. The plants seldom exceed 6 feet in height. Periodic pruning stimulates flower production.

FIGURE 57.—*a*, A branch of henna, *Lawsonia inermis*, just coming into flower; *b*, Even after flowering, when the petals are shriveled, the fragrance persists.

The flowers are produced in large numbers at the ends of branches and in the axils of the leaves near the branch tips. The flower heads are 6 to 12 inches long and half as wide. The individual flowers are 0.5 inch in diameter with 4 petals and sepals and double this number of stamens. The fruits are circular, up to ¼ inch in diameter, and contain many fine seeds.

The small, pointed leaves are susceptible to a fungus which does little damage except to their looks. The young stems are nearly square.

Seeds, when available, and cuttings can be used for propagation.

Leea coccinea Planch. (fig. 58)
Vitaceae

This Burman plant is seldom seen in other tropical regions. The plants grow from 6 to 10 feet tall with an irregular, somewhat circular shape. They begin to flower when very small. In older plants some flowers may be hidden behind developing branches. In winter, without flowers, these plants are useful for their large,

FIGURE 58.—*Leea coccinea* is an attractive tall shrub with large multi-branched leaves and red flower clusters except for the small white petal rings.

dark green leaves, that sometimes turn reddish bronze with age and make excellent background material. They may also be planted individually as specimens. Several other leeas have variegated or red foliage.

The flowers are carried in large flattened heads 5 to 10 inches in diameter. The branches of the flower head and the quarter-inch fruits are deep red.

The leaves are three times branched. The leaflets are toothed along the margins and prominently veined. The petioles and the branches are rigid on top and swollen at every fork, which makes it difficult to distinguish between petiole and stem.

Propagation is by seed.

***Ligustrum indicum* (Lour.) Merr.**
Synonym: *Ligustrum nepalense* (Don) Wall.
Indian Privet (fig. 59, *A (b)*)
Oleaceae

This tall, Indian shrub can reach a height of 12 to 14 feet and an even greater spread. Unpruned it is useful chiefly for background or screening purposes. It can also be used for hedging by frequent pruning. The plants become leggy when shaded. They grow in quite a range of soil types.

The flowers are carried in slender 2- to 4-inch terminal heads with very short dense clusters along the sides. The four white corolla lobes are about the same length as the tube, and wider than those of *Ligustrum ovalifolium.*

The leaves are 3 to 5 inches long with thick tough blades and margins that roll downward.

Stem cuttings are easily rooted.

***Ligustrum ovalifolium* Hassk.**
California Privet (fig. 59, *A (a), B*)
Oleaceae

The so-called California privet comes from Japan. It is one of the best privets for warmer temperature regions. Although it will grow at sea level in some parts of the Tropics, it is more satisfactory at middle or higher elevations; and there are better, truly tropical plants adapted to lowland conditions. This privet tolerates severe trimming and a wide variety of soil conditions, including very sandy soil.

The flowers have four slender corolla lobes twice the length of the tube, and two long stamens. They occur in small clusters in the axils of the upper leaves and in terminal spikes.

The leaves are elliptical, about 2 inches long and half as wide, with rather blunt tips and short petioles. Fine hairs grow on the young stems and petioles.

Propagation is by cuttings.

***Malpighia coccigera* L.**
Holly Malpighia
"Azotacaballo" (fig. 60, *A*)
Malpighiaceae

The azotacaballo is native to many of the larger West Indian islands. It is a low grower, rarely exceeding 3 feet, and can be maintained even lower by occasional pruning. It can be used as a border plant, as a ground cover, or even grown in large pots for patios. The flowers are attractive, but do not create a mass effect because of their small size and number. The leaves are a deep glossy green and attractive at all seasons. The plants are adapted to moist conditions and grow in full sun or partial shade.

The flowers are pink, 0.4 inch broad. The petals are slightly contracted at the base. The red fruits are 0.2 to 0.3 inch long.

FIGURE 59, *A*.—The California privet (*a*) and the Indian privet (*b*) flower in the fall and winter. The former has slender leaves and narrow petals. The latter has wider, thicker leaves and petals. *B*, A California privet sheared in a wind-swept location near the sea.

FIGURE 60, *A*.—The azotacaballo, *Malpighia coccigera*, grows wild in the Puerto Rican hills. It is attractive both for the flowers and the glossy green foliage.

B.—The broadly circular outline of the West Indian cherry makes it a good subject for specimen planting. By shearing it can be used for hedging.

The leaves are variable in size, depending on the strain. They are sometimes only a half inch long, with many slender marginal spines.

It may be grown from seed or cuttings.

***Malpighia glabra* L.**
Barbados-Cherry
"Acerola," "Huesito," "Cereza," "Cereza Colorada" (fig. 60, *B*)
Malpighiaceae

The Barbados-cherry has a natural range covering much of the American Tropics and subtropics. It has recently been established

in many warm regions because of the interest aroused in its high vitamin C content. The acerola or cereza was distinguished from *Malpighia glabra* by Linnaeus, but plants are so variable that there are no characters on which the two species can be clearly

FIGURE 61.—The sleeping hibiscus, *Malvaviscus grandiflorus*, has bright scarlet drooping flowers which never "wake" to open more than shown.

separated. From both the economic and ornamental standpoints this is a valuable plant around a home as the fruit is particularly high in vitamin C and can be used to make a delicious cold drink or "refresco" as well as jelly or jam. The plants are nearly circular in outline, reaching a height of 9 to 12 feet. They can be pruned

or sheared for a hedge, but this severely limits flowering. Full sun is desirable for best growth.

The flowers are produced in the spring in several flushes from 2 to 4 weeks apart. Flower color varies from white through pink to deep lavender. The five petals are contracted at the base. The fruits are bright red, 0.5 to 0.9 inch in diameter, somewhat angular but not grooved as in the Surinam-cherry. They ripen from March to June.

The opposite leaves are small and numerous with pointed tips and short petioles.

The plants can be grown from seeds or cuttings which root best in high humidity.

***Malvaviscus grandiflorus* H.B.K.**
Sleeping Hibiscus
'Capucha de Monje" (fig. 61)
Malvaceae

The common name is derived from the appearance of unopened hibiscus flowers. It is a native of Mexico, but now is widely planted. Many soil types are satisfactory for good growth. The plants reach a height of 8 to 11 feet with a rounded form. They are grown chiefly for their flowers which appear during most of the year. The dense, medium-green foliage will also serve for screening. It is a desirable addition to the shrub border and for specimen plantings. Adequate growth is obtained both in full sun and light shade. The plants will tolerate considerable soil moisture.

The flowers are scarlet, 2.5 inches long, but never open more than 1.5 inches. They appear one or two at a time near the tips of many branches and hang downward. The stamens appear on the column which is tipped by a small whorl of 10 maroon stigmas.

Leaves are rounded and widest below the middle, tapering to a slender, drawn-out tip. The margins are bluntly and irregularly toothed. The leaf blades are 3 to 5 inches long on hairy petioles up to half the length of the blade.

Stem cuttings root fairly easily.

***Muehlenbeckia platyclada* (F. Muell.) Lindau**
Synonym: *Homalocladium platycladum* Bailey
Ribbonbush, Centipede Plant
"Ciempiés," "Helecho Chino" (fig. 62)
Polygonaceae

This native of the Solomon Islands is frequently grown in conservatories because of its peculiar nature. In tropical gardens the plants become shrubs and reach a height of 6 to 8 feet. They will grow in a variety of soils and tolerate considerable shade. The leaves usually drop quickly when formed, except on small plants or in deeply shaded, moist conditions. The green, flattened, ribbon-like branches function as leaves. The plants are particularly useful in well-shaded locations unsuited for most species. The flattened stems serve for filler in flower arrangements.

The flowers are minute, appearing at the joints or nodes on both edges of the stem. In Puerto Rico fruits are very rarely seen, but

in some regions bright red, three-angled fruits are produced which darken at maturity.

The jointed stems are 0.3 to 0.8 inch in width. The distance between joints ranges from 0.5 to 0.9 inch.

Plants can be grown from seeds when available, otherwise from cuttings.

