Journal of Tropical **Agriculture** 37 (1999) : 110-114

CROP-TREE INVENTORY OF THE HOME GARDENS OF SOUTHERN KERALA

Homegardens. an excellent example of the many systems and practices of agroforestry. has been one of the survival strategies of the farmers of Kerala since time immemorial. Home gardens comprise a specific land use system. in which plants. animals and man co-exist in a mutually symbiotic manner. which is an essential component of ecological security. The value of home gardens as sources of crops and varieties is assessed by analysis of their species diversity. Moreover. knowledge on the composition of the home gardens could serve as an effective tool for land use planning and development. Despite the importance of this system to the economy of the State and its people. very little research (Babu *et al*.. 1992; Salam *et al*.. 1992) fes been undertaken to critically study the diversity and structure of homegardens. The present study was therefore undertaken with the objective of obtaining a detailed inventory of the crops / trees grown in the homegardens of southern Kerala and to assess the variation in their relative predominance with respect to agroecological zones. The study formed part of an ICAR *ad hoc* project entitled Homestead Agro-forestry Systems of Kerala: Productivity of the Extant Homestead Models and Increasing the Efficiency of the Models. A systems inventory description survey covering 400 households was undertaken in Thiruvananthapuram district of southern Kerala. The different trees and crops grown in the homesteads were ascertained through personal interview and visual identification. Ornamental plants were not considered in the study. The data were subjected to frequency and percentage analysis. The plant population in each crop category div ided by the sum total of plants of all categories and expressed as percentage was used to rank the crop categories in their order of predominance. The differences between the agro-ecological subzones of the region identified by the KAU (1989) were evaluated by analysis of variance technique for unequal replications (Snedecor and Cochran. 1967). The average size of home gardens surveyed in the southern region was 0.33 ha per holding. There was significant difference between the agroecological regions with respect to the holding size total number of plants and species diversity (Table 1). The farmers deliberately retained and managed numerous species of crops and trees

Table 1. Comparison of home gardens located in different agro-ecological zones of southern Kerala

Attribute	Average per homestead			CD (0.05)			
	Highland (H)	Lowland (L)	Midland (M)	Whole region	HI.	HM	LM
Area (cents)	138.27 (0.55 ha)	56.90 (0.23 ha)	78.77 (0.32 ha)	83.32 (0.3.3 ha)	28.49	23.89	21.331
Total number of plants	765.07	138.75	385 80	3932X	293.23	245.91	219.520
Number of species	13.77	12.89	15.32	14.60	NS	NS	1.646
Number of plants							
Coconut	42.12	55.85	52.95	51.91	NS	NS	NS
Fruit crops	221.7.3	33.85	58.39	77.99	154.04	129.18	NS
Tubers crops	292.60	2.3.75	205.29	182.08	99.21	83.20	74.276
Spice crops	24.48	6.98	15.05	14.85	10.80	9.06	NS
Vegetable crops	5.10	8.91	14.93	12.25	NS	NS	NS
Timber and fuel trees	9.42	3.79	13.33	10.83	NS	NS	5.279
Fodder crops	0.83	1.31	7.87	5.50	NS	NS	NS
Rubber	145.67	0.00	15.54	31.95	35.083	29.421	NS
Miscellaneous	23.12	4.31	2.46	5.93	12.941	10.230	NS

NS-not significant

Table ' Crop/tree species noticed in the home gardens of southern Kerala

Common name	Scientific name	Nature of growth	Uses
Oil yielders			
Coconut	*Cocos nucifera*	P	1 3, 4 5, 8 11 12
Tuber crops			
Taro	*Colocasia esculentus*	A	1, 12
Elephant yam	*Amorphophallus paeniifolius*	A	1, 14
Tapioca	*Manihot esculenta*	A	1, 12
Arrowroot	*Maranta arundinacea*	A	1, 12
Lesser yam	***Dioscorea*** *esculenta.*	A	1. 14
Greater yam	*Dioscorea alata*	A	1
Chinese potato	*Coleus parviflorus*	A	1
Sweet potato	*Ipomoea batatus*	A	1, 12, 14
Mango ginger	***Curcuma*** *amada*	A	1.7
Spices and condiments			
Cinnamon	*Cinnamomum zeylanicum*	P	7, 8, 12, 14
Clove	***Eugenia*** *caryophyllum*	P	7, 8, 12. 14
Nutmeg	*Myristica fragrans*	P	7. 8. 12. 14
Tamarind	*Tamarindus indicus*	P	1. 3, 7. 12. 14
Ginger	*Zingiber officinale*	A	7, 8. 14
Turmeric	***Curcuma*** *longa*	A	7. 12. 13, 14,
Pepper	***Piper*** *nigrum*	P	7, 14
Curry leaf	*Murraya koenigi*	P	7
Cardamom	*Elettaria cardamomum*	P	7, 12. 14
Garcinia	*Garcinia indica*	P	7. 12
Chilli	*Capsicum annuum*	A	7, 14
Pippali	*Piper longum*	P	7, 14
Fruits			
Cashew	*Anacardium occidentale*	P	1. 4. 8. 11. 12
Banana	*Musa* spp.	A	1. 14
Jack fruit	***A*** *rtocarpus heterophyllus*	P	1. 2. 3. 4
Breadfruit	*Artocarpus altilis*	P	1, 12
Mango	*Mangifera indica*	P	1. 2. 13
Sapota	*Achras sapota*	P	1
Guava	*Psidium guajava*	P	1.3, 12
Bullock's heart	*Annona reticulata*	P	1. 8. 12
Seethaphal	*Annona squamosa*	P	1,8
Egg fruit	*Poutia campechiana*	P	1
Pomegranate	*Punica granatum*	P	1, 14
Lovi-lovi	*Flacortia inermis*	P	1
Pineapple	***Ananas*** *comosus*	A	1,5, 12. 14
Rose apple	*Euginia jambosa*	P	1
Papaya	*Carica papaya*	P	1,6, 12. 14
Njaval	*Zizyphus jujuba*	P	1. 2. 14
Cherry	*Malpighia glabra*	P	1, 12

