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Floristic Composition of Weeds in Coconut (*Cocos nucifera* L.) Plantations of Sivagangai District, Tamil Nadu, Southern India

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Abstract

A study was conducted to find out the weed floristic composition in coconut (*Cocos nucifera* L.) plantations of Sivagangai district in Tamil Nadu. Totally 92 weed species (75 species of dicots, 16 species of monocots and 1 species of Pteridophyte) of 81 genera belonging to 37 families were recorded in the study area. A total of 36 angiospermic families were found in the study area. Among them 33 families belonged to dicots and 3 to monocots. Poaceae (11 species) was found as dominant family followed by Amaranthaceae (7 species) and Convolvulaceae and Euphorbiaceae (each of 6 species). 19 families were found with single species.

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Introduction

Weeds are unwanted plants in the cropland that compete with other plants for water, nutrients and space. These plants may be found growing on agricultural fields and gardens (Ngugi et al., 1978; Stephen, 1982; Casas et al., 1996). Weeds also act as hosts for pests and diseases. The abundance or distribution of weed species in a cropped field varies due to the nature of the crops, cultural practices cropping pattern/system, soil type, moisture availability, location and season. Weed species form a component of agro-biodiversity, playing a part in the ecology of natural enemies as in harbouring and supporting many beneficial arthropod species that suppress pest populations consequently improving crop yields (Richerdson et al., 1992).

Extensive literature is available on weed flora dynamics in field crops (Moyer et al., 1989; Fuente et al., 1999; Derksen et al., 2002), as well as on weed flora in palms grown as plantations (Gopinathan Nair and Chami, 1963; Thomas and Abraham, 1996), data palm (Abd-El-Ghani, 1998; El-Halawany, 2001), areca nut (Sahapurmath et al., 2003), peach palm (Bogants and Aguero, 2003; Souza et al., 2003) and grape fields (Selvakumar and Shanmugam, 2010). There has also been an increasing effort on the study of weeds relating to systematic studies (Tiwrai, 1981; Holzner and Immonen, 1982; Barua, 1992; Singh et al., 1994; Ara et al., 1995; Tan et al, 2000; Isaiarasu and Ganesan, 2005), ecological studies (Pandya, 1989; Blumenthal and Jordan, 2001; Suarez et al., 2001), medicinal (Oudhia, 1999; Oudhia, 1999a; Khan et al., 2004; Pandey and Rai, 2005; Jeeva et al., 2006), and food values (Hajra and Chakraborty, 1981; Selvakumar and Shanmugam, 2009; Shanmugam et al., 2011).

Knowledge of weeds flora enables one to use the required herbicide and formulate other suitable management strategies. It is also useful to exploiting abundance weeds as a crop cover or pasture and for other economic uses (Sit et al., 2007). According to Derksen et al. (2002), the study of weed dynamics is essential to formulate a management strategy for the cropping

system. Hence, the present study has been carried out to document the weed plants grown under Coconut (*Cocos nucifera* L.) plantations of Sivagangai District in Tamil Nadu.

Materials and methods

The survey was conducted in coconut (*Cocos nucifera* L.) growing areas of Sivagangai district in Tamil Nadu, just after the rainy season. The entire area of Sivagangai district lies between 9º 30' – 10º 30' N latitude and 77º 00' – 78 º 30' E longitude. The altitude of the study area is about 102 m (334 feet) above mean sea level. The district is spread over an area of about 4189 sq. km and is bounded on the North and Northeast by Pudukkottai district, on the Southeast and South by Ramanathapuram District, on the Southwest by Virudhunagar district and on the West by Madurai district. The district receives an annual rainfall is about 635 – 1019 mm. The maximum and minimum temperature varies between 20º and 40ºC. The study area has high population density and large area of agricultural land. This study includes major coconut cultivating areas from Sivagangai district. Flora of Tamil Nadu Carnatic (Matthew, 1983–1986) was used to ascertain the nomenclature of weed species recorded.

Results and discussion

A total of 92 weeds distributed among 81 genera of 37 families (91 weed species of 80 genera belonging to 36 families of angiosperms and a species of the genus *Marsilia* belonging to 1 family of Pteridophyte) were recorded in the study area (Table 1). Among the 91 species distributed among 36 families of angiosperms, 75 species of 33 families belonged to dicots and 16 species of 3 families belonged to monocots. The percentage of monocots and dicots is about 17.392% and 81.522% respectively. Totally 99.014% of angiosperms and 1.086% of pteridophytes were recorded in the study area (Table 2). In the case of dicots the maximum number of weeds (7 species) was recorded for the family Amaranthaceae. In the case of monocots the maximum number of weeds (11 species) was recorded for the family Poaceae. A total of 18 families of dicots and one family of monocots were recorded only one species (Table 2).

Table 1. Weed species recorded in the study area with their family and local name.

