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PLANT DIVERSITY AND UTILIZATION PATTERNS OF SELECTED HOME GARDENS IN KOLLAM DISTRICT, KERALA -A CASE STUDY

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ABSTRACT:

The present study revealed that home gardens of Kollam district of Kerala are having diverse plant resources of both ecological and economic significance. A preliminary vegetation survey was conducted in 10 different home gardens in Kollam district of Kerala. A total of 255 plant species belonging to 202 genera and representing 83 families was encountered from 10 home gardens consisting of 57 trees 52 shrubs and 146 herbs excluding cultivars of Musa and Heveaspp, of these The different use category plants are studied, including 156 ornamental plants , 27fruits yielding plants, 30 species of vegetables, 150 species of medicinal plants, 24 species of timbers, 16 species of fuel woods, 18 species of spices and10 species of miscellaneous plants are presented of these plants IUCN, RET category and endemic plants like Baccoureacourtalensis, Vateriaindica, Woodfordiafruticosa, Saracaasoka were encountered.. Hence It is necessary to study in detail whether home gardening in Kerala can be a viable mechanism for biodiversity/ex-situ conservation of Biodiversity.Thus Home gardening can play an important role in advancing food and nutritional security and also strengthening the provisioning of numerous ecosystem services in conserving the Biodiversity.

Key words: Ex-situ conservation, Home gardens, Ago-biodiversity,

INTRODUCTION:

Home gardens play an important role in conserving agro-biodiversity, they serve as refuges for crops and crop varieties that were once more widespread in the larger agro-ecosystem. There is an increasing interest in Home Gardens (HGs) as biodiversity hot spots and also there is increasing evidence that traditional agroforestry systems(on-farm Conservation) stand as a promising option to conserve it (Gardener et al 2009). However, knowledge on how sociocultural characteristics and environment influence knowledge and management of HG species is still limited. Home gardens play an important role in conserving agro-biodiversity. However, the importance of home gardens in the production of food, medicine miscellaneous and timber categories were the most frequent component followed by fruits, timber and vegetables and other useful products for human beings is widely recognized. In many places across the world, home gardening is a traditional conservation system. Where some key versatile plant species are grown by local farmers near their houses(Galluzi et al 2010) . Webb and Kabir (2009) reported the home gardening for tropical biodiversity conservation and examined whether home gardening is viable conservation option-even it is an option of

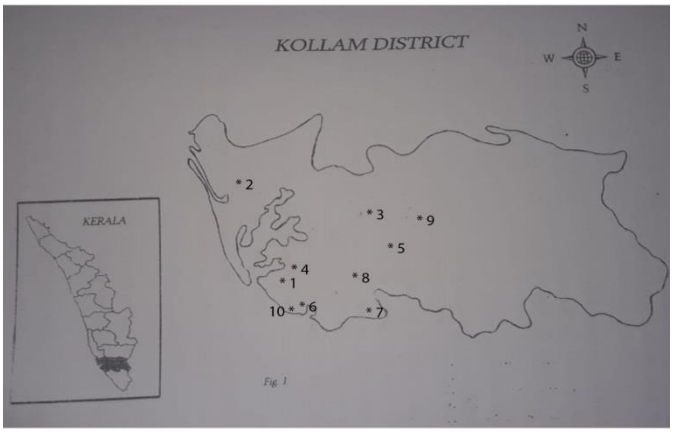
"last resort" in degraded landscapes. Home gardening, the agroforestry practice of planting a mixed patch of livelihood-oriented perennial and annual species with in a clearly bounded area near the homestead (Fernandes& Nair 1986).Home gardens also serve as sink of carbon, thereby playing an ecological role in the current global climate change scenario (Saha et al. 2009). Home gardens can also serve as buffer zones around protected areas. Farmers often use home gardens as site for experimentation and introduction of new cultivars arising from exchange and interactions between cultures and communities, or as sites for domestication of wild species.

There is a lack of information and documentation on the traditional home gardens of Kollam district of Kerala. Therefore the present study was carried out on the home garden species diversity and floristic composition and utilization pattern in and around Kollam in the selected ten homes these home gardens farming system will provide fresh vegetables and fruits leading to enriched and balanced diets supplementing proteins vitamins and minerals (Galhena et al. 2013) Through supply of medicinal herbs and an opportunity for physical activity, home gardens are also important to human health and wellbeing. Thus, home gardens can improve food security, diversity, nutritious value, and the microenvironment around the family home.