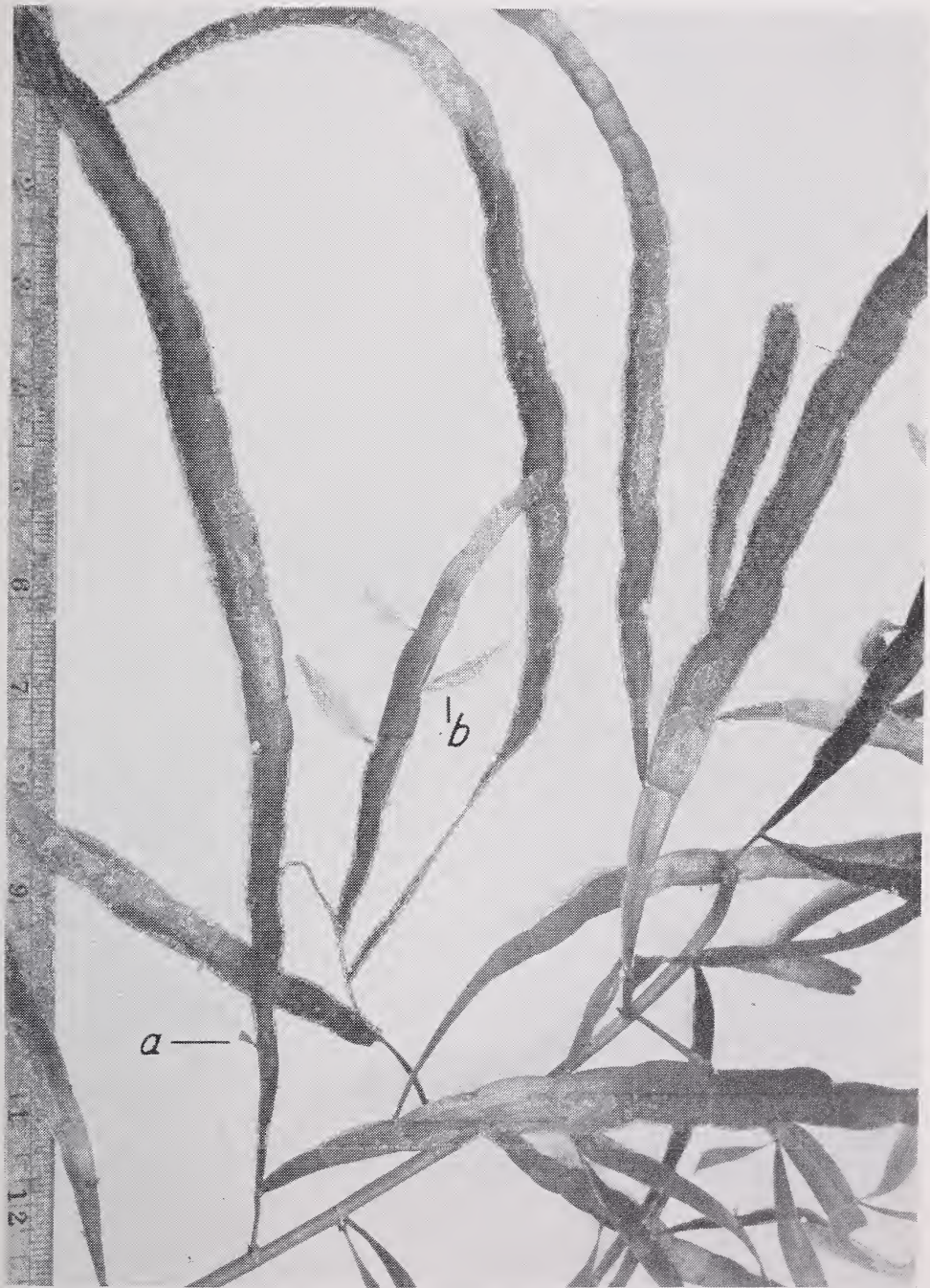

FIGURE 62.—The ribbonbush, *Muehlenbeckia platyclada*, flowers on the edges of leaflike flattened stems, *a*. The true leaves drop soon after they appear, *b*.

Murraya exotica L.
Synonym: *Chalcas exotica* (L.) Millsp.
Chinabox Jasminorange, Mockorange
"Mirto" (fig. 63)
Rutaceae

The orange-jasmine is a native of a considerable part of the Far East. It is a favorite in conservatories for pot culture in temperate regions, and is equally desirable for outdoor growth in the Tropics where it reaches 10 to 15 feet in height. Its triple landscape features include dark, glossy, green leaves; white, very fragrant flowers; and bright-red fruits. Since this shrub tolerates pruning, it may be used effectively for hedges, but should not be sheared any narrower than 4 to 5 feet for best results. The cut branches are used for wreathes at Christmas time when they are full of ripe fruit.

The flowers are formed in tight, terminal clusters. Although each individual is less than ½ inch in diameter, the flowers create a mass effect because of their abundance. They appear in flushes at intervals of several weeks during the summer. The time of flushing is influenced to some extent by local climatic conditions.

The leaves are compound, with 4 to 9 leaflets, and have the same general character as those of the dwarf boxwood, *Buxus microphylla* Willd. & Zucc.

Propagation is by seed.

Mussaenda erythrophylla Schum. & Thonn.
Scarlet Mussaenda (fig. 64, *B*)
Rubiaceae

This mussaenda is a native of tropical Africa, but is distributed to a limited extent in other tropical sections of the world. It is adapted to the climate of Mayaguez where it flowers at all seasons.

The plants of this species at the Federal Experiment Station are typically shrubby, somewhat broader than high. They can easily be maintained at 6 to 8 feet. Reports by Fairchild (*4*) indicate that there may be both bush and vine strains. Harrison W. Smith, Papeari, Tahiti, Society Islands, in a letter states that one of his plants that grew in the sun was a bush with drooping branches, whereas another that grew in the shade showed an inclination to become a liana, its slender branches climbing into a tree above. Thus both the inheritance and the environment appear to affect the type of growth.

The shrub type of the scarlet mussaenda is sufficiently showy to be used for specimen planting and is effective in masses for foundation planting or in combination with the white-flowered mussaendas.

The flowering habit is quite uncommon. One of the sepals, which persists after the corolla falls off, enlarges to the size and shape of a small leaf and becomes a brilliant scarlet color. The ½-inch diameter corolla face consists of five cream-colored petals partially united. The flower color is reported as yellow in most descriptions, but in Puerto Rico they are creamy white. The sepals, including

FIGURE 63.—Mirto, *Murraya exotica*, produces white flowers which are followed by red berries, *A*. It is a beautiful evergreen shrub, *B*, commonly grown in tropical gardens.

the expanded one, are a brilliant scarlet. Both the outside of the corolla and the throat as well as the sepals and flower stems are covered with soft scarlet hairs.

The opposite leaves are broad and end in blunt points, 3 to 6 inches long. The veins on the undersurface are prominent and tinged with pink. Both of the leaf surfaces and the young stems have a velvety feeling from the presence of many short hairs. The petioles are about ½ inch in length. Those of a pair are connected by prominent stipules ¼ inch long and slightly wider.

Propagation can be made from seeds which are occasionally produced in some parts of the world. Otherwise it is necessary to use cuttings that are rooted with considerable difficulty.

Mussaenda philippica A. Rich. (fig. 64, *A*)
Rubiaceae

This orange-and-white-flowered mussaenda is common and widely distributed in the Philippines, New Guinea, and adjacent regions. It is rarely seen outside of its native range, but a plant has been growing for over 30 years at Mayaguez, P. R. It has reached a height of 17 feet and may eventually become a small tree. This species can be maintained as a shrub by occasional pruning, because of its slow growth. During the dry winter season it is subject to attack by termites and scale insects.

It flowers from April to November. The bractlike sepals create a mass of color attracting the attention of all who pass.

The orange corolla tube expands at the top to a diameter of 0.4 inch. One of the five sepals enlarges until it reaches the size and shape of a small leaf, but turns white. It persists after the corolla falls and gives the main color effect.

The opposite leaves are thin without hairs, 4 to 6 inches long.

Its propagation is hindered by lack of seed and the difficulty of rooting cuttings.

Nerium oleander L.
Common Oleander
"Adelfa," "Alhelí Extranjero," "Laurel Rosado" (fig. 65)
Apocynaceae

Oleanders are grown over most of the world, but in cooler climates they are confined to greenhouses during the winter months as they will not stand severe cold weather. The name Nerium, derived from a Greek word meaning moist, alludes to a preference for moist localities. However, in Puerto Rico, where most soils are rather moisture-retentive, best growth has been observed in well-drained soils. If unpruned the plants will eventually reach a height of 16 to 20 feet. They can be maintained at medium heights by pruning. If all lower side branches are regularly removed the plant will eventually form a tree. Oleanders function best as specimen plants, or in large informal shrub borders. In many countries the oleanders suffer severely from attack by several scale insects. In Puerto Rico the chief danger appears to be from excessive soil moisture. They are not adapted to dry regions unless irrigated.

