International Journal of Botany Studies
ISSN: 2455-541X; Impact Factor: RJIF 5.12
Received: 03-01-2020; Accepted: 16-01-2020
www.botanyjournals.com
Volume 5; Issue 1; February 2020; Page No. 75-82

Floristic diversity and Phytosociological analysis of Alien weeds of Coconut Plantations in Kanyakumari District Tamil Nadu India

R L Reena[1], P David Samuel[2]
[1] Department of Botany, Nesamony memorial Christian College Marthandam, Tamil, Nadu, India
[2] Assistant Professor, Department of Botany, Nesamony Memorial Christian College Marthandam Tamil, Nadu, India

Abstract
The present study aimed to observe the floristic diversity and phytosociological analysis of alien weeds of Coconut Plantations in Kanyakumari District. One sixty one species belonging to 125 genera and 46 families were identified. Of these 31 families were dicot, 14 families were monocot and 3 families were Pteridophyte. Vegetation data were collected by quadrate method and analysed for density, frequency, important value index (IVI), shannon-weiner diversity index, simpson index, wittaker index and whitford index for each crop ecosystems. The three dominant weed families in the study area were Asteraceae, Poaceae, Cyperaceae. *Chromolaena odorata* was found as dominant in site 1,2,4,5 *and Cyanodon dactylon, Ipomea –pes-caprae* was found as dominant in site 3 with Important Value Index (IVI) of (Site 1) 5.3,(Site 2) 7, (Site 3) 9.41, (Site 4, 5)7.8.

Keywords: alien weeds, coconut plantation, diversity index, phytosociological analysis, IVI, vegetation

Introduction

Coconut (*Cocos nucifera* L.) is a perennial plantation crop native to South Asia. Coconut is known as 'Kalpa vruksha ', as every part of this palm is being utilized for some or the other purposes and it also provides the basic necessities of human being like food, fuel and fibre. In India, Coconut is cultivated in an area of 2.13 million ha Somshekhar (2015) [31]. In a country like India where agriculture predominates, weeds have a major role to play in the economy of the country. However, these plants not only affect the crops by competing with them for necessary requirement, but also act as alternate hosts for various fungal, bacterial and viral pathogens of rops. For effective control measures of these unwanted plants, knowledge on their floristic composition, and phenology are essential. Neogi and Rao (1980) [16]. Coconut palms in a plantation require a wide spacing between palms due to the broad canopy structure, which permits abundant sunlight to the understory. As a result, the unutilized space beneath the plantation becomes invaded by a wide range of perennial and annual weed species Liyanage (1989). Such weeds compete with the coconuts for soil moisture and nutrients, affecting the growth and yield of the coconut crop and obstructing routine estate practices Senarathne *et al.*, (2003) [24] Shaw (1956) [26] stated that weeds grow in places, where they are not desired. They grow faster, spread rapidly, reproduce in high numbers and produce large quantity of seed which enable them to establish a kingdom of their own within a short period. Some of the weeds may be poisonous to livestock. The seed of weeds may remain dormant and viable for 30-40 years and hard seed coat of the seed can resists adverse climate, disease and soil condition Oudejan (1994) [17]. They compete with crops in which they grow for their resources like sunlight, water, minerals and other soil contents. Thus they reduce the quantity and quality of yield and cause economic loss to the farmer. In general weeds cause 5% loss to agricultural production in most developed countries and 25% loss in least developed countries. Of the total annual loss agricultural produce from weeds in 45% in India. Dangwal *et al*.,(2010) [3] Plant species diversity is complex in nature and its structure and composition differs from place to place because of varying climatic condition and topography (Raturi 2012) [20]. Weeds are notorious yield reducers that are, in many situations, economically and other pest organisms in agricultural fields (Savary *et al.*, 1997, 2000) [22, 23]. Coconut is one of the major agricultural crop in Kanyakumari District. Recently the coconut production has been reduced due to disease attack of insect, pathogens and also that competition by weeds. So proper management taken in have to be formulated for the eradication of the species. The past workers such as Sugumaran *et al.*, (2008), Jeeva *et al.*, (2006) [10] have studied weeds of Kanyakumari district. However, detailed information regarding the weed flora and phytosociological analysis of weeds are rarely from the study area. Therefore, the present study was undertaken.