MATERIALS AND METHODS:

In the present study, the Home gardens were surveyed in and around Kollam district for the floristic composition and the uses of plants in these home gardens and their conservation were conducted in ten home gardens from Kollam corporation and different panchayaths such as Sasthamkotta, Perayam, Nedumpana, Thrikkovilvattomkalluvathukkal,Ezhukone and Aadichanalloor of Kollam district (latitude 10^0 00^1 N & longitude 76^0 25^1 E) (Fig.1) In the study sites the plant species were observed in the site itself and photographs were taken for the identified. The habits of individual species such as herb, shrub, trees and climbers are recorded. Information regarding utilization pattern of home garden plants were collected by the interaction with the house owners, focusing on: (i) Selection of home garden plants, (ii) utilization pattern of available plant species, and (iii) Traditional management practice for conservation of endemic,Rare, Endangered and Threatened (RET) species. The economically important plants were then classified into different use categories such as Fruits, Medicinal, Ornamental, timber, vegetables, fuels and miscellaneous. Study were conducted in ten individual homes, the house owners name and location, address and extent of area are furnished. The study sites were noted as S1-S10.

Fig.1. Showing the study sites in Kollam, Kerala



1.MUNDAKKAL,
2.SASTHAMKOTTA
3.MULAVANA
4.MADANNADA, KOLLAM
5.NEDUMONKAVU
6.TRIKKOVILVATTOM, KOTTIYAM
7.KALLUVATHUKKAL
8.ADUTHALA
9.EZHUKONE
10.THAZHUTHALA, KOTTIYAM

RESULT AND DISCUSSIONS:

A total of 255plant species belonging to 202genera and representing 83families was encountered from Ten home gardens consisting of 57 trees, 52shrubs and 146 herbs excluding cultivars of Musa. Although the number of trees, documented was higher than shrubs and herbs. The different use category plants are studied, including 156 ornamental plants , 27 fruits yielding plants, 30 species of Vegetables, 150 species of medicinal plants, 24 species of timbers, 16 species of fuel woods, 18 species of spices and10specis of Miscellaneous plants are presented. Similar studies were reported on Floristic composition and plant utilization pattern in home gardens of Upper Assam was reported (Albuquerque et al (2005), Saikiaet al .2012). These small scale home gardens can produce high crop yields of fruits and vegetables through judicious management of inputs needed for achieving sustainability. Agro biodiversity is a confluence of the past, present and future and both tangible and intangible resource critical for both rural and urban food and nutrition security and also the agro biodiversity has a critical role in play in dealing with the issue of under nutrition and hence dynamic conservation of agro biodiversity needs to be alleviating poverty and malnutrition. (Anil Kumar et al .,2015)

The majority of home gardens species are useful for different purposes. Plants of Ornamentals, Medicinal uses, Fruits spices, vegetables timbers, Miscellaneous and fuel wood were categorized. The minimal use categories are fuel wood and miscellaneous. Occurrence percentage of different plant species in each category varied among different home gardens. Mangiferaindica, Artocarpusheterophyllus, Cocosnucifera, Azadirachtaindica, Aloe vera and Simarubaglauca are the common tree species the study sites than the others. Medicinal plants having different curative properties were abundant in all the home gardens. Most important are Azadirachtaindica, Zingiber officinalis, Catharanthusroseus, Oscimum sanctum, Aloe vera. Most common ornamental plants such as Jasminumsambac, Hibiscus rosa-sinensis, Catharanthusroseus, Portulucagrandiflorum. Fruits such as Musa paradisiaca, ,Mangiferaindica, Artocarpusheterophyllus and Anonamuricata. Timber plants such as Tectonagrandis, Swieteniamacrophylla, Artocarpushirsutus, Artocarpusheterophyllus. Fuel plants such as Macarangapelatata, Ailanthus excelsa, Heveabrasiliensis, Cocosnucifera. Spices such as Curcuma longa, Zingiber officinalis, Tamarindusindica, Garciniagummi-gutta, Piper nigrum etc.

However the percentage of different use category of plants in Fig. 2 shown highest of Ornamental plants followed by medicinal plants and the plant species shown 12.55 per cent vegetables and 11.29 percent fruits which shows high nutritional and economic significance during the Covid 19 pandemic scenario.

Fig.2. Percentage of species in different use categories in the selected home gardens