Table 2 continued

Karakka	*Carisa caronda*	P	1
Lime	*Citrus aurantifolia*	P	1, 8, 12, 14
Bamblimass	*Citrus maxima*	P	1, 8, 12, 14
Fig	*Ficus carica*	P	1, 14
Passion fruit	*Passiflora edulis*	P	1
Aonla	*Emblica officinalis*	P	1, 3, 12, 14
Bilimbi	*Averrhoia bilimbi*	P	1
Mangosteen	*Garcinia mangostana*	P	1, 14
Palmyrah	*Borassus flabellifer*	P	1, 3, 11, 12
Carambola	*Averrhoa carambola*	P	1, 12
Timber/fuel trees			
Wild jack / ayoni	*Artocarpus hirsute*	P	3, 4
Ailanthus / matty	*Ailanthus triphysa*	P	3, 12, 14
Eucalyptus	*Eucalyptus* spp.	P	4, 8, 9, 12, 14
Mahogany	*Swietenia macrophylla*	P	3
Teak	*Tectona grandis*	P	3, 12
Portia	*Thespesia populenea*	P	1, 2, 3, 8, 14
Uthimaram	*Lannia coromandelica*	P	1, 3, 6, 12
Red silk cotton	*Rombax ceiba*	P	1, 2, 3, 5, 6, 12
Silk cotton	*Ceiba pentandra*	P	4, 5, 8, 12
Bamboo	*Bambusa arundinacea*	P	3, 12
Acacia	*Acacia auriculiformis*	P	4, 9, 12
Subabul	*Leucaena leucocephala*	P	1, 2, 3, 4, 9, 10, 12
Morinda	*Morinda tinctoria*	P	1, 2, 3, 12
Vatta	*Macaranga pellala*	P	4, 6
Azhantha	*Pazanelia rheedii*	P	3, 12
Albizzia	*Paraserianthes falcataria*	P	2, 3, 9, 12
Mangium	*Acacia mangium*	P	3
Casuarina	*Casuarina equisettifolia*	P	3, 4, 12
Arjun	*Terminalia arjuna*	P	3, 12, 14
Malay bushbeech	*Gmelina arborea*	P	3, 12
Pezha	*Careya arborea*	P	3, 5, 12
Erythrina	*Erythrina indica*	P	4, 2, 9, 12,
Indian kinotree	*Pterocarpus marsupium*	P	1, 3, 6, 12, 14
Indian rosewood	*Dalbergia latifolia*	P	3
Fodder grasses			
Napier grass	*Pennisetum purpureum*	P	2
Guinea grass	*Panicum maximum*	P	2
Vegetables			
Cowpea	*Vigna unguiculata*	A	1,2
Agathi	*Sesbania grandiflora*	P	1, 2, 5, 9, 12, 14
Kuppameni	*Acalypha indica*	P	1, 14
Drumstick tree	*Moringa oleifera*	P	1, 8, 12, 14