S. No.	Botanical Name	Family	Local Name
Dicotyledons			
1.	*Abutilon indicum* L.	Malvaceae	Thuthi
2.	*Acalypha indica* L.	Euphorbiaceae	Kuppaimeni
3.	*Achyranthes aspera* L.	Amaranthaceae	Naayuruvi
4.	*Aerva lanata* (L.) Juss.	Amaranthaceae	Sirukanpeelai
5	*Alternanthera sessilis* DC.	Amaranthaceae	Ponnaanganni
6.	*Alysicarpus vaginalis* (L.) DC.	Fabaceae	Kaakkattaan
7.	*Amaranthus gralcizans* L.	Amaranthaceae	Sirukeerai
8.	*Amaranthus spinosus* L.	Amaranthaceae	Mullikkeerai
9.	*Amaranthus tristis* Roxb.	Amaranthaceae	Thandangeerai
10.	*Argemone mexicana* L.	Papaveraceae	Birammathandu
11.	*Aristolochia indica* L.	Aristolochiaceae	Preumarundhu
12.	*Asystasia gangetica* (L.) T. Anderson	Acanthaceae	Medday keerai
13.	*Azima tetracantha* Lam.	Salvadoraceae	Sangilai
14.	*Boerhavia diffusa* L.	Nyctanginaceae	Padarmookirattai
15.	*Boerhavia erecta* L.	Nyctanginaceae	Mookirattai
16.	*Calotropis gigantea* (L). R.Br.	Asclepiadaceae	Yerukkam
17.	*Cardiospermum halicacabum* L.	Sapindaceae	Mudakkathaan
18.	*Citrullus colocynthis* (L.) Schrader.	Cucurbitaceae	Kumattikkaai
19.	*Cleome gynandra* L.	Capparidaceae	Nallavelai
20.	*Cleome viscosa* L.	Capparidaceae	Naaikkadukhu
21.	*Clitoria ternatea* L.	Fabaceae	Sanguppoo
22.	*Coccinia grandis* (L.) Voigt.	Cucurbitaceae	Kovai
23.	*Cocculus hirsutus* (L.) Diels.	Menispermaceae	Kaattukkodi
24.	*Corchorus aestuans* L.	Tiliaceae	Karikkeerai
25.	*Croton bonplandianus* Baillon	Euphorbiaceae	Yeliaamanakku
26.	*Cyphostemma setosum* (Roxb.) Alston	Vitaceae	Pullinaranai
27.	*Datura metel* L.	Solanaceae	Oomathai
28.	*Desmodium gangeticum* (L.) DC.	Fabaceae	Pulladi