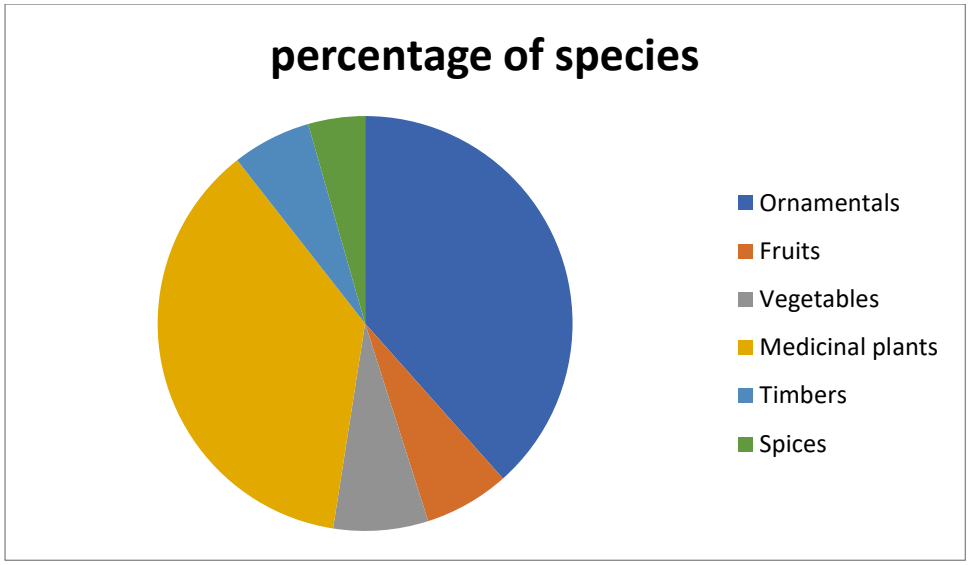
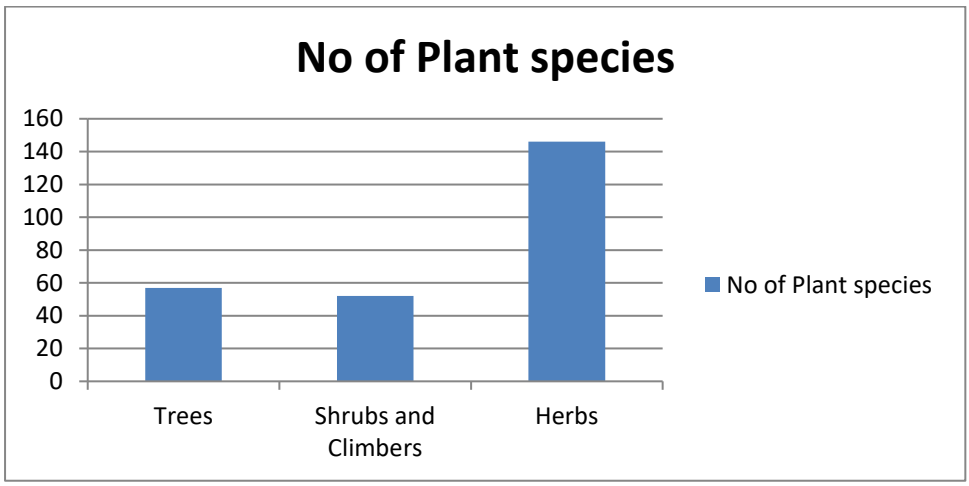


Fig.3.Percentage of species in different Habits in the selected home grdens



Among the total no of plant species (255) the percentage of occurrence of different habits was not uniform,. Maximum percentage 57.25 of herbs followed by 22.35 % Trees (excluding the cultivars of Musa and Heaveaspp) and minimum of 20.39 % of shrubs.(Fig.3)

The importance of home gardens in the production of food, medicine and other useful products for human beings is widely recognized. About 30 species of vegetable and 27 species of Fruit yielding crops and 150 medicinal plants were reported in the present study. In addition to increasing access to fresh and nutritious food, home gardens also strengthen supporting, provisioning, regulating, and cultural/social ecosystem services. Site-specific examples of these Ecosystem services include: 1) soil formation and primary production for supporting services, 2) food, fiber, fresh water and infra-structure foundation of provisioning services, 3) micro-climate modification, flood control, water purification, soil bioremediation and decontamination for regulating services, and 4) aesthetical, spiritual, recreational, and social for cultural services. More over the percentage of endemic plants (native plants) is higher (which is about 29%) in all sites, non-native plants was higher in ornamental plants (which is about 71 %).Most importantly conservation of IUCN Red listed rare plant species such as Saracaasoka, Woodfordiafruticosa, and Vateriaindica are well conserved and signify home gardens as a store house of rare plant genetic resources. In the present study indicates that the home gardens may be the possible option to maintain species ex-situ like a wild

edible fruit tree Baccoureacourtallensis(Mootipazham) previously found in forests domesticated in the home gardens. In this context, this study focuses on ex situ conservation of agro-biodiversity in those small but highly diversified ecological niches generally known as home gardens.

The distribution of plant species are varied in the selected Home gardens in Kollam district (Table.1) The distribution of Ocimum sanctum is 100 per cent, followed by Musa paradisica (Banana-80%), Cocosnucifera(Coconut-80%), Mangiferaindica (mango-80%), Aloe vera (80%), Ixoracoccinia (60%) Artocarpusheterphylla (Jack-60%), Azadirachtaindica (Neem-50%) . The occurrence of banana trees in all HGs shows the importance of Nutritional value and inevitable components present in the fruits and this fruits is commonly used in all home gardens. The 100 percent occurrence of Ocimum used as herbal medicine used for curing cough, fever, breathing troubles and also used as a blood purifier. The other trees like coconut, mango and Jack are grown in every HG for its edible purposes and few trees and herbs are grown for the religious purposes. The minimum distribution 10-30 per cent shows the garden specific ornamental plants like Orchids, Anthurium,flowering herbs, shrubs and hanging plants for the avenue and beautification purposes in the HGs.