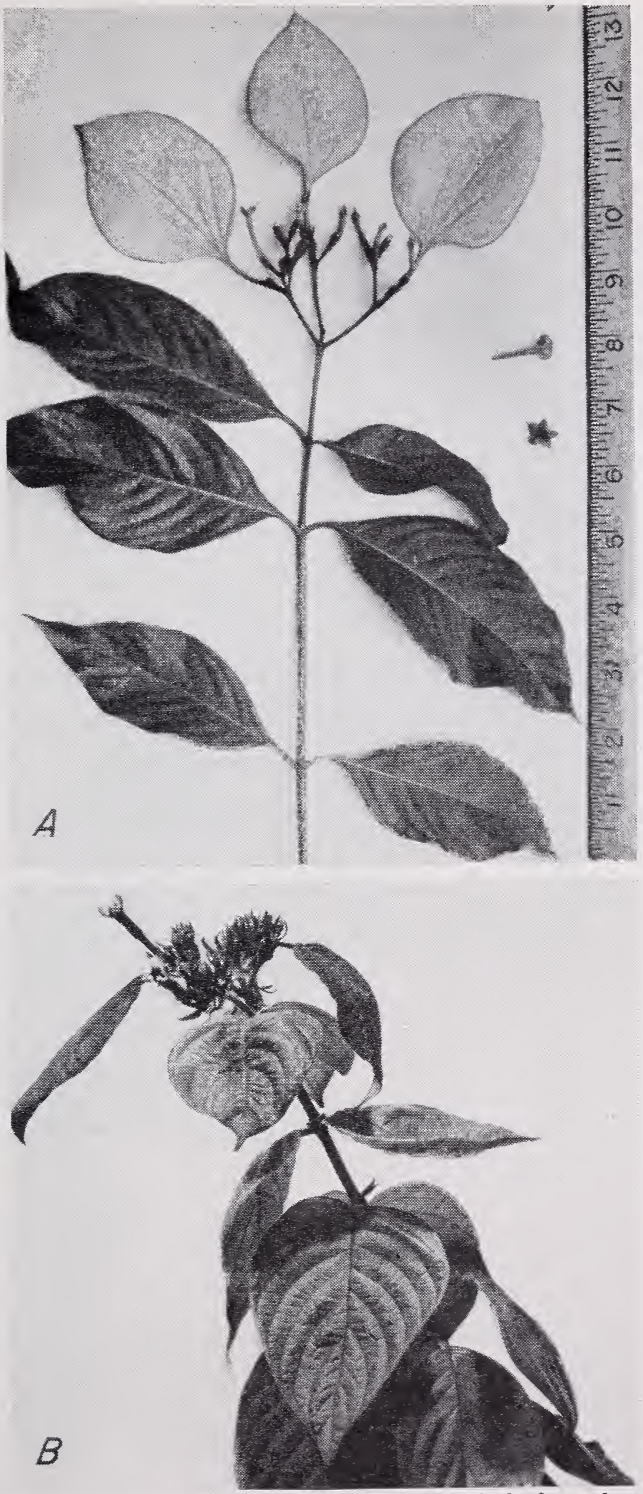

FIGURE 64, *A*.—One white, leaf-shaped sepal expands before the orange petals open. A detached corolla is shown between 6 and 7 on the ruler.

B.—A *Mussaenda erythrophylla* flower has a scarlet sepal which enlarges after the petals have fallen.

OLEANDERS CONTAIN A POISON. CHILDREN SHOULD BE WARNED NOT TO PLAY WITH THE PLANTS. THE BRANCHES SHOULD NEVER BE USED FOR COOKING FOOD OVER A FIRE.

FIGURE 65.—The fragrant flowers of *Nerium oleander* continue to open when the branches are cut and placed in water.

Either single- or double-flowered varieties are available ranging from white to red. Flowers are produced almost throughout the year. They grow in small terminal clusters. The individual fragrant flowers reach 1.5 to 2 inches in diameter.

The leaves are narrow with slender, tapered points at both ends. They are arranged in whorls of three or occasionally four.

The better varieties are propagated by large stem cuttings which can even be rooted in well-aerated water or sandy soil, but are usually started in sand.

Oncoba echinata Oliver
Gorli Oncoba (fig. 66)
Flacourtiaceae

This species is a native of tropical Africa. It is seldom seen outside of arboretums in other parts of the world. It was introduced as a source of chaulmoogra oil, formerly considered a treatment for leprosy. The seeds have been found to contain nearly 40 percent of oil. The large chestnut-like fruits are the chief ornamental attraction. In stiff clay soils this oncoba reaches a height of 10 to 12 feet. Under shaded conditions the plants are too open, but if permitted more sunlight and not crowded they have a dense foliage and rounded shape.

The flowers are creamy white, 0.8 inch broad, and appear in winter. The fruit is covered with soft spines like a chestnut, reaching 3 inches in diameter and turning yellow at maturity.

The seeds germinate naturally after they fall to the ground and sometimes present a slight weeding problem. The leaves have an uneven surface because of the depressed veins. They reach a length of 6 to 10 inches.

The volunteer seedlings can be used for propagation, or seeds may be sown in flats or pots.

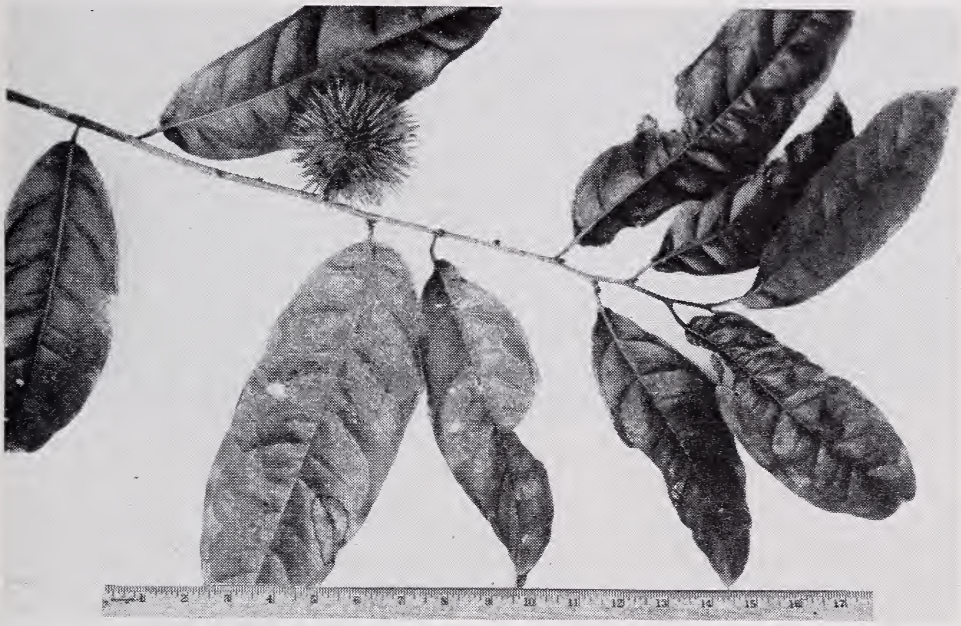

FIGURE 66.—The gorli oncoba, *Oncoba echinata*, has yellow fruit covered with soft bristles, but the flowers are very small.

***Oncoba spinosa* Forsk.**
Spiny Onoaba (fig. 67)
Flacourtiaceae

Another plant which under favorable conditions becomes a small tree, is the spiny oncoba. At Mayaguez in a clay soil it has remained a shrub for at least 6 years, reaching a height of 8 feet with an equal spread. It is native to Africa and Arabia and is grown elsewhere because of the large, white, fragrant flowers. The numerous thorns and frequent branching habit would enable this plant to function as live fencing.

In planting the home grounds, it should be restricted to locations where it is not important to limit the height.

In the description in Macmillan (*10*), the flowering date is given as April to May, but in Puerto Rico the flowers appear in June and July. They are carried individually, chiefly at the branch tips with 9 to 11 petals, and spread to a diameter of 3 inches. A mass

FIGURE 67.—The spiny oncoba has white, fragrant flowers with a mass of yellow stamens.

of yellow stamens forms a cushion 1 inch across in the center of the flower. No seeds have been observed in Puerto Rico, but they are described as round, smooth, and green.

The leaves are alternate with minutely toothed margins and slender tips. The petioles are short, frequently with a thorn at the base.

Grown from seeds when available, or from hardwood cuttings.

Pedilanthus tithymaloides (L.) Poit.
Redbird Slipperflower
"Ipecacuana,"[5] "Itamo Real," "Oreja de Conejo" (fig. 68)
Euphorbiaceae

A native of the Caribbean region, the "ipecacuana" is widely planted for ornamental purposes and as a source of medicine. Its chief ornamental uses are for low hedges and for foundation plantings. The stems do not exceed 5 feet and are usually only about 3 feet.

The flowers are red or purple with a thin corolla tube less than half an inch long. They are produced chiefly in the winter in small terminal groups. The fruit is a capsule slightly shorter than the flower.

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[5]Should not be confused with the true species of Ipecacuana, *Cephaelis ipecacuanha* (Brot.) Rich., a low creeping herb.