Materials and Methods

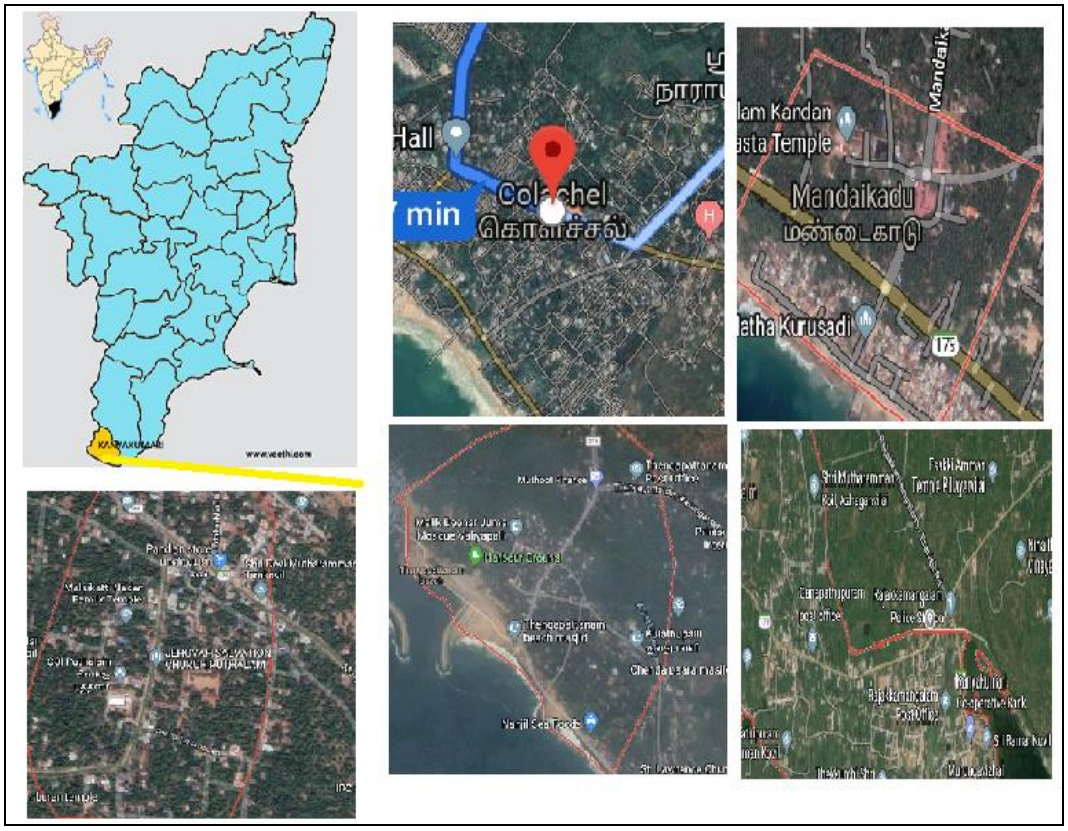

Fig 1: Map showing study area.

Study area

The present study was conducted to find out the alien weed flora and phytosociological analysis of coconut plantation in different area of Kanyakumari district. Five Coconut plantation selected for the study were Colachel, Mandaikadu, Thengappatanam, Rajakkamangalam, and Puthalam. Site 1 is Colachel, It is a coastal town in the far south of India. It is spread about 700 acres lying between 8.1786 ° N, 77. 2561 ° E. Site 2 is Mandaikadu, it is located near colachel in the western cost of Kanyakumari district. It is spread about 200 acres lying between 8.1631 ° N, 77.2786 ° E. Site 3 is Thengappatanam, it is derives name from the abundance of coconut groves,meaning the town with coconut trees in abundance. It is lying between 8.2393 ° N, 77.1730 ° E. Site 4 is Rajakkamangalam, it is a revenue block in the kanyakumari district. It is lying between 8.1290 ° N, 77.3640 ° E. Site 5 is Puthalam, it is lies between the manakudy estuary and the Indian Ocean. It is lying between 8.0632 ° N, 77.2800 ° E.

Floristic study

Frequent and regular field visits have been made in the study area with a view of document weed flora. Field surveys have been carried out in study area during 2017 to 2019, covering different seasons. During field trips voucher specimens of every species was collected in flowering and fruiting stages and detailed field notes were prepared on the spot. Special emphasize was given on data pertaining to habit, habitat association with other species. Collection and preservation was made as per the procedure given by (Jain and Rao, 1977) [9], (Nayar *et al.*, 2014). Initially identification was provisionally done by using (Gamble-Fischer 1915-1936), (Charles Bryson *et al.*, 2009) [2] Available monographs and relevant literature were also consulted for the same. The specimens were then poisoned with Mercuric Chloride in alcohol. Further process of pressing, mounting and labeling were done following the instructions given by (Jain and Rao, 1977 [9]. The mounted specimens were deposited in the Herbarium of Botany Department and Research centre N.M.C. College Marthandam.

Phytosociological analysis

Phytosociological studies were carried out by using quadrate method. 1m × 1m Quadrates were laid randomly in the coconut Plantation to quantify various weed species. Phytosociological analysis of alien weed flora was done following quantitative measures as frequency, density, abundance and Importance Value of Index (IVI = relative frequency + relative density + relative abundance) were calculated following Misra (1968).

The following formulae were used to compute different ecological parameters:

Total no.of quadrats in which the species occurred

$$\text{Freqency \%} = \frac{\text{Total no.of quadrats in which the species occurred}}{\text{Total no.of quadrats studied}} \times 100$$

$$\text{Density} = \frac{\text{Total no.of individuals of a species in all the quadrats}}{\text{Total no. of quadrats studied}}$$

$$\text{Abundance} = \frac{\text{Total no.of individuals of the species in all the quadrats}}{\text{Total no.of quadrats in which the species occurred}}$$

$$\text{Relative Frequency (R.F)} = \frac{\text{Total no.of occurrence of a species all the quadrats}}{\text{Total no.of occurrence of all species in all the quadrats}} \times 100$$

$$\text{Relative Density (RD)} = \frac{\text{Total no.of individuals of a species in all the quadrats}}{\text{Total no.of individuals of all species in all quadrats}} \times 100$$

$$\text{Relative Abundance (RA)} = \frac{\text{Total no.of individuals of a species in all the quadrats}}{\text{Total no.of individuals of all species in all quadrats}} \times 100$$

IVI = Relative frequency +Relative density + Relative abundance

$$\text{Whitford'sindex} = \frac{\text{Abundance (A)}}{\text{Frequency (F)}} \times 100$$

Diversity index (Shannon & Weiner, 1949)

$$H' = -\sum_{i=1}^{S} p_i \ln p_i$$

Where H' is the Shannon–Weiner Diversity Index, p_i is the proportion of IVI of a species, i.e. (n_i/N).
Dominance Index (Simpson, 1949)

$$Cd = -\sum_{i-1}^{s} (p_i)^2$$

Result and Discussion
Site 1
Important Value Index
In site 1 [Colachel], 95 plants belonging to 32 families, 93 genera and 94 species were recorded. The IVI varies from 1.1 to 7. Chromolaena odorata shows maximum IVI 7. and the minimum IVI is recorded by Mirabilis jalapa 1.1**.** [Table 1]