Proper nutrition is vital to maintain good health with stronger immune system. A balanced diet will guarantee a strong immune system that can help to withstand any disease. Agro biodiversity has a critical role in maintaining nutritional security. Growing tubers is a common practice in home gardens of Kerala such as *Dioscoreaalata* (Greater yam / kachil) , *Amorphophalluspaeoniifolius* (elephant yam / chena) , *Colocasiaesculenta* (chembu) , *Manihotesculenta* (Marachini / tapioca) and these tubers are widely used as famine food with chilly chatni (side dish). Then eat fresh vegetables available in home gardens like *Abelmoschusesculentus*(okra), *Solanummelogena* (brinjal) , *Solanumlycopersicum* (tomato) ,and different varieties of chillies like *Capsicumfrutescences* , *Capsicumannuum*, *Capsicumchinense* . A combination of*Capsicumfrutescences* with tuber is traditional food in Kerala and is good for health. At last fruit varieties like *Ananascomosus*(pineapple), *Mangiferaindica* (Mango) , *Annonamuricata* (Mullatha) and varieties of banana such as *Musavelutina*, *Musasapientum*, *Musaacuminata* , *Musaparadisiaca*. In the current situation, the specific fruit, vegetable, and tuber varieties can improve our immune system.

Thus, home gardens can improve food security, diversity, nutritious value, and the microenvironment around the family home. The present study revealed that Home gardens in Kollam district of Kerala are the depositories of diverse plant resources of both ecological and economic significance. Also home gardens may be considered as a vital source of income in the present scenario.

Table 1. Species occurrence and their distribution level in selected Home Gardens of Kollam District, Kerala.

S. No	Species	Samples of Home Gardens (GH)										Per cent distribution
		HG 1	HG 2	HG 3	HG 4	HG 5	HG 6	HG 7	HG 8	HG 9	HG 10	
	Trees				-							
1	Acrassapota	-	-	-	-	-	-	-	+	-	-	10
2	Aeglemarmelos	-	-	-	-	-	-	+	-	-	-	10
3	Alianthusexcelsa	-	+	-	-	-	-	-	-	-	-	10
4	Alstoniascholaris	-	-	+	-	-	-	-	-	-	-	10
5	Anacardiumoccidentale	+	+	+	-	-	-	+	+	-	-	50

6	Annonamuricata	+	-	+	-	-	-	+	+	-	-	40
7	Annonareticulata	-	+	-	-	-	-	-	-	-	-	10
8	Annonasquamosa	-	-	+	-	-	-	+	-	-	+	30
9	Araaucariahetrophylla	-	-	+	-	-	-	-	-	-	-	10
10	Areca catechu	-	-	+	-	-	-	-	-	-	-	10
11	Artocarpusheteropyllus	+	-	+	-	+	+	+	-	+	-	60
12	Artocarpushirsutus	-	-	+	-	-	-	-	-	-	-	10
13	Averrhoecarumbola	-	+	-	-	-	-	-	-	-	-	10
14	Azadiractaindica	-	-	+	-	-	+	+	+	-	+	50
	Baccouriacourtallensis	+	-	-	-	-	-	-	-	-	-	10
15	Bambusa bamboo	-	-	-	+	-	-	-	-	-	-	10
16	Bambusa vulgaris	+	-	+	-	-	-	-	-	-	-	20
17	Carica papaya	+	-	-	-	-	-	-	+	-	-	20
18	Cassia fistula	-	-	+	-	-	-	-	-	-	-	10
19	Ceibapentandra	-	+	-	-	-	-	-	-	-	-	10
20	Cinnamomumverum	-	-	-	-	-	-	-	+	+	-	20
21	Citrus lemon	+	-	-	-	-	-	+	-	-	-	20
22	Citussinessis	+	-	-	-	-	-	-	-	-	-	10
23	Cocosnucifera	+	+	+	+	+	+	+	+	-	-	80
24	Commiphoracaudata	-	+	-	-	-	-	-	-	-	-	10
25	Cordylineterminalis	-	-	+	-	-	-	-	-	-	-	10
26	Cycasrevoluta	+	-	-	-	-	-	-	-	-	-	10
27	Epipremnumaureum	-	-	+	-	-	-	-	-	-	-	10
28	Ficusbengalensis	-	-	+	-	-	-	-	-	-	-	10
29	Ficusbenjamina	-	-	-	-	+	-	-	+	-	-	20
30	Ficusreligiosa	+	-	-	-	-	-	-	-	-	-	10
31	Ficusscitifolia	+	-	-	-	-	-	-	-	-	-	10
32	Garciniagummigutta	-	+	-	-	-	+	+	+	-	-	40
33	Heveabrasilensis	-	-	-	-	-	-	-	+	-	-	10
34	Macarangapeltata	-	+	-	-	-	-	-	-	-	-	10
35	Mangiferaindica	+	+	+	+	+	+	+	+	-	-	80
36	Metrosiderosmarcopus	-	-	-	-	-	-	+	-	-	-	10
37	Moringaoleifera	-	+	-	-	+	-	-	+	-	-	30
38	Morusnigra	-	+	-	-	-	-	-	-	-	-	10
39	Musa paradasiaca	+	+	+	+	+	+	-	+	+	-	80
40	Nepheliumlappeceum	-	+	-	-	-	-	-	-	-	-	10
41	Perseaamericana	-	-	-	-	-	-	+	-	-	-	10
42	Phyllanthusemblica	-	-	-	-	-	-	-	+	-	-	10
43	Psidiumgujava	-	+	+	-	-	-	+	-	+	-	40
44	Punicagranatum	-	+	-	-	-	-	-	-	-	-	10
45	Saracaasoka	-	+	-	-	-	+	-	+	-	-	30
46	Simaroubaglauca	-	-	+	-	-	-	-	+	-	-	20
47	Strychnusnux - vomica	-	-	-	-	-	-	-	-	+	-	10
48	Swieteniamacrophylla	-	+	-	-	+	-	-	+	-	-	30
49	Syzygiummalscense	-	-	-	-	-	-	+	-	-	-	10
50	Syzygiumsamarangense	-	-	-	-	-	-	-	-	-	+	10
51	Tamarindusindica	+	-	-	-	-	-	+	-	-	-	20
52	Tectonagrandis	+	+	-	-	+	+	-	+	-	-	50