FIGURE 68.—*Pedilanthus tithymaloides* is used here as a low hedge along a garden walk.

The 4- to 5-inch leaves are either a uniform green or, in the variegated variety, green and white in irregular patterns. The white areas are near the leaf margins and are often separated by areas of mixed green and white. The variegated variety is the one most frequently grown for ornamental use.

It is propagated by cuttings.

Pentas lanceolata **(Forsk.) Schum.**
Synonym: *P. carnea* Benth.
Egyptian Starcluster (fig. 69)
Rubiaceae

A native of tropical Africa, this species is sparingly cultivated in other regions. One reason for its lack of popularity is that it is susceptible to drought. It will flower vigorously even in pots. It is a low-growing shrub, seldom exceeding a height of 4 feet, and will function in foundation plantings or in low shrub borders. The stems are succulent except at the base.

The flowers occur in flattened, oval clusters at the branch tips. Each flower consists of a slender corolla tube 0.7 inch long, from which five narrow, slender pointed lobes radiate to give a starlike appearance, the basis for the common name. The style extends beyond the petals but the stamens are enclosed in the tube and covered by a mass of fine hairs. Lavender-, pink-, red-, and white-flowered varieties are grown.

The 3- to 5-inch leaves are prominently veined. Fine hairs are found on the young stems and on the underleaf surfaces.

Propagation is by cuttings.

FIGURE 69.—The flowers of the Egyptian starcluster, *Pentas lanceolata*, are lavender, pink, or white, depending on the variety.

***Plumbago capensis* Thunb.**
Cape Plumbago, Leadwort
"Isabel Segunda" (fig. 70)
Plumbaginaceae

The cape plumbago is cultivated both in the Temperate Zone outdoors in the summer as a garden flower, and in the Tropics throughout the year as a low shrub. In some localities, particularly

FIGURE 70.—The cape plumbago, *Plumbago capensis*, produces many blue or white flowers, *A*, in terminal clusters. The stems are woody only near the base and seldom exceed 3 feet in height, *B*.

in the shade, there is a tendency to climb. If unsupported, the plants seldom exceed a height of 3 feet, which make them satisfactory for planting under windows.

The plants are susceptible to sun injury in the Tropics if grown in full sunlight. This is particularly true if the root system is shallow or weak. Flowering is continuous during the rainy season. Stems can serve as a source of cut flowers.

The flowers form at the ends of slender branches. The sepal tube is covered with sticky hairs. The corolla lobes, spreading from the tip of a slender tube nearly 2 inches long, are wider near the tip, with a prominent midvein. Blue- and white-flowered varieties are available and a pink variety is reported.

The leaves develop in clusters at the nodes, the largest exceeding 3 inches. They are slightly contracted at the base.

Plants are grown from cuttings.

Plumeria rubra L.
Nosegay Frangipani, Red Paucipan
"Alhelí Rojo" (fig. 71)
Apocynaceae

This plumeria, a native of continental tropical America, is occasionally cultivated elsewhere, especially in the West Indies. Although it will eventually become a small tree if not disturbed, it will flower and serve as a shrub for many years. The plant can be maintained as a shrub if headed back, particularly in its early

FIGURE 71.—*Plumeria rubra* flowers have an orange throat and pink petals.

stages, to stimulate branching. It is capable of growing in relatively dry regions but succeeds in more humid locations as well. It is useful chiefly as a specimen plant. Several other plumerias are not included because of their more treelike habit.

The flowers appear in June and July in terminal branching clusters. The throat of the flower is golden, gradually changing to pink in the outer portion of the overlapping petals. The stamens are in the base of the flower and can only be seen by breaking open the flower tube.

Plumeria leaves fall during the dry season leaving bare stems. They develop in clusters near ends of branches and may reach a length of 1 foot. The midvein is depressed below the surface of the leaf blade. A prominent marginal vein connects the tips of all the side veins. The young stems are green, turning gray with age.

Propagation is by large cuttings preferably taken near the end of the dormant or leafless season.

Polyalthia suberosa **(Roxb.) Benth. & Hook.**
Synonym: *Uvaria suberosa* Roxb. (fig. 72)
Annonaceae

In India and Ceylon this plant is a small tree or shrub with corky bark. It is seldom seen outside its natural range. In Puerto Rico the plants remain slender, many-branched shrubs not exceeding 10 feet in height. Their chief attraction is the clusters of small, dark-brown fruits that decorate the plants throughout the year.

FIGURE 72.—*Polyalthia suberosa* has small white flowers, *a*, and attractive fruit clusters, *b*.

The small, greenish-white flowers are drooping and largely obscured by the leaves. The flowers are not effective for landscape purposes because of their short life and inconspicuous nature. About 20 almost round fruits, each 0.3 inch long, form in a cluster.

The leaves are 2 to 3 inches long and bluntly tipped. The young stems are covered with fine brown hairs which soon drop leaving a brown, obscurely dotted bark.

Seeds are used for propagation.

Polyscias balfouriana **Bailey**
Synonym: *Aralia balfouriana* Hort.
Balfour Polyscias (fig. 73, *A*)
Araliaceae

Less widely grown than the common *Polyscias guilfoylei,* this species is occasionally used wherever a slower growing, densely foliated shrub is desired. The usual height is about 6 feet. Continuous exposure to tropical sun will turn the normally green portions of the leaves somewhat yellow. If there is a moderate cloud cover or partial tree shade during the day, yellowing does not occur.

Flowers rarely develop. The variegated, compound leaves supply the decorative effect. A leaf usually consists of three nearly circular leaflets blotched with white or intermediate shades of green.

Propagation is by stem cuttings.

Polyscias filicifolia **(Moore) Bailey**
Synonyms: *Aralia filicifolia* Moore, *A. spectabilis* Hort.
Fernleaf Polyscias
"Cubano," "Filipino," "Gallego" (fig. 74)
Araliaceae

The fernleaf polyscias, a native of the Pacific Islands, is grown in conservatories and outdoors in tropical regions for its deeply cut leaves. The plants reach a height of 6 to 8 feet with a slender habit, growing both in full sun and considerable shade. The young leaves are yellow green, and remain yellow longer in full sunlight. The plants are useful for hedging and in the shrub border. Flowering is extremely rare.

The leaves are compound with 5 or 6 pairs of leaflets. The young leaflets are deeply cut, but on old plants the leaflets become much wider and the margins less deeply toothed.

Cuttings are used for propagation.

Polyscias guilfoylei **(Bull) Bailey**
"Gallego" (fig. 73, *B*)
Araliaceae

The gallego is commonly used for tall hedges in tropical regions. It is originally from the South Sea Islands. The plants seldom flower but are nevertheless attractive because the leaflets usually have white margins. The growth is rapid and the form, if not pruned, is tall and slender, reaching 15 feet or more. In order to