Frequency %
In site 1, the frequency % ranges between 10%-100%. The maximum frequency was recorded by Chromolaena odorata, Lantana camara are dominant in site 1. The minimum frequency % was recorded by Eleusine indica, Eryngium campestre, Mirabilis Jalapa, Phyllanthus amarus [10%]**.**

Density
In site 1, the density of weeds varies from 0.2 to 4.2. The maximum density was recorded by Chromolaena odorata [4.2] The minimum density was recorded by Mirabilis jalapa [0.2]. [Table 1 Fig 2]

Abundance
In site the abundance varies from 1.3 to 5.6. The maximum abundance was recorded by Lindernia crustacea [5.6] The minimum abundance was recorded by Clitoria ternatea, Lobelia alsinoides [1.3].

Site 2
Important Value Index
In 2 [Mandaikadu], 100 plants belonging to 85 genera and 98 species were recorded. The IVI varies from 0.8 to 5.53. Chromolaena odorata shows maximum IVI 5.57 and the minimum IVI is recorded by Cuscuta reflexa, Clitoria ternatea [0.8]. [Table 1]

Frequency%
In site 2, the frequency % ranges between 10%-100%. The maximum frequency was recorded by Chromolaena odorata [100%].It is dominant in site 2. This was followed by Calotropis procera,Clerodendrum infortunatum, Ipomea pes-tigridis,Parthenium hysterophorus [90%], The minimum frequency% was recorded by Clitoria ternatea,Cuscuta reflexa, Physalis minima [10%].

Density
In site 2, the density of weeds various from 0.2 to 4.9. The maximum density was recorded by Chromolaena odorata [4.9] The minimum density was recorded by Clitoria ternatea, Cuscuta reflexa [0.2].

Abundance
In site 2, the abundance varies from 1 to 8.6. The maximum abundance was recorded in Synedrella nodiflora [8.6] and the miminum in Rubia cordifolia [1].

Site 3
Important Value Index
In site 3 [Thengapattanum], 85 plants belonging to 32 families, 83 genera and 84 species were recorded. The IVI varies from 7.03 to 1.16 Cynadon dactylon and Ipomea – pes-caprae shows maximum IVI 7.03 and the minimum IVI is recorded by Argemone Mexicana 1.16.[Table 1]

Frequency %
In site 3, the frequency % ranges between 10%-100%. The maximum frequency was recorded by Cynodon dacrtylon, Ipomea- pes-tigridis re dominant in site 3. The minimum frequency % was recorded by Mukia maderaspatana [10%]**.**

Density
In site 3, the density of weeds varies from 0.2 to 3.2 The maximum density was recorded by Pennisetum pedicellatum [3.2] The minimum density was recorded by Argemone Mexicana [0.2].

Abundance
In site the abundance varies from 0.5 to 6. The maximum abundance was recorded by Pennisetum pedicellatum [0.5].The minimum abundance was recorded by Cassytha filiformis [0.8]

Site 4
Important Value Index
In site 4 [Rajakkamangalam**]**, 74 plants belonging to 34 families, 72 genera and 72 species were recorded. The IVI varies from 9.21 to 1.83. Chromolaena odorata, shows maximum IVI 9.21 and the minimum IVI is recorded by Amaranthus dubius, Barlaria cristata, Eleusine indica, Emila sonchifolia 1.83**.** [Table 1]

Frequency %
In site 4, the frequency % ranges between 10%-100%. The maximum frequency was recorded by Chromolaena odorata, Ceratopteris thalictroides are dominant in site 4. The minimum frequency % was recorded by Eleusine indica, Emilia sonchifolia, Cuscuta reflexa, Amaranthus [10%]**.**

Density
In site 4, the density of weeds varies from 0.2 to 3.2 The maximum density was recorded by Chromolaena odorata, [3.2] The minimum density was recorded by Eleusine

indica, Eryngium campestre, Mirabilis jalapa, Phyllanthus amarus. [0.2].

Abundance

In site the abundance varies from 6 to 1. The maximum abundance was recorded by Alocasia macrorrhizos [6]. The minimum abundance was recorded by Lindernia crustaceae, Ludwigia hyssopifolia, Piper nigrum [1]. [Table 1]

Site 5

Important Value Index

In site 5 [Puthalam], 77 plants belonging to 36 families, 74 genera and 75 species were recorded. The IVI varies from 9.41 to 1.75. Chromolaena odorata, shows maximum IVI 9.41 and the minimum IVI is recorded by Cassia tora, Elephantopus scaber, Erygium campestre 1.75.

Frequency %

In site 5, the frequency % ranges between 10%-100%. The maximum frequency was recorded by Chromolaena odorata, dominant in site 5. The minimum frequency % was recorded by Centella asiatica, Eryngium campestre, Elephantopus scaber, Cassia tora [10%].

Density

In site 5, the density of weeds varies from 3.2 to 0.2 The maximum density was recorded by Chromolaena odorata, [3.2] The minimum density was recorded by Cassia tora, Elephantopus scaber, Erygium campestre [0.2].

Abundance

In site the abundance varies from 5.7 to 0.6. The maximum abundance was recorded by [Scoparia dulcis [5.7].The minimum abundance was recorded by Persicaria barbata [5.7].