53	Theobramacacoa	+	-	-	-	-	-	-	-	-	-	10
54	Thespesiapopulnia	-	+	-	-	-	-	-	-	-	-	10
55	Triphosiatrifolia	-	+	-	-	-	-	-	-	-	-	10
56	Vateriaindica	-	-	-	-	-	+	-	-	-		
57	Ziziphusmauritiana	-	+	-	-	-	-	-	-	-	-	10
	Shrubs			-		-	-	-				
58	Allamandacathartica	+	-	-	-	-	-	-	-	-	-	10
59	Amorphophalluspaeoniifolius	-	+	-	-	-	-	-	-	-	-	10
60	Boganvillaeglabra	-	-	-	-	-	-	-	-	+	-	10
61	Bougainvillea spectabilus	-	+	-	-	-	+	-	-	+	+	40
62	Caesalpiniapulcherrima	-	-	-	-	-	+	-	-	-	+	20
63	Calotropisgigantea	-	-	-	-	-	-	-	-	-	+	10
64	Chrysanthamumspp	-	-	-	-	-	-	-	+	-	-	10
65	Clitoriaternatea	-	-	-	-	-	-	+	-	-	-	10
66	Cocciniagrandis	-	-	-	+	-	-	-	-	-	-	10
67	Codiaeumvariegatum	-	+	-	+	-	-	-	-	-	-	20
68	Coffeaarabica	-	-	+	-	-	-	-	-	-	-	10
69	Colacasiaesculenta	-	+	+	-	-	-	-	-	-	-	20
70	Crossandrainfundibuliformis	-	-	+	-	-	-	+	-	-	-	20
71	Cyrtostacysrenda	+	-	-	-	-	-	-	-	-	-	10
72	Dracaena reflexa	-	-	+	-	+	-	-	-	-	-	20
73	Durantaerecta	-	+	-	-	+	-	-	-	-	-	20
74	Epiphyllumoxypetalum	-	-	-	-	+	-	-	-	-	-	10
75	Gomphrenaglobosa	-	+	-	-	-	-	-	-	-	-	10
76	Hamelia patens	-	+	-	-	+	-	-	-	-	-	20
77	Hebiscusrosasinensis	-	-	+	-	+	+	+	+	+	-	60
78	Heliconiarostrata	-	-	-	-	-	+	-	-	-	-	10
79	Hibiscus malvavisus	-	-	-	-	-	-	-	-	-	+	10
80	Hibiscus waimeae	-	+	-	-	-	-	+	-	-	-	20
81	Ipomoea batatas	-	-	-	-	+	-	-	-	-	-	10
82	Ixoracocconia	-	-	+	-	+	+	-	+	+	-	50
83	Jasminumspp	-	-	-	-	-	-	-	-	+	-	10
84	Lantana camara	+	-	-	-	-	-	-	-	-	-	10
85	Lawsoniainermis	-	-	-	-	+	-	-	-	-	-	10
86	Manihotesculenta	-	+	+	-	-	+	+	-	+	-	50
87	Momordicacharantia	+	-	+	+	-	-	-	+	+	-	50
88	Murraya exotica	-	-	-	-	-	-	-	-	-	+	10
89	Murrayakoeingii	-	-	-	+	-	-	-	-	-	+	20
90	Nerium oleander	-	-	-	-	+	-	-	-	+	-	10
91	Passifloraedulis	-	+	-	-	-	-	+	-	-	+	30
92	Perseaamericana	-	-	-	-	-	-	+	-	-	-	10
93	Piper nigrum	-	-	+	+	+	-	-	+	+	-	50
94	Plectranthuscolcoides	-	-	-	-	-	-	+	-	-	-	10
95	Plumeriapudica	-	-	-	-	+	-	-	-	-	-	10
96	Plumeriapudica	-	-	+	-	-	-	-	-	-	-	10
97	Plumeriarubra	-	-	-	-	+	-	-	-	-	-	10

