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Investigation of Agroforestry species of tea estate of KMTR region in Southern Western Ghats, Tirunelveli District, Tamilnadu

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Abstract

The present study deal with investigation of agroforestry species of Nalmukh, Kuthiraivetti and Manjolai regions of Kalakad Mundanthurai Tiger Reserve (KMTR), Tirunelveli District, Tamil nadu. The study area of Nalmukh, Kuthiraivetti and Manjolai were observed by exploration of agroforestry species found in the randomly selected area of tea estate period from 2015-2016. The results of study area were encountered in the 87 species identified in both angiosperms and pteridophytes. Agroforestry region of Nalmukh, Kuthiraivetti and Manjolai were cultivated in the tea plantations. Most of the species were identified by high medicinal values. The agroforestry species were identified in maximum number of species in lauraceae family. Agroforest plants were cultivated, protecting the soils and conservation of this area of KMTR regions.

Keywords: Biodiversity, KMTR, Nalmukh, Kuthiraivetti and Manjolai, Agroforestry, Agriculture, plants

1 INTRODUCTION

The natural forest resource continues to play a major role in improving the livelihood of local communities. Still now, world's forest resources are very shrinking and disappearing at an alarming rate due to heavy harvesting and cutting trees for wood purposes. Agroforestry refers the sustainable land use system that combines arable crops with tree crops and/ or livestock on the same land management unit, either spatially or temporally [1]. It is a collective name for land-use systems involving trees combined with arable crops and/or animals on the and practices where woody perennials are deliberately used on the same land management system as agricultural crops and/or animals, in a spatial or temporal sequence, there being both ecological and economic interaction between the components [2]. Agroforestry systems are considered as an option for mitigating the negative impacts of this change [3-4]. In addition, selecting proper tree species is important for a productive and environmentally sustainable agroforestry system [5-7].

The study area of KMTR region was good source of agriculture land. An approximately 1,71,526 ha of agricultural land is being irrigated by the rivers in the districts of Tirunelveli, Tuticorin and Kanyakumari. The irrigation is mainly for the cultivation of paddy field, which is the livelihood of the people and thus the water bodies serving as the economic backbone for agriculture and livelihood. KMTR region was assessed in more endemic species, which are threat due to damming and clearing diversity (Ganesan, 2002). In the present study we have chosen an area that has very high habitat complexity, attributed to high rainfall, varied topography and biotic disturbance factors, and high patch complexity in terms of stand structure and floristic composition of agroforestry system of KMTR region, Tirunelveli District, Tamilnadu.

2 MATERIALS AND METHODS

2.1 Study site

The study area was carried out three regions of Nalmukh, Kuthiraivetti and Manjolai estate in the Kalakad

Mundanthurai Tiger Reserve, Southern Western Ghats, India, during the period 2013-2015. For this study, exploration of plants observed in the different agroregions of Nalmukh, Kuthiraivetti and Manjolai. For the assessing of plants and collection of agro species were frequent field trips in month wise. The collected plant specimens were identified with the help of regional floras and herbaria [8-15].