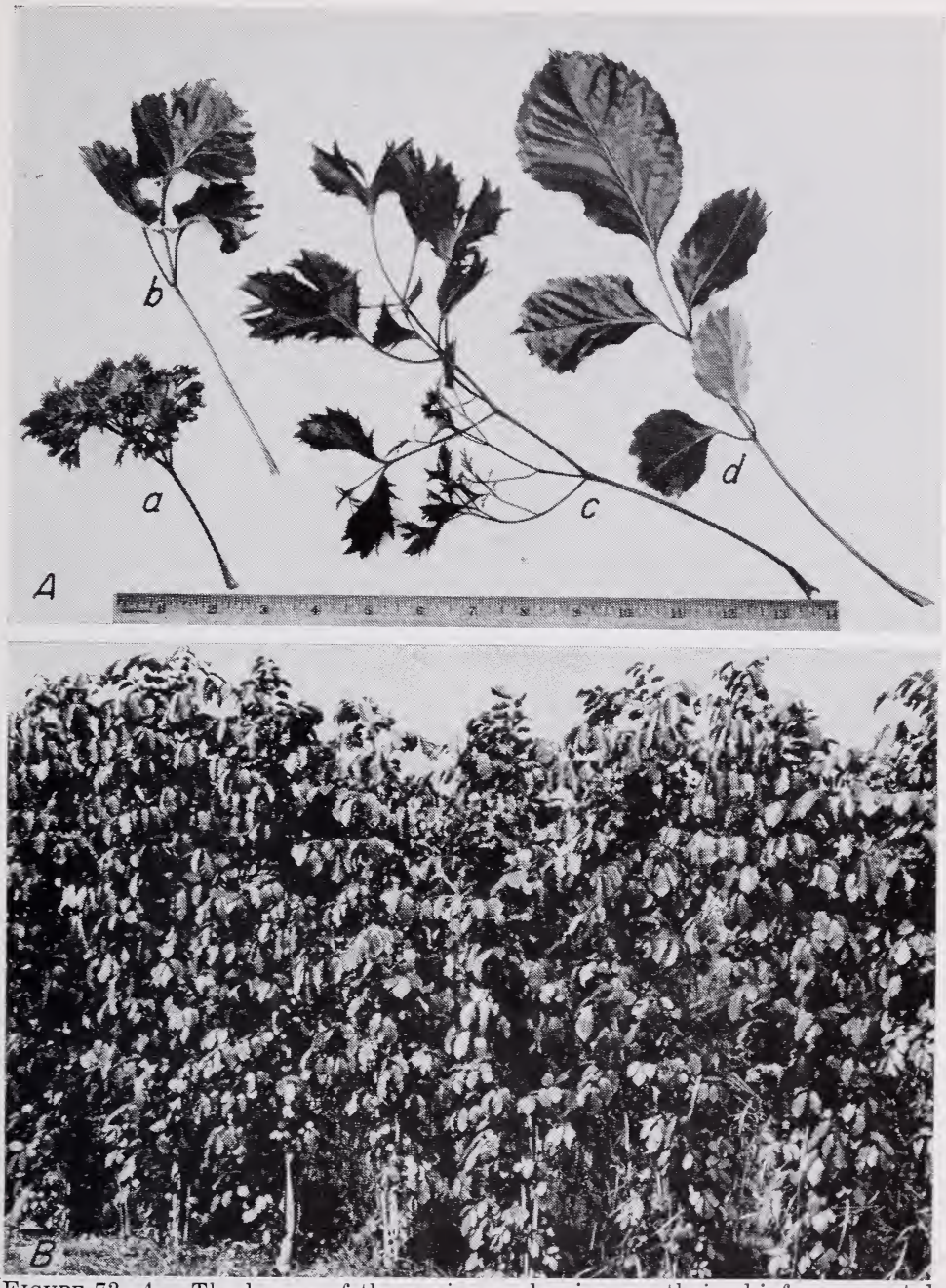

FIGURE 73, *A*.—The leaves of the various polyscias are their chief ornamental value. (*a*) Deeply cut variety; (*b*) *P. balfouriana;* (*c*) *P. guilfoylei* var. *laciniata;* and (*d*) the common type of *P. guilfoylei* whose leaflet margins are usually more variegated.

B.—A hedge of gallego, *P. guilfoylei*, 2 years after planting, about 9 feet tall. The white leaf margins are not conspicuous in this picture.

maintain an attractive hedge the plants should be cut back almost to the ground as soon as established, and headed back at frequent intervals. Several varieties are known with various leaf forms and colorations.

FIGURE 74, *A*.—The fernleaf polyscias, *Polyscias filicifolia*, has deeply cut leaflets with a fernlike texture. The young leaves are yellow at first, later turning green.

B.—On young plants, leaflets are deeply cut but become wider on leaves of old plants.

The leaves are compound with wide leaflets. The terminal leaflets are larger than the laterals. The leaflet margins are finely toothed in most varieties.

Propagation is by stem cuttings; even large branches will root.

Psidium littorale Raddi.
Synonym: *P. cattleianum* Sabine
Cattley Guava, Strawberry Guava (fig. 75)
Myrtaceae

The native home of this species is South America, but it is cultivated to a limited extent in many parts of the world. This kind of guava is quite variable because it includes several forms that were formerly considered distinct species and varieties. Some of these strains have an attractive growth habit which makes them adapted to landscape use. The plants range from 6 to 12 feet or

FIGURE 75.—The cattley guava, *Psidium littorale*, has a rather open habit and rounded form.

occasionally taller. Most plants are grown for the fruits which are used chiefly in preserves. The flowers, though short-lived and not produced in great numbers, are both attractive and fragrant. The ripe fruits are ornamental as well as edible.

The plants grow best in full sun. They thrive in soils too poor for many shrubs, and will survive considerable drought.

The flowers are white, about 1 inch in diameter, with many slender stamens. The fruits are yellow, red, or purple with lemon- or red-colored flesh.

The leaves are 2 to 4 inches long, dark, smooth, and shiny on the upper surface.

Guavas are propagated by seed. Superior lines are best propagated by air layers or root cuttings as they are difficult to bud or graft.

***Punica granatum* L.**
Pomegranate
"Granada" (fig. 76)
Punicaceae

FIGURE 76.—The pomegranate, *Punica granatum*, tends to be straggly unless pruned.

The scientific name comes from two Latin words meaning apple of Carthage and indicates its early culture in the Mediterranean region. It is apparently native to the foothills of the Himalayas. Its edible fruits were carried by travelers to all parts of the world early in the period of colonization. Now this species is well known wherever conditions permit its growth.

While the pomegranate can be pruned to eventually form a tree, it is normally a much-branched shrub 6 to 12 feet high. A dwarf variety is a very slow grower and can be grown in tubs. Pomegranates can be grown in relatively dry regions in full sunlight. Since it is sometimes thorny, it can serve both as an ornamental and as a barrier hedge. The plants can be sheared occasionally with benefit or cut back to make a denser growth than that shown in the accompanying figure. The fruits contain many seeds, each surrounded by an edible pulp. A cooling drink sometimes known as grenadine, is made from the pulp with the addition of water and sugar. In fact this is the best way of utilizing the fruit as the numerous seeds make it difficult to eat out of hand.

The flowers are usually a brilliant orange-red or scarlet, but yellow and white varieties are also available. Most ornamental varieties are double flowered and do not form fruit. The fruits are bright orange-red, 3 to 4 inches in diameter, and carry the sepals at the flower end even at maturity.

The 2- to 4-inch leaves are tapered at both ends. They are opposite or clustered at branch tips and have smooth margins.

Fruiting varieties may be grown from seeds, but superior quality plants and the double-flowered varieties must be grown from cuttings.

Pyracantha crenulata **(Roxb.) Roem.**
Nepal Firethorn (fig. 77)
Rosaceae

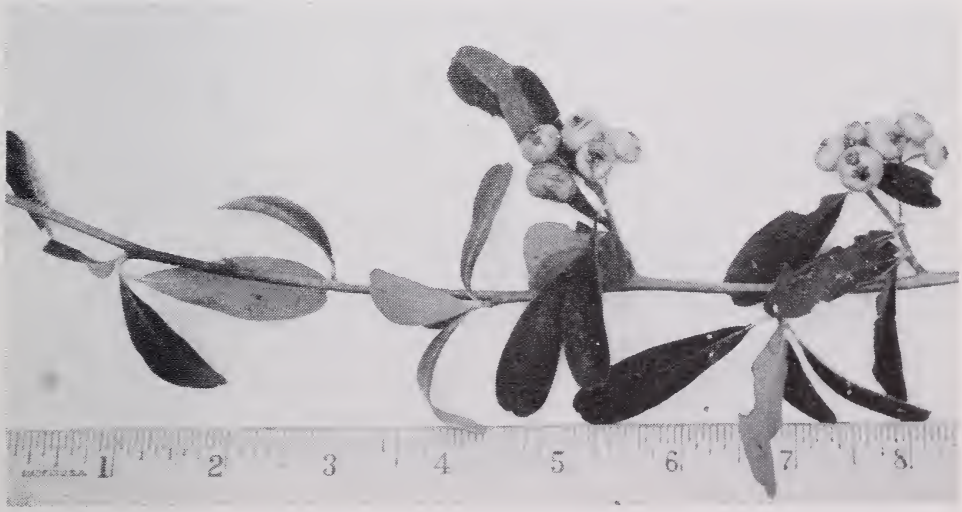

FIGURE 77.—The orange-yellow fruits of *Pyracantha crenulata* develop in the fall.

This tall shrub from the Himalayas is better suited to the temperate regions or higher elevations in the Tropics. Although rarely seen, it will grow and fruit almost down to sea level in Puerto Rico. It has been included because of the dark shiny foliage and the orange-yellow fruits which hang on for several months in the winter. It is also adapted to live fencing, if pruned, because the thorns make penetration difficult. Unpruned plants have an irregular form with long arching branches. It grows best in full sun, in a wide variety of soils.

The flowers are inconspicuous, but the flattened fruits reach 0.4 inch in diameter and carry the withered sepals at the flower end. They grow in small clusters on spur branches.

The leaves reach a length of 2 inches and are widest near the end. Fine teeth are found along the leaf margins of some strains.

Plants are grown from seed.

Quassia amara L.
Surinam Quassia (fig. 78)
Simaroubaceae

The Surinam quassia is a native of northeastern South America and is occasionally planted in other tropical regions. At one time a bitter substance called quassia was extracted from the wood, but now a closely related plant is the chief source of this drug. Under optimum conditions it eventually becomes a small tree, but it grows slowly, especially in unfavorable soils or climates. It

FIGURE 78.—The flowers of the Surinam quassia, *Quassia amara*, are bright red, seldom opening except at the tip. The flower stems and petiole bases are dark red.

functions well as a shrub but may require an occasional pruning. It is useful for the brilliant scarlet flowers. The midveins of the leaves may also turn red under some conditions. The plants grow best in full sunlight. In heavy clay soils or in regions where there is a severe dry season this quassia may make poor growth.