98	Prunussavium	-	-	-	-	-	-	-	-	+	-	10
99	Punicagranatum	+	-	-	-	+	-	+	-	-	-	30
100	Sasanqua Camellia	-	-	-	-	-	-	-	-	+	-	10
101	Sesbaniagrandiflora	-	-	-	-	-	-	+	+	-	-	20
102	Strebulusasper	-	-	-	-	-	-	+	-	-	-	10
103	Tabernaemontanadivericata	-	+	-	-	+	-	+	-	-	-	30
104	Tecomacapensis	-	-	-	-	-	-	+	-	-	-	10
105	Tibouchinamutabilis	-	-	-	-	-	-	-	+	+	-	20
106	Tinosporacordifolia	-	+	-	-	-	-	-	-	-	-	10
107	Trichosanthesanguina	+	-	-	-	-	-	-	-	-	-	10
108	Vitexnegundo	-	-	-	-	-	-	-	+	-	-	10
109	Woodfordiafruticosa	+	-	-	-	-	-	-	-	-	-	10
	Herbs											
110	Abutilon theophrasti	-	-	-	-	-	-	-	+	-	-	10
111	Adenaummultiflorum	-	-	-	+	-	-	-	-	-	-	10
112	Adeniumarabisum	-	-	-	-	-	-	+	-	-	-	10
113	Adeniumobesum	-	-	+	-	-	-	-	-	-	-	10
114	Aerideslawrenceae	-	+	-	-	-	-	-	-	-	-	10
115	Alocasiaamazonica	-	-	-	-	-	-	+	-	+	-	20
116	Aloe vera	-	+	+	+	+	-	-	+	-	+	60
117	Amaranthusbilitum	-	-	-	+	-	-	-	-	-	-	10
118	Amaranthusdubis	+	-	+	-	-	-	-	+	-	-	30
119	Ananasnanus	-	-	-	-	-	-	-	+	-	-	10
120	Ananassativus	-	-	+	-	-	-	-	-	-	-	10
121	Anthuriumpallidiflorum	+	-	-	-	-	-	-	-	-	-	10
122	Anthuriumandreanum	+	-	-	-	-	-	-	-	-	-	10
12	Anthuriumandreanum	+	-	-	-	-	+	+	-	-	-	30

3												
124	Anthuriumcrystallium	-	-	-	-	-	-	+	-	-	-	10
125	Anthuriumcutucuense	+	-	-	-	-	-	-	-	-	-	10
126	Anthuriumobovatum	+	-	-	-	-	-	-	-	-	-	10
127	Asparagus seataceus	+	-	-	-	-	-	-	-	-	-	10
128	Aspidistra elatior	-	-	+	-	-	-	-	-	-	-	10
129	Aspidistra elatior	-	-	-	-	-	-	+	-	-	-	10
130	Bacopamonnieri	-	+	-	-	-	+	+	-	-	-	30
131	Barlareiacristata	+	-	-	-	-	-	-	-	-	-	10
132	Barlerialupulina	-	-	+	-	-	-	-	-	-	-	10
133	Begonia cuculata	-	-	-	+	-	-	-	-	-	-	10
134	Begonia obliqua	-	-	+	-	-	-	-	-	-	-	10
135	Bletillastriata	+	-	-	-	-	-	-	-	-	-	10
136	Brassica oleracea	-	-	-	-	-	-	-	+	-	-	10
137	Calatheaspp	-	-	-	-	-	-	-	+	-	-	10
138	CalatheaZebrina	-	-	-	-	-	-	+	-	-	-	10
139	Callisiafragrans	-	-	-	-	-	-	+	-	-	-	10
140	Capsicum annum	+	+	+	-	-	-	-	-	-	-	30
141	Capsicum fruitenscens	+	+	-	-	-	-	-	-	-	-	20
142	Catharanthusroseus	+	+	+	-	-	-	-	-	-	-	30
143	Catleyaspp	+	-	-	-	-	-	-	-	-	-	10
144	Celosia cristata	-	+	+	-	-	-	-	-	-	-	20
145	Centellaasiatica	-	+	+	-	-	-	-	+	+	-	40
146	Cestrum laevigatum	-	-	-	-	-	-	+	-	-	-	10
147	Chlorophytumcosmosum	-	-	-	+	-	-	-	-	-	-	10
14	Chloropythumcomosum	+	-	-	-	-	-	-	+	-	-	20