Table-1: Agroforestry species of KMTR regions in tea plantations

Sl.No.	**Species Name**	**Family**
1.	*Coffea arabica* Linn.	Rubiaceae
2.	*Decalepis hamiltonii* Wight & Arn.	Periplocaceae
3.	*Myristica dactyloides* Gaertn.	Myristicaceae
4.	*Myristica malabarica* Lamk.	Myristicaceae
5.	*Calophyllum austroindicum* Kosterm. ex P. Stevens	Clusiaceae
6.	*Garcinia gummi-gutta* (L.) Robs	Clusiaceae
7.	*Murraya paniculata* (L.) JACK	Rutaceae
8.	*Murraya koenigii* (L.) Spreng	Rutaceae
9.	*Citrus limon* (L.)	Rutaceae
10.	*Cullenia exarillata* Robyns	Malvaceae
11.	*Dioscorea alata* L.	Dioscoreaceae
12.	*Colocasia esculenta* Schott.	Araceae
13.	*Artocarpus hirsutus* Lam.	Moraceae
14.	*Artocarpus heterophyllus* Lam.	Moraceae
15.	*Elaeocarpus venustus* Bedd.	Elaeocarpaceae
16.	*Elaeocarpus munronii* (Wight) Mast	Elaeocarpaceae
17.	*Elaeocarpus serratus* L.	Elaeocarpaceae
18.	*Piper barberi* Gamble	Piperaceae
19.	*Piper longum* L.	Piperaceae
20.	*Asparagus racemosus* Willd.	Liliaceae
21.	*Syzygium cumini* (L.)	Myrtaceae
22.	*Syzygium caryophyllatum* (L.) Alston	Myrtaceae
23.	*Syzygium densiflorum* Wall. ex Wight & Arn	Myrtaceae
24.	*Syzygium mundagam* (Bourd.) Chithra	Myrtaceae
25.	*Vitex negundo* L.	Verbenaceae
26.	*Cynodon dactylon* (L.) Pers	Poaceae
27.	*Cymbopogon caesius* (Nees ex Hook. & Arn.) Stapf.	Poaceae
28.	*Cocos nucifera* L.	Arecaceae
29.	*Areca catechu* L.	Arecaceae
30.	*Curcuma longa* L.	Zingiberaceae
31.	*Alpinia galanga* (L.) Willd.	Zingiberaceae
32.	*Tabernaemontana divaricate* L.) R. Br. ex Roem. & Schult.	Apocynaceae
33.	*Wrightia tinctoria* R. Br.	Apocynaceae
34.	*Diospyros ebenum* Roxb.	Ebenaceae
35.	*Diospyros montana* Roxb.	Ebenaceae
36.	*Emblica officinalis* L.	Euphorbiaceae
37.	*Mallotus philippinensis* Muell. Arg	Euphorbiaceae
38.	*Baccaurea courtallensis* (Wight) Muell.-Arg. in DC	Euphorbiaceae
39.	*Mallotus stenanthus* Müll.Arg	Euphorbiaceae
40.	*Butea monosperma* (Lam.) Taub.	Fabaceae
41.	*Bauhinia varigate* L.	Fabaceae
42.	*Mangifera indica* L.	Anacardiaceae
43.	*Gluta travancorica* Bedd.	Anacardiaceae
44.	*Dipterocarpus indicus* Bedd.	Dipterocarpaceae
45.	*Gordonia obtusa* Wall.ex Wight & Arn.	Theaceae
46.	*Camellia sinensis* (L.)	Theaceae
47.	*Cinnamomum malabatrum* (Burm. f.) Bl	Lauraceae
48.	*Cinnamomum sulphuratum* Nees in Wall	Lauraceae
49.	*Cinnamomum wightii* Meisner in DC.	Lauraceae