The scarlet flowers are borne on slender, crimson, terminal spikes 4 to 9 inches long. Each 1-inch flower consists of 5 overlapping petals which open only at the tip where the 10 stamens protrude. The fruit is black, 0.3 to 0.5 inch long.

The leaves consist of a terminal leaflet and 1 to 3 pairs of lateral leaflets on a winged central stem which is swollen and red near the base.

It is difficult to propagate. Layering (*23*) and ripe shoots inserted under glass (*15*) are recommended.

FIGURE 79.—The starflower randia blooms intermittently during the summer. Illustration shows a bush in flower.

Randia formosa **(Jacq.) K. Schum.**
Synonym: *Randia mussaenda* DC.
Starflower Randia
"Jazmín de Rosa" (fig. 79)
Rubiaceae

The starflower randia is from Brazil, but it is cultivated in other tropical regions to a limited extent. The plants are usually less than 8 feet tall but occasional specimens may reach 12 feet. It is an upright, well-foliated shrub bearing many white flowers followed by the green fruit with whitish markings which turn yellow on ripening. The plants are useful for screening and shrub borders.

The flowers are solitary from the tips of short side branches or spurs. They have slender, greenish white corolla tubes which open into five white, sharp-pointed lobes in the shape of a star. Flowering occurs in flushes when the shrubs carry a mass of bloom. The fruits reach 1½ inches.

The leaves are formed in tight clusters on the spurs, 1.5 to 3 inches long.

The plants can be grown from seeds or cuttings.

Ricinus communis **L.**
Castor-bean
"Higuereta," "Ricino," "Palma Cristi" (fig. 80)
Euphorbiaceae

The castor-bean came originally from Africa but has been carried from country to country wherever climatic conditions permit its growth. The beans yield a valuable oil for lubricants, and for medicine, fuel, and manufacture of soap. There are numerous races differing in size, leaf form, and seed characteristics. In temperate regions the castor-bean is an annual whose ultimate size depends on the length of the growing season, but in the Tropics it may grow to 30 feet. As the stems are easily pruned, it can be maintained as a tall, spreading shrub.

The large, deeply cut leaves have an exotic appearance, but the flowers are too small to attract much attention. The plants function best as background material.

There are two kinds of flowers. The females appear near the end of the branches and consist of a spiny ovary, tipped by a minute orange-red corolla. The male flowers appear in clusters on the stems below the female ones and consist of a ball of white stamens, 0.3 in. in diameter.

The alternate leaves are usually 8-lobed, cut more than half way to the base of the leaf on foot-long petioles.

Propagation is by seed.

Rosa
Rose (fig. 81)
Rosaceae

Perhaps no plant of the temperate region has been more often planted in the Tropics. It is world-wide in range but is not well

FIGURE 80.—The castor-bean, *Ricinus communis*, is a tall spreading shrub, grown chiefly for its oil-bearing seeds. It is useful for ornamental planting because of its large, exotic-looking leaves.

adapted to lower elevations in tropical regions, where there is a tendency for the flowers to open rapidly and to wither quickly. In Puerto Rico the growth of roses in the mountain region is superior to that near sea level. Roses will grow in either heavy or sandy soils, if the soils are fertile and well drained and there is plenty of sunlight. Most of the roses grown are the hybrid teas, which develop into shrubs and reach 5 feet or more in height if not cut back. Usually the bushes are maintained at any desired height by regulating the length of the flower stems to be cut for indoor decoration. Roses are grown primarily as sources of cut flowers, as the shrubs are not particularly attractive in form. However, they can be used as a part of a shrub border or in a formal garden when the bushes are maintained at a low height. Roses are susceptible to damage from several insects and diseases that may require control measures.

There is a wide array of colors available among the thousands of rose varieties and many kinds have a delightful fragrance. The shrubs will flower almost the year around if watered sufficiently, but a 1- to 2-month rest period is desirable in the dry season. At the time the water supply may be limited but not entirely cut off.

FIGURE 81.—Rose plants are seldom shapely but, even in the Tropics, are frequently grown for their flowers.

For home decoration the flowers should be cut when the buds begin to open.

Most roses are grafted or budded, but cuttings can also be rooted if well protected from strong sunlight and drying winds. Grafting onto vigorous rootstocks is recommended for a more nearly continuous flowering.

The majority of modern hybrid-tea-rose varieties may be expected to do well in the Tropics. Vigor will vary with elevation and climate, and the gardener should experiment with several varieties to determine which are best adapted to his particular location. The hardy Radiance rose varieties have performed especially well in Puerto Rico. Most of these are no longer obtainable from commercial nurseries, but may be propagated easily.

Russelia equisetiformis **Schl. & Cham.**
Synonym: *R. juncea* Zucc.
Coral Plant, Fountainplant
"Coral de Italia," "Lluvia de Coral" (fig. 82)
Scrophulariaceae

Russelias are native to Mexico and Central America. This species is a favorite for Temperate Zone conservatories. It may also be found outdoors in many tropical regions, reaching a height of 6 to 8 feet. The plant is particularly attractive because of its graceful curving branches and its more or less continuous flowering when moisture is not limited. Extremely vigorous growth may be headed back, but the graceful effect of the curving branches is lost if they are all cut back indiscriminately. The plants will

FIGURE 82.—The coral plant, *Russelia equisetiformis*, has many small red flowers and multibranched green stems but the leaves are too small to be noticed without careful examination.

succeed even in a limited volume of soil, as in hanging baskets or in urns, but they will seldom reach the size attained in open planting. Best results are obtained in nearly full sunlight.

The coral-covered flowers are a scant inch long with 5 short corolla lobes of irregular form.

The leaves are nonfunctional and not noticed except on close examination. They are reduced to almost scalelike proportions and appear as a ring below each node or joint. Under heavy rainfall conditions an anthracnoselike disease blackens a few buds and smaller stems.

Plants are propagated by cuttings.

Sambucus simpsonii **Rehder**
Synonym: *S. intermedia insularis* Schwerin
Florida Elder
"Saúco" (fig. 83)
Caprifoliaceae

FIGURE 83.—The saúco, *Sambucus simpsonii*, has white flowers in flattened heads the year around.

The saúco is found in many Caribbean islands, Central America, and southern portions of the Gulf Coast States. In Puerto Rico it grows best at middle elevations, but tolerates garden sites close to sea level. The plants may reach a height of 14 feet but tend to grow irregularly with bare lower stems. Careful heading back of vigorous shoots, especially when the plants are young, will help to develop a more branched, compact growth.

The white flowers appear in large numbers in flattened heads. The 0.3-inch-diameter flowers have 4 to 5 petals. The 5-petaled flowers appear only on the shortest flower branch in each flower head. No fruits have been observed in Puerto Rico, but in Florida black globose fruits 0.2 inch in diameter are common.

The opposite leaves are compound, and the lower leaflets also branch. The leaflets have finely toothed margins. The petioles are ridged on top and swollen at the base where they join the stems.

Propagation is from 2-node stem cuttings where seed is not available.

Scutellaria ventenatii Hook.
Colombia Skullcap (fig. 84)
Labiatae

The common name indicates the South American origin of this low-growing shrub. The plants seldom exceed a height of 4 feet and are woody only in the lower portion of the stem. The scarlet flowers make a brilliant show. The plants are particularly useful under windows or in front of taller growing plants. Much better growth is obtained in fertile soil and full sunlight.

The flowers are clustered at the tips of terminal spikes. The 1-inch tube gradually expands into an irregularly shaped flower consisting of one large and four smaller lobes. A small greenish bract appears below the calyx that covers the small seed.

The leaves are bluntly toothed, with slender tips and heart-shaped base. The petioles are half as long as the blades. The young stems and leaves are covered with fine hairs.

Stem cuttings are used for propagation.

Serjania glabrata H.B.K.
Heartkey Serjania (fig. 85)
Sapindaceae

The heartkey serjania is a climbing shrub with occasional tendrils. If planted alone it makes a spreading shrub. It grows best in well-drained soils.

The flowers are formed in terminal branching clusters 2 to 4 inches long. The creamy white flowers are less than ½ inch in diameter. The black shiny seeds are fused in groups of three.

The compound leaves consist of five leaflets; the lower pair are again divided. All leaflets have toothed margins and slender tips.

Propagation is from seed.

FIGURE 84.—A low-growing shrub, the Colombia skullcap, *Scutellaria ventenatii*, has bright red flowers.

FIGURE 85.—*Serjania glabrata* is a climbing shrub with creamy white flowers.