8												
149	Clematis terniflora	+	-	-	-	-	-	-	-	-	-	10
150	Cnidoscolusaconittifolius	-	+	-	-	-	-	-	-	-	-	10
151	Codiaeumpunctuatum	-	-	-	-	-	-	+	-	-	-	10
152	Codiaeumvariegatum	-	+	-	-	-	-	-	-	-	-	10
153	Codiaeumvariegatum	-	-	-	-	-	-	+	-	-	-	10
154	Coleus hybridus	-	-	+	-	-	-	-	-	-	-	10
155	Cordylineastralis	-	-	+	-	-	-	-	-	-	-	10
156	Cordylinefruticosa	+	-	-	-	-	-	-	-	-	-	10
157	CordylineTerminalis	-	-	-	-	-	-	+	-	-	-	10
158	Ctenantheoppenheimiana	-	-	-	-	-	-	+	-	-	-	10
159	Cuphaehyssopifolia	+	-	-	-	-	-	-	-	-	-	10
160	Curcuma aromatica	-	+	-	+	-	-	-	-	-	-	20
161	Curcuma caeisa	-	-	-	-	-	-	+	-	-	-	10
162	Curcuma longa	-	+	-	-	+	-	+	-	-	-	30
163	Cymbidium spp	+	-	-	-	-	-	-	-	-	-	10
164	Cymbopogoncitratus	-	-	-	-	-	-	+	-	-	-	10
165	Daucuscarota	-	-	-	-	-	-	-	+	-	-	10
166	Dendrobiummoniliforme	-	+	-	-	-	-	-	-	-	-	10
167	Dendrobium noble	+	+	+	-	-	-	-	-	-	-	30
168	Dianthus barbatus	-	+	-	-	-	-	-	-	-	-	10
169	Dieffenbachia amoena	-	-	-	-	-	-	+	-	-	-	10
170	Dieffenbachia seguine	-	-	+	-	-	+	-	-	-	-	20
171	Dracenatrifusciata	+	-	-	-	-	-	-	-	-	-	10
172	Dracula simia	+	-	-	-	-	-	-	-	-	-	10
17	Ecliptaprostrata	-	+	-	-	-	-	-	-	+	+	30

3												
174	Epidendrumradicans	-	+	-	-	-	-	-	-	-	-	10
175	Epipremnumaureum	+	-	-	-	-	-	-	-	-	-	10
176	Erucavesicaria	-	-	-	-	-	-	-	+	-	-	10
177	Eryngiumfoetidium	-	+	-	-	-	-	-	-	-	-	10
178	Euphorbia milli	+	+	-	-	-	-	-	-	-	-	20
179	Evolvulusalsinoides	-	+	-	-	-	-	-	-	-	-	10
180	Fittoniaalbevenis	+	-	-	-	-	-	-	-	-	-	10
181	Geberajamesonii	+	-	-	-	-	-	-	-	-	-	10
182	Gingiberofficinalis	-	-	-	+	-	-	-	+	-	-	20
183	Gomesabifolia	+	-	-	-	-	-	-	-	-	-	10
184	Gomphrenaglobosa	+	-	+	-	-	-	-	+	-	-	30
185	Gossipiumhirsutum	+	-	-	-	-	-	-	-	-	-	10
186	Graptophylumpictum	-	-	+	-	-	-	-	-	-	-	10
187	Hedychiumcoronarium	-	+	-	-	-	-	-	-	+	-	20
189	Hydrangiamacrophylla	-	+	-	-	-	-	-	-	-	-	10
190	Impatiens balsamina	-	+	-	-	-	-	-	-	+	-	20
191	Impatiens wallerians	-	-	+	-	-	-	-	-	-	-	10
192	Ipomoea batatas	-	-	-	-	-	-	-	+	-	-	10
193	Kaempferiagalanga	-	-	-	+	-	-	-	-	-	-	10
194	Lalblahpurpureus	+	-	-	-	-	-	-	-	-	-	10
195	Lathyrusodaratus	+	-	-	-	-	-	-	-	-	-	10
196	Leearubra	-	-	-	-	-	-	+	-	-	-	10
197	Liriopespicata	-	-	+	-	-	-	-	-	-	-	10
198	Menthapiperita	-	-	-	-	-	-	+	-	-	-	10
19	Menthapipertia	-	+	-	-	-	-	-	-	-	-	10