50.	*Litsea venulosa* (Meisner) Hook.f	Lauraceae
51.	*Litsea mysorensis* Gamble	Lauraceae
52.	*Smilax zeylanica* L.	Smilacaceae
53.	*Begonia malabarica* Lam.	Begoniaceae
54.	*Solanum pubescens* Willd.	Solanaceae
55.	*Physalis minima* L.	Solanaceae
56.	*Jasminum malabaricum* Wight.	Oleaceae
57.	*Jasminum angustifolium* (L.) Willd.	Oleaceae
58.	*Jasminum azoricum* L.	Oleaceae
59.	*Bauhinia purpurea* L.	Caesalpiniaceae
60.	*Strychnos nux-vomica* L.	Loganiaceae
61.	*Clerodendrum viscosum* Vent., nom. superfl.	Lamiaceae
62.	*Tectona grandis* L.f.	Lamiaceae
63.	*Aglaia bourdillonii* Gamble	Meliaceae
64.	*Canarium strictum* Roxb	Burseraceae
65.	*Terminalia bellirica* (Gaertn.) Roxb.	Combretaceae
66.	*Terminalia paniculata* Roth	Combretaceae
67.	*Macaranga peltata* (Roxb.) Müll.Arg.	Armatellaceae
68.	Maesa indica (Roxb.) A. DC.	Armatellaceae
69.	*Calophyllum inophyllum* L.	Calophyllaceae
70.	*Drynaria quercifolia* (L.) J. Sm	Polypodiaceae
71.	*Diplazium esculentum* (Retz.) Sw	Athriaceae
72.	*Asplenium trichomanes* L.	Aspleniaceae
73.	*Cheilanthes tenuifolia* (Burm. fil.) Sw.	Pteridaceae
74.	*Adiantum lunulatum* Burm. f	Pteridaceae
75.	*Acrostichum aureum* Linn	Pteridaceae
76.	*Actiniopteris radiata* (J.König ex Sw.) Link	Pteridaceae
77.	*Acrostichum aureum* L.	Pteridaceae
78.	*Pteris ensiformis* Burm.f.	Pteridaceae
79.	*Christella parasitica* (L) Lev	Thelypteridaceae
80.	*Blechnum orientale* Linn	Blechnaceae
81.	*Dicranopteris linearis* (Burm.f.)	Gleicheniaceae
82.	*Helminthostachys zeylanica* Linn.	Helminthostachyaceae
83.	*Bolbitis virens* (Wall. ex Hook. & Grev.) Schott	Lomariopsidaceae
84.	*Pityrogramma calomelanos* (L.) Link	Adiantaceae
85.	*Pteridium aquilinum* (L.)	Dennstaedtiaceae
86.	*Nephrolepis biserrata* (Sw.) Schott	Oleandraceae
87.	*Angiopteris evecta* (G.Forst.) Hoffm.	Marattiaceae

3 RESULTS AND DISCUSSION

The study area of agroforest regions of KMTR in Southern Western Ghats observed by agrospecies were encountered the three regions viz., Nalmukh, Kuthiraivetti and Manjolai seen in table-1. These study areas were observed by rich dense biodiversity and most of these regions were cultivated in the tea plantations. A total of 87 species belonging to families 40 were identified by both angiosperms (70 spp) and pteridophytes 17 (spp). Agroforestry region of Nalmukh was rich biodiversity and possess the high levels of floristic diversity and endemic species (Table-1). Both roadways of Manjolai and nalumukh was observed by rich fern diversity and most of the fern species were used as medicinal purposes. Agroforestry species are utilized as food, medicine and sources of construction materials while some are used as fodder for livestock, fuel wood, source of fiber and other industrial and household uses [16]. More species are likely to create favorable attitudes that contribute to their active management for their conservation among farmers within agroforestry systems[17]. Earlier studies, Agduma et al., (2011) reported that dominant species of agroforestry system found in Moraceae, Euphorbiaceae, Fabaceae, Arecaceae, Dipterocarpaceae, Araceae and Poaceae were observed by agroforest region in Makilala in North Cotabat [16]. Our study, observed that Manjolai region are rich diversity and more endemic species. Giriraj, (2006) reported that forest characterized by high density and species diversity comparable to that of other tropical forests in Asia, Africa and South America [18]. Edgar et al., (2017) revealed that lion's share of the species in the upper timberland harbored higher percent of endemism, in this manner, contained differing hereditary data. As the living space compose transforms, it likewise influences endemism of species that decreased inevitably [19]. Natural surroundings change because of agrarian extension and overexploitation of endemic species were watched. These put the endemic greenery species into undermined and defenseless species. Outside of agroforestry systems, the attribute of being useful may instead lead to over exploitation and sometimes destructive harvesting [20]. Different attributes have made many species easy to maintain in the community. The species that are perceived to be abundant all have fast rates of growth, are easy to propagate, and have high survival rates and their planting materials are readily available [20- 21]. Nutrient turnover is strongly influenced by the species composition and biomass of the tree components [22- 24]. Forest structure and microclimate have been identified as principal drivers of diversity of ferns, bryophytes and lichens in tropical forests [25-29]. For terrestrial ferns, in addition, soil characters play an important role [30]. Soil quality analysis indicates that all the place had better fertility of KMTR regions. In the present examination the vast majority of the species were consumable natural product inferring the criticalness of agroforestry to deliver timber as well as non-timber woods items. The part of non-timber items is very much perceived and could be considered as the key segment for preservation and economical utilization of plant biodiversity.

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