Stenolobium stans **(Juss.) Seem.**
Synonym: *Tecoma stans* Juss.
Florida Yellowtrumpet
"Saúco Amarillo" (fig. 86)
Bignoniaceae

This tecoma is one of the better, yellow-flowered shrubs for the Tropics, reaching a height of 20 feet. It grows vigorously in the sandy soils and also in heavy soils of many tropical regions. The plants are useful for screening because the foliage is dense, frequently reaching to the ground. For general planting, they should not be spaced closer than 20 feet from walks or buildings, or from each other unless one is prepared to restrain the spread by regular pruning.

The bright yellow flowers are formed in greatest profusion in the winter months, although some flowering may continue throughout the year. The flowers appear in large, branching, terminal clusters. Each flower is like a rounded funnel with short lobes spreading from the lip. The seeds are in slender pods 5 to 6 inches long.

The leaves are compound, with 7 to 11 slender-pointed leaflets with fine marginal teeth.

Propagation is usually by seed, but soft greenwood cuttings will root.

FIGURE 86.—The Florida yellowtrumpet, *Stenolobium stans*, carries bright yellow flowers in profusion.

***Synsepalum dulcificum* (Schum.) Daniell**
Miracle Fruit (fig. 87)
Sapotaceae

The U. S. Department of Agriculture introduced this much branched shrub into the United States from Cameroun, West Africa, where it attains a height of 6 feet. In Puerto Rico it has proved a slow grower in heavy soil, seldom exceeding 4 feet, but is densely foliated. It is, therefore, well suited for locations requiring strictly limited height. The fruits are not particularly sweet but have the remarkable property of sweetening the taste of sour fruits eaten up to several hours later. It is believed that the juice temporarily paralyzes the sour taste buds in the mouth.

The flowers are minute, without landscape value; but the dark-red, capsule-shaped fruits are attractive ornaments, one-half inch long.

The narrow leaves are closely set at branch tips on very short petioles. The blades are widest near the tip end, with a long, tapering base.

Plants are grown from seed.

FIGURE 87.—The miracle fruit, *Synsepalum dulcificum*, is a low, much branched shrub with red capsulelike fruit, shown close to the ruler. Any sour fruit eaten after one of the miracle fruit will taste sweeter than normal.

Tabernaemontana coronaria **(Jacq.) Willd.**
Synonym: *Ervatamia coronaria*
Wild Crape-jasmine (fig. 88, *A*)
Apocynaceae

The original home of this many flowered shrub is unknown, but it is used extensively in tropical countries and other areas which experience only an occasional light frost. The plants are frequently grouped for a mass effect. They are useful under windows or in similar locations, because they seldom exceed a height of 5 feet. Growth is good in full sunlight or light shade, with soil enriched by additional organic matter.

The numerous 1- to 2-inch flowers appear throughout the year in few flowered clusters. They are white and usually double, with crinkled petal margins resembling those of the double white oleander. Some strains have a sweet fragrance.

The leaves are shiny green and slender-pointed at both ends.

New plants of the single varieties can be grown from seed, but the superior and more common double strains must be propagated from cuttings, which root fairly rapidly.

Tabernaemontana panducaqui **Poir.**
Synonym: *Ervatamia panducaqui* (fig. 88, *B*)
Apocynaceae

FIGURE 88, *A.*—*Tabernaemontana coronaria* has double white flowers that attract attention.

B.—A tall rounded shrub, *T. panducaqui*, has delightful dark-green foliage and small, delicate flowers.

The U. S. Department of Agriculture, Division of Plant Introduction and Exploration, introduced this *Tabernaemontana* from the Philippines. Although it grows well under tropical conditions,

it is rarely seen in tropical plantings. It grows to a height of 12 feet with a rounded form. The foliage is dark green and attractive. The white flowers and orange-red seeds are not numerous or large enough for a mass floral effect. Growth is dense and regular, practically eliminating the necessity of pruning. The plants are well suited for screening and border planting.

The flowers consist of a thin, greenish white tube with five white, narrow lobes reaching a diameter of 1.4 inches. They occur in short terminal clusters of 8 to 14 flowers, only one or two opening at a time. The fruits are 0.7 to 1.5 inches long and decorative. They ripen in the fall after the summer blooming season.

The slender-pointed leaves are 4 to 6 inches long with very short petioles.

Plants are grown from seed.

Thevetia ahoui (L.) A. DC. (fig. 89, *A*)
Apocynaceae

This thevetia from tropical America is a relatively new introduction in tropical horticulture. Plants of this species have not been growing in the collection at Mayaguez long enough to determine whether they will finally become trees. Eight-year-old plants are still quite bushy in form but have reached a height of 8 to 10 feet and are upright in character. They flower during most of the year. The plants are attractive in form and can be used as specimens, but plenty of space should be allowed for ultimate growth.

The flowers are creamy yellow, consisting of a ridged tube and 5 lobes spreading to 2 inches in diameter. They form in terminal clusters on green flower stems.

The alternate 6- to 7-inch leaves have a width of 1½ inches, or several times that of *Thevetia peruviana*. The stems remain green for some distance back from the tip. Both the stems and leaves contain a milky juice which is probably poisonous like many other members of this family.

A yellow caterpillar with black spots and bands, *Paradosis flegia* Cram., in some locations may occasionally partially or completely defoliate the plants.

Plants can be produced from stem cuttings.

Thevetia peruviana (Pers.) Merr.
Synonyms: *Thevetia neriifolia* Juss., *Cerbera thevetia* L.
Lucky Nut, Yellow Oleander
"Cabalonga," "Caballón" (fig. 89, *B*)
Apocynaceae

The lucky nut is planted for ornament in the West Indies and to a lesser extent in other tropical regions. In regions experiencing light frost it remains a shrub but in the Tropics, if not pruned, it can become a small tree under favorable conditions. It is highly ornamental because of the yellow flowers and shiny, abundant foliage. It is not tolerant of wet soils, but is adapted to arid regions and full sunlight. It is useful in shrub borders because it is densely foliated. The fruits are used for ornament in the Far East, where they are strung like beads for necklaces or carried as a charm.

FIGURE 89, *A.*—*Thevetia ahoui* is a tall shrub with creamy yellow flowers. *B.*—The orange-yellow flowers of the lucky nut, *T. peruviana*, harmonize with the dark shiny green of the slender leaves.

The flowers are trumpet shaped, 3 inches long; although they are normally yellow, there is also an orange-colored variety. The corolla remains in a half-opened condition much of the time, but the sepals point straight out from their base. The fruit are rounded, triangular, slightly more than an inch wide. The nuts are enclosed in a thin layer of flesh.

THE LEAVES AND STEM CONTAIN A POISONOUS MILKY JUICE THAT MAY BE USED MEDICINALLY IN SMALL QUANTITIES.

The leaves are 6 to 7 inches long but less than one-half inch wide with practically no petiole. The leaves and stem are subject to attack by the yellow caterpillar discussed under *Thevetia ahoui.*

Plants may be propagated from seed or cuttings.

Thryallis glauca **(Cav.) Kuntze**
Synonyms: *Galphimia glauca* Cav., *Thryallis gracilis* (Bartl.) Kuntze
Goldshower Thryallis
"Consuelito," "Lluvia de Oro," "Reseda" (fig. 90)
Malpighiaceae

FIGURE 90.—*Thryallis glauca* used for foundation planting in combination with *Nephrolepis exaltata* (in the urn) and *Cordyline terminalis* (right).

This species, a native of Mexico, is naturalized in many warmer sections of the Western Hemisphere where it is also commonly planted as an ornamental. The plants which are slow growers seldom exceed 10 feet, and are easily restrained in locations where the height must be limited. Unpruned plants have an irregular form more suitable for informal designs. They grow best in full sun and will thrive on sandy and unfertile soil.

The yellow flowers are sometimes tinged with red. Their length is 1 inch or slightly less, and the petals are more or less constricted at the base. They are produced in profusion on slender terminal spikes and are followed by small spherical seed capsules containing dark brown seeds.

The thin, slender, 2- to 3-inch leaves have short petioles.

Plants are easily grown from seed.

Thunbergia erecta **(Benth.) T. Anders.**
Bush Clockvine
"Viuda" (fig. 91)
Acanthaceae

The bush clockvine is a native of tropical West Africa. It is one of the most commonly cultivated shrubs in many warmer sections of the world. It grows up to 6 feet and flowers during most of the year. Since it can be sheared and is slow growing, it is particularly useful for low to medium hedges. It is relatively tolerant of adverse soil conditions and can be grown in partial shade as well as full sunlight.

There are three color forms, all with yellow throats. The most common has dark-blue petals, although light-blue and white-flowered varieties are occasionally seen. The flowers occur singly in the leaf axils. The corolla lobes spread from the top of the curved, funnel-shaped throat and have irregular margins.