Table 2 continued

Amaranth	*Amaranthus* spp.	A	1, 2
Bhindi	*Abelmoschus esculentus*	A	1, 5, 8, 12
Brinjal	*Solanum melongena*	A	1
Chekurmanis	*Psoropus androgayanus*	P	1
Bitter gourd	*Momordica charantia*	A	1
Cucumber	*Cucumis sativus*	A	1, 8, 14
Snake gourd	*Trichosanthes anguina*	A	1, 14
Winged bean	*Psophocarpus tetragonolobus*	A	1, 2
Radish	*Raphanus sativa*	A	1, 14
Ash gourd	*Benincasa hispida*	A	1
Bottle gourd	*Lagenaria vulgaris*	A	1, 12, 14
Cluster bean	*Cyamopsis tetragonaloba*	A	1, 2, 6, 12
Ivy gourd	*Coccinia cordifolia*	A	1, 14
Pumpkin	*Cucurbita maxima*	A	1, 14
Ridge gourd	*Luffa aculanguta*	A	1, 5
Sword bean	*Canavalia gladiata*	A	1
Chundakkai	*Solarium torvum*	A	1, 14
Broad bean	*Vicia faba*	A	1,2
Beverages			
Cocoa	*Theobroma cacao*	P	11, 12, 14
Arecanut	*Areca catechu*	P	11, 12, 13, 14
Betel vine	*Piper betel*	P	11
Coffee	*Coffea arabica*	P	11
Miscellaneous			
Rubber	*Hevea brazilensis*	P	3, 6, 12
Neem	*Azadirachta indica*	P	1, 3, 8, 12, 14
Glyricidia	*Glyricidia sepium*	P	10
Indian almond	*Terminalia catappa*	P	1, 3, 12
Sugarcane	*Saccharum officinarum*	A	1, 4, 11, 12
Mulberry	*Moms alba*	P	1, 12

Nature of growth : A = Annual P = Perennial
Uses : 1. Food, 2. Fodder, 3. Timber, 4. Fuel, 5. Fibre, 6. Latex/gum, 7. Spice, 8. Oil, 9. Shade, 10. Live fence, 11. Beverage / stimulant, 12. Commercial products, 13. Religious, 14. Medicine

in their home gardens (Table 2). In the southern region, tuber crops (46.3 % of total plants of all categories) predominated among the crop categories, followed by fruits (19.3 %), coconut (13.3 %) rubber (8.12 %), spices (3.78 %), vegetables (3.11 %), timber/fuel trees (2.75 %) and fodder crops (1.4 %). In the highlands, tuber crops dominated followed by fruits, rubber, coconut, spices, timber/fuel trees, vegetables and fodder. Tuber crops predominated in the midlands followed by fruits, coconut, rubber, spices, vegetables, timber / fuel trees and fodder. In lowlands the predominance was in the order of coconut, fruits, tubers, vegetables, spices, timber/fuel trees, fodder and rubber. Among the tropical tubers, cassava (64.19 % of total tuber crops) was most commonly grown, followed by taro (14.56 %). *Dioscorea* spp. (8.44 %), elephant foot yam (8.08 %) and sweet potato (1.74 %). The predominance of tuber crops in the home gardens may be due to the fact that they can be grown with relatively little care as understorey species in partial shade and yet yield reasonably. Nair (1993) made similar observations in our tropical homegardens. Among fruits, banana (50.65 % of total fruit crops), pineapple (34.14 %), jack (4.27 %), mango

(3.46 cashew (1.68 %), guava (1.11 %), annona (1.06 %) papaya (1.04 %), rose apple (0.50 %) and lovi-lovi (0.38 %) were most widely planted. Rubber was grown in several homesteads of southern Kerala and is fast becoming a home garden tree crop, especially in the highlands. This is in accordance with the findings of Soemarwoto (1987) who stated that when market demand and price offered for a certain plant product becomes high, the cultivation of that species spread. Cultivation of spices like pepper (57.33 % of total spice crops), clove (2.90 %) curry leaf (12.20). ginger (11.31 %), turmeric (6.56 %), tamarind (4.98 %) and nutmeg (1.20 %) were very popular. The low predominance of vegetables in highlands was probably due to the increased rubber cultivation. Soemarwoto (1987) reported a similar instance of replacement of less valued vegetables by commercialization. The tree density was found to increase as the size of holding decreased. In large holdings. (> 2.00 ha) the tree density was worked out as 368.55 per hectare while in very small holdings (0.02-0.20 ha), it was 403.32 per hectare. Ailanthus (26.59 %), wild jack (19.52 %), teak (15.60 %), portia (8.24 %) and erythrina (7.75 %) were the most preferred timber/fuel trees. Comparatively poor cultivation of fodder crops by the farmers in their home gardens may be due to the high dependence on non-conventional feeds and oilcakes for feeding the cattle.

With respect to the structural arrangement of the tree/crop components. it was found the home gardens with a multitude of crops. presented a multitier canopy configuration. The upper canopy (> 25 m) went to coconut. arecanut. certain fruit and timber/fuel trees. This was followed by certain medium sized fruit, spice and timber/fuel trees (10-20 m). The third layer (3-10 m) comprised of crops like pepper. tree spices and certain fruit trees. The lower storey (1-3 m) was occupied fey banana. cassava and other tuber crops. At the floor level, pineapple, vegetables and other herbaceous crops were grown. The structural arrangement observed in the homegardens in the prcsenl study are similar to those of the tropical gardens described by Fernandes and Nair (1986).

The concepl of mixlures to create diversity is appropriately extended in the home gardens of southern Kerala. by growing woody and herbaceous perennials in association with seasonal annuals. The exlenl and magnilude of all the advantages of home gardens. however. are not same for all families. They vary wilh the level of structural complexity and size of the home gardens.

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