Table 1: Ecological aspects of Common Weed flora of Coconut Plantation [Colachel, Mandaikadu, Thengapattanam, Rajakkamangalam, Puthalam

Scientific Name	Family	Site 1	Site 2	Site 3	Site 4	Site 5
Abutilon hirtum (Lam.)Sweet.	Malvaceae	2.79	-	2.59	-	-
Abutilon indicum (L.)Sweet.	Malvaceae	2.55	3.22	-	-	-
Acalypha indica L.	Euphorbiaceae	3.24	-	3.66	-	-
Acanthospermum hispidum Dc.	Asteraceae	2.55	-	-	-	-
Achyranthes aspera L.	Malvaceae	3.71	3.13	4.04	5.09	5.42
Acmella paniculata (Wall.ex.Dc.)R.K.Jansen.	Asteraceae		4.23	-	4.71	-
Acmella radicans Jacq.	Asteraceae	3.11	-	2.31	-	-
Acrosticum aureum L.	Pteridaceae	2.55	-	1.53	-	-
Adiantum raddianum C.Presl.	Pteridaceae	2.71	-	-	-	-
Aerva lanata (L.)Juss.	Amaranthaceae	3.54	4.23	5.21	5.02	6.03
Aeschynomene aspera L.	Leguminosae	-	-	-	-	3.84
Agave catula Roxb.	Agavaceae	2.11	2.34	3.19	-	2.59
Agave vivipara	Agavaceae	3.05	-	-	-	-
Ageratum conyzoides (L.)L.	Asteraceae	2.78	3.57	3.76	3.2	5.15
Alocasia macrorrhizos (Schoot.)G.Don.	Araceae	-	-	-	6.01	-
Alternanthera sessilis Dc.	Amaranthaceae	4.1	4.51	4.71	-	3.25
Alysicarpus heterophylla Jafri &Ali	Leguminosae	-	-	-	-	2.81
Alysicarpus vaginalis (L.)Dc.	Leguminosae	-	-	2.27	-	-
Amaranthus dubius Mart.ex.Thell.	Amaranthaceae	-	3.57		1.83	3.2
Amaranthus spinosus L.	Amaranthaceae	2.21	-	-	-	-
Amaranthus viridis L.	Amaranthaceae	3.19	-	3.61	-	-
Ananas comosus L.	Bromeliaceae	3.13	-	4.87	-	-
Andropogon pumilus Roxb.	Poaceae	2.24	-	1.76	-	-
Anisomeles indica (L.)Kuntze.	Lamiaceae	-	1.65	-	1.93	2.59
Apluda mutica L.	Poaceae	-	-	-	-	3.93
Argemone mexicana L.	Papaveraceae	3.39	-	1.16	-	-
Aristolochia indica L.	Aristolochiaceae	1.62	-	1.9	-	-
Arundinella pumila (Hochst.)Steud.	Poaceae	-	1.92	-	3.52	7.05
Asystasia gangetica (L.)T.Anderson.	Acanthaceae	4.25	4.02	5.21	4.6	7.13
Barleria cristata L.	Acanthaceae	-	3.07	-	1.83	2.76
Basilicum polystachyon (L.)Moench.	Lamiaceae	-	1.23	-	-	3.92
Biophytum sensitivum (L.)DC.	Geraniaceae	2.85	1.48	4.31	5.02	3.32
Blepharis maderaspatensis (L.)B.Heyne ex Roth.	Acanthaceae	-	2.05	-	3.29	-
Boerhavia diffusa L.	Nyctaginaceae	3.23	-	3.55	-	-
Boerhavia errecta L.	Nyctaginaceae	-	-	3.36	-	-
Brachiaria mutica (Forssk)Stapf	Poaceae	-	-	-	-	3.25
Brachiaria ramosa (L.)Stapf.	Poaceae	-	-	-	-	-
Calotropis procera (Ait)R.Br.	Asclepiadaceae	4.63	5.03	3.87	6.14	4.82
Cardiospermum helecacabum L.	Sapindaceae	3.26	4.4	4.17	4.86	-
Cassia occidentalis L.	Leguminosae	-	2.05	-	2.24	-
Cassia tora L.	Leguminosae	-	3.4	-	2.94	1.75
Cassytha filiformis L.	Lauraceae	4.04	4.38	4.87	-	-
Catharanthes roseus (L.)G.Don.	Apocyanaceae	-	1.23	-	2.61	-
Centella asiatica (L.)Urb.	Apiaceae	-	3.39	-	3.26	2.47