The opposite leaves are on petioles which are usually curved. They are small but numerous, with an irregular outline, and seldom exceed a length of 2 inches.

As seeds are rare, propagation is usually by means of stem cuttings.

Tithonia diversifolia **(Hemsl.) Gray**
Yucatan Tithonia (fig. 92)
Compositae

Mexico and Guatemala are the home of this tithonia which is also grown in India, Ceylon, and some other tropical regions. It is best adapted to full sunlight where the plants reach a height of 6 to 12 feet or occasionally even more, with an upright growth habit. Their chief usefulness is in localities where the effect of tall plants is wanted quickly. They are short lived so should be replaced with more permanent species as soon as possible.

The orange-yellow flower heads are produced on thickened stems during late fall and winter. At Mayaguez they are frequently stung by an unidentified insect, and this results in deformed flowers.

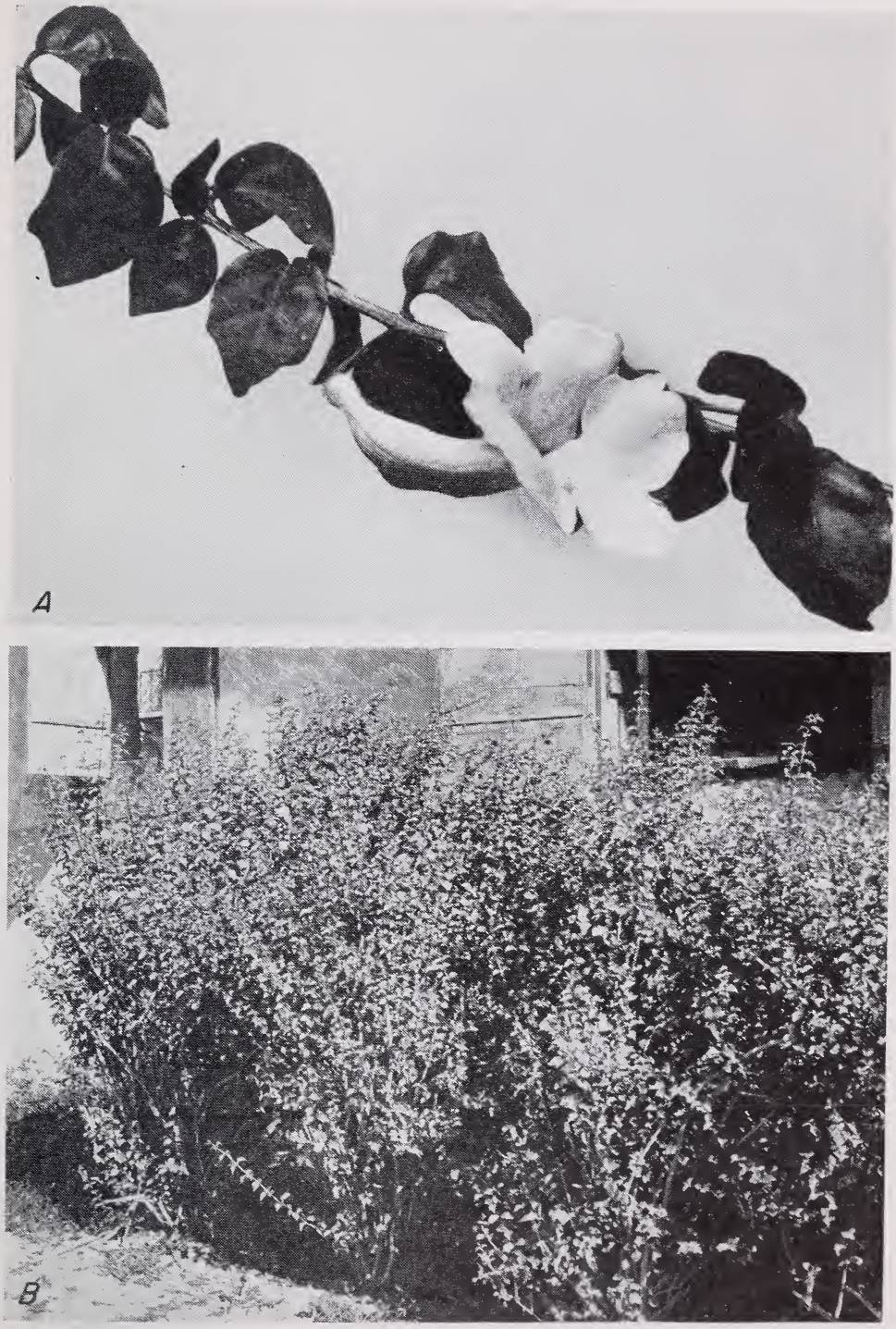

FIGURE 91, *A*.—The bush clockvine, *Thunbergia erecta*, has a curved flower tube with wavy petals. This is the white variety. *B*, The plants are excellent for hedges and foundation planting because they are everblooming and easily grown.

FIGURE 92.—The Yucatan tithonia, *Tithonia diversifolia*, is a tall, quick-growing shrub (*A*), with large orange-yellow flower heads (*B*).

The 8- to 10-inch leaves are variously cut, often with 3 to 5 long lobes.

Propagation is by seed.

Triphasia trifolia (Burm. f.) P. Wilson
Limeberry
"China de Bakón," "Chinita," "Limón de Jerusalén" (fig. 93)
Rutaceae

FIGURE 93.—The deep red fruits of the limeberry, *Triphasia trifolia*, make it attractive as an ornamental and are useful for preserves (*a*). The whitish flowers (*b*) are too small for landscape interest.

This native of the East Indies is widely used for hedges and natural fences, particularly in alkaline regions, because of its high salt tolerance. The fruit is useful for preserves. The name *trifolia* is derived from the three leaflets that compose the leaf. The plants will grow as high as 15 feet under favorable conditions, but are usually 6 or 8 feet. They will stand reasonable pruning or shearing and make excellent hedges or natural fences because of the many sharp thorns. They tolerate considerable shade, but under these conditions growth is drastically reduced.

The white flowers, about 1 inch in diameter, are formed close to the stem but are too short lived for effective display. The elongated, globose berry turns dark maroon when fully ripe.

The short leaves are 3-parted with the center one larger than those on each side. There is a pair of spines at the base of each leaf.

Seeds germinate readily for propagation.

Vinca rosea L.
Synonyms: *Lochnera rosea* (L.) Reichenb., *Catharanthus roseus* (L.) Don
Madagascar-periwinkle
"Cangrejera," "Desbarata Casamiento," "Playera," "Flor de Todo el Año" (fig. 94)
Apocynaceae

Although a native of the Eastern Hemisphere, the Madagascar-periwinkle probably did not originate in Madagascar as the name implies. It is widely planted in tropical and subtropical regions. This low-growing plant seldom exceeds 3 feet. Its stems are woody only at the base. The plants can be used for edgings and other locations requiring permanently low growth. They flower almost continuously throughout the year. The five petals are narrow at the base but several times as wide at the tip. The most common color type is lavender purple. Other varieties include pure white or white with a pink or reddish eye.

The 2-inch, opposite leaves are widest above the middle. They have prominent midveins and short petioles. The stem is gray.

It is propagated by seed or cuttings.

Vitex negundo L.
Negundo Chaste-tree
"Chencherenche?", "Sauzgatillo?" (fig. 95)
Verbenaceae

This beautiful blue-flowered shrub has been introduced into many parts of the world from China. Although well adapted to tropical lowland conditions, it is also hardy enough to grow in many warmer sections of the Temperate Zone. It tolerates arid regions and alkali soils. Under tropical conditions it eventually reaches a height of as much as 20 feet if undisturbed. Best growth occurs in full sunlight but it also grows under considerable shade. The plants are naturally spreading and will cover an area that is wider than their height. Since it is not adapted to close pruning, this vitex should not be planted in any area closer than 20 feet to walks or other obstructions. The flowers are very attractive to bees and serve as a source of honey. The Chinese use the young shoots occasionally for weaving baskets.

FIGURE 94.—There are several different color forms of the Madagascar-periwinkle, *Vinca rosea*. This is the wild, magenta-colored type.

The flowers are described as lilac or lavender but the plants at Mayaguez are almost pure blue. A flower is only 0.3 inch long, with 2 pairs of stamens extending beyond the petals. Fruits are small containing a hard seed.

The leaves consist of five to seven slender leaflets radiating from the tip of the 3- to 4-inch common petiole. The central leaflets reach a length of 3 to 4 inches, while those on the margins are less than

FIGURE 95.—The brilliant blue color of the *Vitex negundo* flowers is lost in this black and white photograph.

half as long. The undersurface is light gray while the upper is medium to dark green. The younger stems are nearly square in cross section.

Seed, soft stem cuttings, and layers can be employed for propagation.

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