9												
200	Mirabalisjalappa	+	-	-	-	-	-	-	-	-	-	10
201	Monstera oblique	-	-	-	-	-	+	-	-	-	-	10
202	Nepenthes belle	-	-	-	-	-	-	+	-	-	-	10
203	Ocimum sanctum	+	+	+	+	+	+	+	+	+	+	100
204	Ocimumtenuiflorum	-	-	-	-	-	-	+	-	-	-	10
205	Oncidiumbauerii	+	+	-	-	-	-	-	-	-	-	20
206	Onsidiumflexuosus	-	+	-	-	-	-	-	-	-	-	10
207	Opuntiacochenillifera	-	-	-	-	-	-	-	+	-	-	10
208	Oxalis corniculata	-	-	-	-	-	-	+	-	-	-	10
209	Oxalis trianqularis	-	-	-	-	-	-	+	-	-	-	10
210	Pajenalialongifolia	-	-	+	-	-	-	-	-	-	-	10
211	Pandanusamaryllifolius	-	+	-	-	-	-	-	-	-	-	10
212	Pentuslanceolata	+	-	-	-	-	-	-	-	-	-	10
213	Phalarasarundinaceae	-	-	-	+	-	-	-	-	-	-	10
214	Phalenopsisaphrodite	+	+	-	-	-	-	-	-	-	-	20
215	Phaseolus vulgaris	-	-	+	-	-	-	-	-	-	-	10
216	Philodendron bipinnatifidum	-	-	-	-	-	-	+	-	-	-	10
217	Philodendron burle marc	-	-	-	-	+	+	-	-	-	-	20
218	Phormiumtenax	-	-	-	-	-	-	+	-	-	-	10
219	Phragmipediumkovachii	-	+	-	-	-	-	-	-	-	-	10
220	Phyllanthusniruri	-	+	-	+	-	-	-	-	-	-	20
221	Pisumsativum	+	+	-	-	-	-	-	-	-	-	20
222	Plectanthuscolevides	-	-	-	-	-	-	+	-	-	-	10
223	Plectranthusamboinicus	-	+	-	-	-	-	+	-	-	-	20
22	Plicoblastusviridistriatus	+	-	-	-	-	-	-	-	-	-	10

4												
225	Polysciasbaulfouriana	-	-	+	-	-	-	-	-	-	-	10
226	Polysciasfruticosa	-	-	+	-	-	-	-	-	-	-	10
227	Polysciasguifoylei	+	-	-	-	-	-	-	-	-	-	10
228	Portulacagrandiflora	+	-	+	-	-	-	-	-	-	-	20
229	Psychopsisspp	-	+	-	-	-	-	-	-	-	-	10
230	Rhyncostylisgigantae	+	-	-	-	-	-	-	-	-	-	10
231	Rhyncostylisretusa	+	-	-	-	-	-	-	-	-	-	10
232	Rosa gallica	-	+	-	-	-	-	-	-	-	-	10
233	Rosa rubignosa	-	+	+	-	-	-	-	-	-	-	20
234	Russeliaequisetiformis	-	-	-	-	-	-	+	-	-	-	10
235	Sansevieriaspp	+	-	-	-	-	-	-	+	-	-	20
236	Sapthiphyllumwallisii	-	-	-	-	-	-	-	+	-	-	10
237	Scheffleraaraboricola	-	-	-	-	-	-	+	-	-	-	10
238	Selaginellapallescens	+	-	-	-	-	-	-	-	-	-	10
239	Sidaacuta	-	-	+	-	-	+	-	-	-	-	20
240	Solanaumnigrum	-	-	-	-	-	-	-	-	-	+	10
241	Solanumlycopersicum	+	-	-	+	-	-	-	-	-	-	20
242	Solanummelongena	+	-	-	+	-	-	-	-	-	-	20
243	Spathoglottisplicata	-	+	-	+	-	-	-	-	-	-	20
244	Spinaciaoleraca	-	-	-	-	-	-	-	+	-	-	10
245	Synedrellanodiflora	-	-	-	-	-	-	+	-	-	-	10
246	Syngoniumpodophyllum	-	-	-	-	-	-	-	+	-	-	10
247	Talinumfruticosm	+	-	-	-	-	-	-	-	-	-	10
248	Tillandsiausneoides	-	-	-	-	-	-	-	+	-	-	10
24	Tradescantiaflumiensis	-	-	+	-	-	-	-	-	-	-	10

9												
250	Tradescantiapallida	-	+	+	-	-	-	-	-	-	-	10
251	Tradescantiaspatheceae	-	+	-	-	-	-	+	-	-	-	20
252	Tradescantiazebrina	-	+	+	-	-	-	-	-	-	-	20
523	Vanda ascocenda	-	+	-	-	-	-	-	-	+	-	20
254	Zamioculcaszamifolia	-	-	-	-	-	-	+	-	-	-	10
255	Zephyranthesrosea	-	+	-	-	-	-	-	-	-	-	10

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