Centrosema pubescens Benth.	Leguminosae	2.79	3.24	2.52	5.38	4.68
Ceratopteris thalictroides (L) Brongniart.	Pteridaceae	3.23	5.17	5.42	8.61	7.67
Chloris barbata Sw.	Poaceae	2.78	-	1.76	-	-
Chromolaena odorata (L.)R.M.King &H.Rob.	Asteraceae	5.53	7	6.54	9.21	9.41
Cladiyum bicolor (Ait) Vent.	Araceae	2.83	1.48	-	-	-
Cleome aspera J.Koenig ex Dc.	Capparaceae	-	1.99	-	7.3	4.93
Cleome gynandra L.	Capparaceae	3.85	-	3.61	-	-
Cleome viscosa L.	Capparaceae	4.37	-	2.93	-	-
Clerodendron infortunatum L.	Verbenaceae	4.16	5.23	3.55	4.86	3.59
Clitoria ternatea L.	Leguminosae	0.8	1.47	2.87	4.86	-
Cocculus hirsutus (L.)Diels.	Menispermaceae	3.24		3.87		-
Combretum indicum (L.)DeFilipps.	Combretaceae	-	2.07	-	2.24	3.63
Commelina diffusa Burm.f	Commelinaceae	-	4.66	-	2.59	2.59
Commelina benghalensis L.	Commelinaceae	4.1	-	5.37	-	-
Crotalaria juncea L.	Leguminosae	3.24	3.39	3.96	2.38	-
Crotalaria verrucosa	Leguminosae	2.79	-	4.58	-	-
Croton bonplandianus Bail.	Euphorbiaceae	3.23	2.25	4.87	3.79	5.04
Cuscuta reflexa Roxb.	Convolvulaceae	0.8	1.65	4.37	2.6	-
Cyanthillium cinereum L.	Asteraceae	3.11	4.4	6.22	-	-
Cynodon dactylon (L.) Pers.	Poaceae	3.4	4.61	7.03	6.79	8.49
Cyperus difformis L.	Cyperaceae	-	3.22		6.74	4.65
Cyperus flavidus Retz.	Cyperaceae	-	-	-	-	2.59
Cyperus rotundus L.	Cyperaceae	3.71	4.23	5.26	5.33	3.59
Dactyloctenium aegypticum (L.)P.Beauv.	Poaceae	2.75	5.06	3.79	5.62	3.32
Datura metel L.	Solanaceae	2.43	-	1.76	-	-
Degitaria radicosa J.Presl.	Poaceae	-	-	-	-	3.22
Desmodium veluntinum (Willd)Dc.	Leguminosae	2.75	3.9	3.43	5.09	1.9
Desmodium gangeticum (L.)Dc.	Leguminosae	3.19	-	-	-	-
Desmodium triflorum (L.)Dc.	Leguminosae	3.85	-	2.79	-	-
Dieffenbachia amoena Bull.	Araceae	2	-	-	-	-
Echinochloa colona (L.)Link.	Poaceae		3.04	-	5.81	-
Echinochloa frumentacea Link	Poaceae	-	-	1.56	-	3.48
Elephantopus scaber L.	Asteraceae	1.37	3.72	2.72	-	1.75
Eleusine indica (L.)Gaertn.	Poaceae	-	1.54	-	1.83	2.33
Emilia sonchifolia (L.)Dc.ex.DC.	Asteraceae	-	1.48	-	-	-
Eryngium campestre L.	Apiaceae	2.11	1.54	2.72	3.52	1.75
Euphorbia heterophylla L.	Euphorbiaceae	-	-	-	5.02	-
Euphorbia hirta L.	Euphorbiaceae	3.23	2.05	3.54	-	2.76
Evolvulus alsinoides L.	Convolvulaceae	4.05	-	2.52	-	-
Evolvulus nummularius (L.)L.	Convolvulaceae	3.2	2.91	2.98	5.1	4.86
Gomphrena celosiodes Mar.	Amaranthaceae	-	2.93	-	3	-
Gomphrena serrata L.	Amaranthaceae	2.14		3.55		-
Heliotropium indicum L.	Boranginaceae	3.19	1.23	4.14	2.61	5.39
Hemidesmus indicus (L.)R.Br.ex.Schult.	Asclepiadaceae	-	1.48	-	2.24	3.92
Hibiscus platanifolius (Willd.)Sweet.	Malvaceae	-	4.01	-	2.24	-
Hibiscus vitifolius L.	Malvaceae	4.1	-	3.36	-	-
Hygrophila auriculata (Schum) Heine.	Acanthaceae	2.11	-	4.14	-	-
Hyptis suaveolens (L.)Poit.	Lamiaceae	2.56	3.39	1.76	2.59	3.51
Ipomea pes- tigridis L.	Convolvulaceae	4.93		7.03	-	-
Ipomea aquatica Forssk.	Convolvulaceae	4.57	3.88	3.76	3.88	3.25
Ipomea obscura (L.)Ker Gawl.	Convolvulaceae	-	3.83	-	-	-
Ixora coccinea L.	Rubiaceae	-	1.48	-	-	-
Jatropha curcas L.	Euphorbiaceae	-	5.31	-	4.67	-
Justicia diffusa Willd.	Acanthaceae	2.86	-	2.79	-	-
Justicia prostrata Gamble.	Acanthaceae	-	3.52	-	2.94	-
Justicia simplex D.Don.	Acanthaceae	-	3.24	2.87	-	-
Kyllinga monocephala Roxb.	Cyperaceae	3.05	1.47	-	4.71	2.76
Lantana camara L.	Verbenaceae	-	5.88	-	5.16	4.65
Lantana wightiana Wall.Ex.Gamble.	Verbenaceae	-	5.71	-	-	3.49
Leucas aspera (Willd.)Link.	Lamiaceae	2.34	-	2.02	-	-
Leucas biflora (Vahl)Sm.	Lamiaceae	-	2.91	-	4.6	2.25
Lindernia crustacea (L.)F.Muell.	Scrophulariaceae	-	3.99	-	2.74	2.59
Lobelia alsinoides Lam.	Campanulaceae	-	1.47	-	-	-
Ludwigia hyssopifolia (G.Don)Exell.	Onagraceae	-	3.49	-	2.32	2.33
Merrimia emarginata Burm.f	Convolvulaceae	2.24	-	3	-	-
Merrimia tridentata (L.)Hallier.	Convolvulaceae	2.79	-	-	-	-
Microstachys chamaelea (L.)Mull.Arg	Euphorbiaceae	-	-	-	-	2.78
Mimosa pudica L.	Leguminosae	4.93	3.02	1.76	5.02	2.76

Mirabilis jalapa L.	Nyctaginaceae	-	1.1	-	-	4.68
Mukia maderaspatana (L.)M.Roem.	Cucurbitaceae	4.04	-	3.4	-	-
Ocimum americanum L.	Lamiaceae	-	4.34	-	4.96	1.9
Ocimum sanctum L.	Lamiaceae	2.55		1.76	-	-
Oldenlandia corymbosa L.	Rubiaceae	4.42	1.48	1.79	3.49	4.82
Oldenlandia umbellata L.	Rubiaceae	3.45		2.03	-	-
Opuntia stricta (Haw.)Haw.	Cactaceae	-	1.48		3.26	2.25
Oxalis corniculata L.	Oxalidaceae	-	2.4	1.79	-	-
Panicum repens L.	Poaceae	2.34	-	2.31	-	-
Parthenium hysterophorus L.	Asteraceae	4.38	4.74	4.79	6.27	5.64
Passiflora foetida L.	Passifloraceae	3.03	2.5	2.03	-	-
Pennisetum pedicellatum Trin.	Poaceae	1.76	4.34	1.32	5.07	4.68
Pepromia pellucida (L.)Kunth.	Piperaceae	-	3.22	-	2.91	5.12
Pergularia daemia (Forssk.)Choir.	Asclepiadaceae	1.09	-	-	-	-
Persicaria barbata var.barbata (L.)H.Hara	Polygonaceae	-	-	-	-	2.29
Phyla nodiflora (L.)Greene.	Verbenaceae	2.5	-	-	-	-
Phyllanthus amarus Schum &Thom.	Euphorbiaceae	2.56	1.54	3.17	2.59	-
Physalis minima L.	Solanaceae	1.11		-	-	-
Pilea microphylla (L.)Liebm.	Utricaceae	-	3.07	-	-	-
Piper nigrum L.	Piperaceae	3.2	1.48	3.14	2.32	3.59
Pistia stratiotes L.	Araceae	-	1.65	-	-	1.9
Portulaca oleracea L.	Portulaceae	3.24	4.38	1.76	-	3.92
Rivina humilis L.	Pteriveraceae	2.14	4.38	4.21	5.36	5.22
Rubia cordifolia L.	Rubiaceae	0.97	-	-	-	-
Ruellia tuberosa L.	Acanthaceae	2.75	3.28	2.72	2.38	5.26
Rungia repens (L.)Nees.	Rubiaceae	2.98				
Scoparia dulcis L.	Plantaginaceae	2.34	3.72	5.19	1.93	6.6
Sida acuta Burm.f	Malvaceae	2.85	3.51	3.55		4.94
Sida cordata (Burm.)Borss.	Malvaceae	2.3	-	-	-	-
Sida cordifolia L.	Malvaceae	4.04	4.38	3.96	2.38	4.65
Solanum nigrum L.	Solanaceae	3.85	-	-	-	-
Solanum torvum Sw.	Solanaceae	2.84	1.99	4.17	6.36	-
Spermacoce hispida L.	Rubiaceae	4.37	-	3.93		-
Spermacoce ocymoides Burm.f	Rubiaceae	-	1.48	-	4.71	3.59
Sphagneticola trilobata (L.)Pruski.	Asteraceae	2.51	-	4.59	-	-
Spilanthus radicans Jacq.	Asteraceae	-	4.55	-	3.26	3.59
Stachytarpheta indica (L.)Vahl.	Verbenaceae	2.18	-	2.87	-	-
Stachytarpheta jamaicensis (L.)Vahl.	Verbenaceae	-	3.81	-	-	3.79
Synedrella nodiflora (L.)Gaertn.	Malvaceae	5.24	-	2.02	-	-
Tephrosia purpurea Pers.	Leguminosae	1.95	-		-	-
Tinospora cordifolia Miers.	Menispermaceae	1.26	-	1.9	-	-
Tithonia diversifolia (Hemsl.)A.Gray.	Asteraceae	-	2.91	-	2.94	1.9
Tribulus terrestris L.	Zygophyllaceae	1.09	-	-	-	-
Tridax procumbens (L.)L.	Asteraceae	4.42	3.83	5.71	3.79	4.65
Typha angustifolia L.	Typaceae	-	4.4	-	4.67	3.79
Urena lobata L.	Malvaceae	-	-	-	2.61	
Urena sinuata L.	Malvaceae	-	1.23	-	-	2.59
Wedelia trilobata A.St-Hil.	Asteraceae	-	5.76	-	6.06	4.68
Ziziphus oenoplia (L.)Mill.	Rhamnaceae	-	-	-	-	2.81

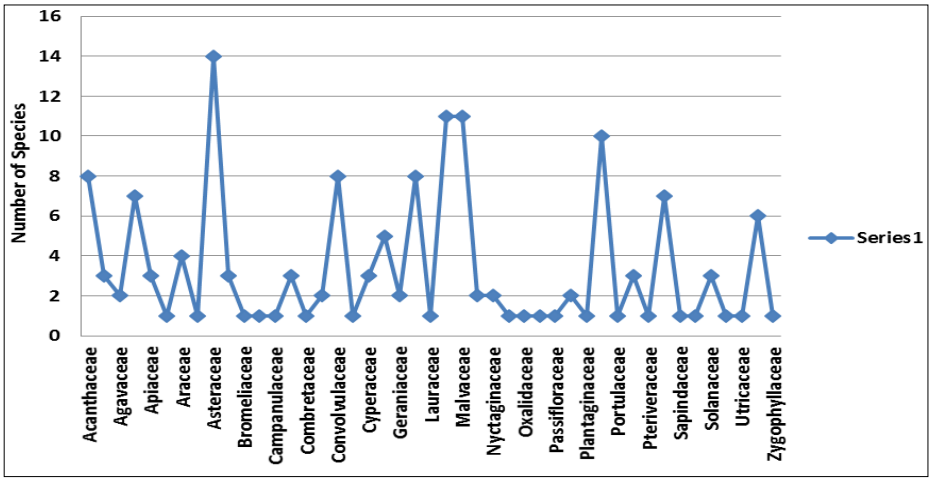

Fig 2: Family wise distribution of weed species in the study area

Table 2: Density, dominance, diversity and evenness indices of plant species in the study area

Variable	Site 1	Site 2	Site 3	Site 4	Site 5
Density	205.2	132.8	101	74.2	71.1
Shannon's diversity index	4.48	4.36	4.38	4.12	4.17
Pielou's evenness index	0.97	0.96	0.98	0.96	0.96
Whittaker index	13.11	13.21	10.29	11.19	9.51
Whitford index	9.22	32.785	4.54	4.78	5.58
Simpson's dominance index	0.01	0.01	1.3	0.02	0.02

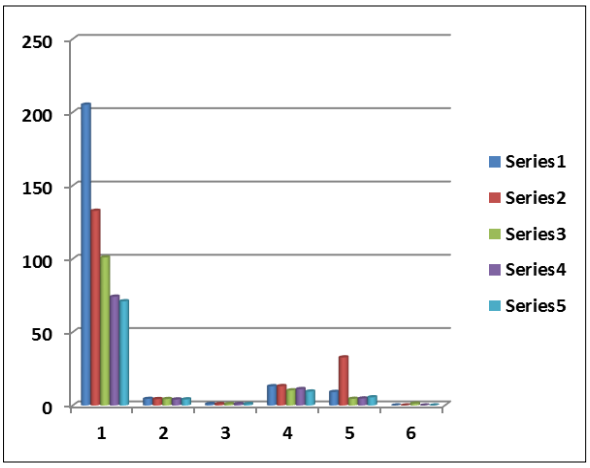

Fig 3: Density, dominance, diversity and evenness indices of plant species in the study area

Shannon-Weiner Diversity Index value was estimated to be 4.48 (site 1), 4.36 (site 2), 101 (Site 3), 74.2 (Site 4), 71.1 (Site 5). Simpson's Dominance Index values was 0.01 (site 1), 0.96 (site 2), 1.3 (Site 3), 0.02 (Site 4), 0.02 (Site 5).The estimated Species Evenness Index value was 0.97 (site 1), 0.96 (site 2), Whitaker Index values for 13.11 (site 1), 13.21 (site 2), Highest density was shown by site 1 (205.2). (Table 2 Fig 4). High diversity and low Simpson's dominance value is due to human interferences. Similar statement was given by Parthasarathy *et al.* (1992) [18], Visalakshi (1995) [34] and Rampilla (2015) [19]. All over the world, plant biodiversity in terrestrial ecosystems have diverse biological communities due to their rapidly changing landscape and geo-climatic history (Herben *et al.*, 2003 [8], Fosaa 2004) [16]. The distribution pattern of plant species in an ecosystems is always representative of the function of that system because it signifies the nature of its biomass (Enquist 2001 [4], Myklestad and Saetersdal 2004). In an ecosystem plant species assemble in a definite fashion and hence can assist in vegetation quantification and evaluation. Thus knowledge of floristic diversity of natural ecosystems and habitat types is a key factor for improving the long-term management of natural resources (Mucina 1997 [14], Ewald 2003 [5], Kumar *et al.*, 2015) [11]. During the study period a total of 161 plant species belonging to 46 families of alien weeds were recorded that 31 families were dicot, 14 families were monocot and 3 families were Pteridophyte. [Fig 2] Among these were 110 herbs, 37 shrubs, and climbers 14 were documented. [Fig 3].The findings of the present study are comparable with that of floristic diversity of weeds. (Sevugaperumal Shanmugam *et al.*, 2016) [28], Somshekhar, 2015 [31]. Sit *et al.*, 2003 reported that 17 families of dicot and 3 monocots Souza *et al.*, 2003 [32], Tahira *et al.*, 2010 [33] the weed flora of Curcuma longa fields in Kasur district in Pakistan. The weed species widely differ with the Environment, soil condition and cropping pattern. Generally, weeds are found in large numbers with great vigour, because of their greater adaptability even under extremities of climatic, edaphic and biotic stresses. High persistence nature of weeds is attributed to their ability to high seed production and longer seed viability Somshekhar, (2015) [31].

Conclusion

Present study revealed that Asteraceae is only dominant family in the study area. Chromolaena odorata Ipomea –pes-caprae, and Cynodon dactylon, were found as dominant species. While making culture operations these plants are treated as weeds and destroyed. This may lead these species ultimately to the disappearance in future. Therefore, conservation strategies must be carried out on these species. This study will provide baseline for future study in this area and for development of conservation as well as management strategies for weeds.

Acknowledegements

The Authors are thankful to Assistant Professor Dr.J. Jonsy Cristobel Head of the Department Botany, NMCC Marthandam, and all teaching faculty Department of Botany, NMCC Marthandam, for providing the all support to conduct this study.

Reference

1. Bezkorowajnyj PG, Gordon AM, Mcbride RA. The effect of cattle foot taffic on soil compaction in a silvo-pastoral system. Agrof. Syst. 1993; 21:1-10.
2. Charles Bryson. Weed of south (Wormsloe Foundation Nature Book Ser.) University of Georgia Press, 2009.
3. Dangwal IR, Singh AD, Singh T, Sharma A, Sharma C. Common weeds of rabi (winter) crops of tehsil Nowshera, district Rajouri, India. Pakistan Journal of Weed Science and Reseach. 2010; 16(1):39-45.
4. Enquist BJ. Universal scaling in tree and vascular plant allometry: Toward a general quantitative theory linking plant form and function from cells to ecosystems. Tree Physiology. 2002; 22:1045-1064.
5. Ewald J 2003. A critique for phytosociology. Journal of Vegetation Science14: 291–296.
6. Fosaa AM. Biodiversity patterns of vascular plant species in mountain vegetation in the Faroe Islands. Diversity and Distributions. 2004; 10:217-223.
7. Gamble JS and Fischer CEC. Flora of the presidency of Madras Adlord and Sons Limited, London, 1915-1935.
8. Herben T, Krahulec F, Hadincova V, Pechackova S Wildova R. Year-to-year variation in plant competition in a mountain grassland. Journal of Ecology. 2003; 91:103-113.
9. Jain SK, Rao RR. A hand book of field and herbarium methods. Today and Tomorrow publication, New Delhi, 1977.
10. Kiruba S, Mishra BP, Israel Stalin S, Jeeva S, Das SSM. Traditional pest management practices in Kanyakumari district, Southern peninsular India. Indian J Traditional Know. 2006; 5:71-74.
11. Kumar A, Bajpai O, Mishra AK, Sahu N, Behera SK, Bargali SS, *et al.* A checklist of the flowering plants of Katerniaghat Wildlife Sanctuary, Uttar Pradesh, India. Journal of Threatened Taxa. 2015; 7(7):7309-3408.

12. Liyanage LVK, De Liyanage MS. Weed control under story weed management in coconut lands. CORD. 1989; 1:48-56.
13. Misra R. Ecology Workbook. Oxford and IBH Publishing Company, Calcutta, 1968.
14. Mucina L. Classification of vegetation: Past, present and future. Journal of Vegetation Science, 1997; 8(6):751-760.
15. Myklestad A, Sætersdal M. The importance of traditional meadow management techniques for conservation of vascular plant species richness in Norway. Biological Conservation. 2004; 118:133-139.
16. Neogi B, Rao RR. Floristic Composition of the Weed flora, Seasonal variation and phenology of some weeds of agriculture lands in Khasi hills, Maghalaya. Proc. Indian natn. Sci. acad, 1980, 579-586.
17. Oudejan JH. Agro-pesticide, Properties and functions in integrated crop protection. United Nation Economic and Social Commission for Asian and pacific, United Nations Bangkok. 1994; 264-290.
18. Parthasarathy N, Kinhal V, Kumar PL. Plant species diversity and human impacts in the tropical wet evergreen forests of Southern Western Ghats. In: Indo-French workshop on Tropical forest ecosystems: natural functioning and anthropogenic impacts. French institute Pondicherry, 1992.
19. Rampilla V, Khasim S, Mahammad, Kakumanu B Floristic diversity and Phyto-sociological studies of Indrakiladri Sacred Grove in Krishna district, Andhra Pradesh, India. Journal of Pharmacy and Biological Sciences. 2015; 10:61-75.
20. Raturi GP. Forest community structure along an altitudinal gradient of district Rudraprayag of Garhwal Himalaya, India. Ecologia. 2012; 2(3):76-84.
21. Reynolds SG. Pastures and cattle under coconuts.FAO Plant Protection and protection, FAO, 1988, 91
22. Savary S, Srivastava RK, Singh HM, Elazegui FA. A characterization of rice pests and quantification of yield losses in the rice-wheat system of India. Crop Protection. 1997; 16:387-398.
23. Savary S, Willocquetn L, Elazegui FA, Castilla NP, Teng PS. Rice pest constraints in tropical Asia:quantification of yield losses due to rice pests in a range of protection situations. Plant Disease. 2000; 84:357-369.
24. Senarathne SHS, Samarajeewa AD, Perera KCP. Comparison of different weed management systems and their effects on yield of coconut plantation in Sri Lanka. Weed Biology and Management. 2003; 3:158-162.
25. Senarathne SHS, Gunathilake HAJ. Weed Management in Mature Coconut Plantations in Sri Lanka. Research aricle Cocos. 2010; 19:93-100.
26. Shaw W. Terminology.Committee Report. Weed Society of America Weed. 1956; 4:278.
27. Shannon CE, Weiner W. The Mathematical Theory of Communication, University of Illinois Press, Urbana, Illionis. 1949; 1-117.
28. Sevugaperumal Shanmugam, Raju Nagaraj, Sethuri Balamurugan, Bose Raja, Kuppu Rajendran, *et al*. Floristic Composition of Weeds in Coconut (Cocos nucifera L.) Plantation of Sivagangai District, Tamil Nadu, Southern India. Int.J. Curr. Res. Biosci. plant. Biol. 2016; 3(2):121-126.
29. Simpon, EH. Measurement of diversity. Nature. 1949; 163:688.
30. Sit AK, Pattacharva M, Sarkar B, Arunachalam V. Weed floristic composition in palm gardens in plains of Eastern Himalavan regions of West Bengal., Curr Sci. 2007; 92(10):1434-1439.
31. Somshekhar Weed management studies in Coconut nursery.M.sc thesis Dept of Horticulture. Dharwad, 2015.
32. Souza LSA, Silva JF, Souza MDB. Floristic composition of weeds in agro-systems of Cupuacu (Theobroma grandiflorum) and peach palm (Bactris gasipaes) Planta-Daninha. 2003; 21:249-255.
33. Tahira JJ, Nawaz Khan S, Suliman R, Anwar W. Weed flora of Curcuma longa fields of district Kasur, Pakistan. Park. J. Weed Sci. Res. 2010; 16(2):241-246.
34. Visalakshi N. Vegetation analysis of two tropical dry evergreen forests in Southern India. Tropical Ecology. 1995; 36:117127.