S. No.	Botanical Name	Family	Local Name
29.	*Desmodium triflorum* (L.) DC.	Fabaceae	Sirupulladi
30.	*Eclipta prostrata* (L.) L.Mant.	Asteraceae	Karisalaanganni
31.	*Enicostemma axillare* (Lam.) A. Raynal.	Gentianaceae	Vellarugu
32.	*Euphorbia hirta* L.	Euphorbiaceae	Ammaan pacharisi
33.	*Evolvulus alsinoides* L.	Convolvulaceae	Vishnukarandhi
34.	*Glinus lotoides* L.	Aizoaceae	Siruseruppadai
35.	*Hibiscus vitifolius* L.	Malvaceae	Aattuparuthi
36.	*Hybanthes ennaespermus* L.	Violaceae	Oridhazh thaamarai
37.	*Hygrophila auriculata* (Schum) Heine.	Acanthaceae	Neermulli
38.	*Indoneesiella echioides* (L.) Sreemadh.	Acanthaceae	Koburandhaangi
39.	*Ipomoea aquatica* Forssk.	Convolvulaceae	Veelaikkeerai
40.	*Ipomoea pes-tigridis* L.	Convolvulaceae	Poonaikkeerai
41.	*Ipomoea obscura* (L.) Ker Gawler.	Convolvulaceae	Siruthaalikkodi
42.	*Leucas aspera* (Willd) Link.	Lamiaceae	Thumbai
43.	*Melochia corchorifolia* L.	Sterculiaceae	Yennaichedi
44.	*Merremia emarginata* Burm.f.	Convolvulaceae	Elikaadhukeerai
45.	*Merremia tridentata* (L.) Hallier	Convolvulaceae	Mudhiyaar koondhal
46.	*Mimosa pudica* L.	Mimosaceae	Thottaalsurungi
47.	*Mukia maderaspatana* (L.) M. Roem.	Cucurbitaceae	Musumusukkai
48.	*Ocimum sanctum* L.	Lamiaceae	Thulasi
49.	*Oldenlandia umbellata* L.	Rubiaceae	Muthakkaasu
50.	*Parthenium hysterophorus* L.	Asteraceae	Mookuthipoochedi
51.	*Passiflora foetida* L.	Passifloraceae	Mupparisavalli
52.	*Pedalium murex* L.	Pedaliaceae	Yaanai nerungil
53.	*Pergularia daemia* (Forssk.) Chior.	Asclepiadaceae	Velipparuthi
54.	*Phaseolus vulgaris* L.	Fabaceae	Miinnikkaai
55.	*Phyllanthus amarus* Schum & Thom.	Euphorbiaceae	Keelaanelli
56.	*Physalis minima* L.	Solanaceae	Sodakku thakkaali
57.	*Polygonum plebeium* R.Br.	Polygonaceae	Kanganichedi
58.	*Portulaca oleracea* L.	Portulacaceae	Paruppukkeerai
59.	*Pupalia atropurpurea* (Lam.) Moq.	Amaranthaceae	Sunnaambukkeerai
60.	*Rungia repens* (L.) Nees	Acanthaceae	Kudakham
61.	*Sida caprinifolia* L.	Malvaceae	Pazhambaasi
62.	*Sida cordifolia* L.	Malvaceae	Nilathuthi
63.	*Solanum nigrum* L.	Solanaceae	Manthakkaali
64.	*Spermacoce hispida* L.	Rubiaceae	Naathaisoori
65.	*Stachytarpheta indica* auct.non (L.) Vahl	Verbenaceae	Seemainaayuruvi
66.	*Synedrella nodiflora* (L.) Gaertner	Asteraceae	Kaattukolai
67.	*Tephrosia purpurea* Pers.	Fabaceae	Kozhunji
68.	*Tinospora cordifolia* Miers.	Menispermaceae	Seendhil
69.	*Tragia involucrata* L.	Euphorbiaceae	Sendhatti
70.	*Trianthema portulacastrum* L.	Aizoaceae	Vellaichaaranai
71.	*Tribulus terrestris* L.	Zygophyllaceae	Nerungil
72.	*Trichodesma indicum* (L.) R.Br.	Boraginaceae	Kavizhthumbai
73.	*Tridax procumbens* L.	Asteraceae	Thaathaapoochedi
74.	*Vernonia cinerea* L.	Asteraceae	Sirudhevi sengeluneer
75.	*Zaleya decandra* (L.) Burm.f.	Aizoaceae	Sirusaaranai
Monocotyledons			
76.	*Andropogon pumilus* Roxb.	Poaceae	Kokkuvaaippull
77.	*Aristida hystrix* L.f.	Poaceae	Kaandhaarippull
78.	*Chloris barbata* Sw.	Poaceae	Kodaippull
79.	*Chrysopogan acciculatus* L.	Poaceae	Sorrkkappull
80.	*Commelina benghalensis* L.	Commelinaceae	Thengaaipoochedi
81.	*Cynodon dactylon* (L.) Pers.	Poaceae	Arugambullu
82.	*Cyperus corymbosus* Rottb.	Cyperaceae	Seemaikorai
83.	*Cyperus rotundus* L.	Cyperaceae	Korai
84.	*Dactyloctenium aegypticum* (L.) P. Beauv.	Poaceae	Sevalkaalpull

S. No.	Botanical Name	Family	Local Name
85.	*Dicanthium annulatum* (L.) P. Beauv.	Poaceae	Silandhippull
86.	*Eragrostis pilosa* (L.) P. Beauv.	Poaceae	Poopull
87.	*Fimbristylis cymosa* R.Br.	Cyperaceae	Kothuppullu
88.	*Kyllinga monocephala* Rottb.	Cyperaceae	Mallikorai
89.	*Panicum repens* L.	Poaceae	Thenippull
90.	*Paspalum conjugatum* L.	Poaceae	Naaivaragu
91.	*Setaria italica* (L.) P. Beauv.	Poaceae	Ottuppullu
Pteridophytes			
92.	*Marsilea quadrifolia* L.	Marsiliaceae	Aaraakkeerai

Table 2. Number of weed species in different families recorded.

Family	Number of weed species
Dicotyledons	
Acanthaceae	4
Aizoaceae	3
Amaranthaceae	7
Aristolochiaceae	1
Asclepiadaceae	2
Asteraceae	5
Boraginaceae	1
Capparidaceae	2
Convolvulaceae	6
Cucurbitaceae	3
Euphorbiaceae	6
Fabaceae	5
Gentianaceae	1
Lamiaceae	1
Malvaceae	4
Menispermaceae	2
Mimosaceae	1
Nyctanginaceae	2
Papaveraceae	1
Passifloraceae	1
Pedaliaceae	1
Polygonaceae	1
Portulacaceae	1
Rubiaceae	2
Salvadoraceae	1
Sapindaceae	1
Solanaceae	3
Sterculiaceae	1
Tiliaceae	1
Verbenaceae	1
Violaceae	1
Vitaceae	1
Zygophyllaceae	1
Monocotyledons	
Commelinaceae	1
Cyperaceae	4
Poaceae	11
Pteridophytes	
Marsiliaceae	1

As many as 33 families of dicots, 3 families of monocots and 1 member of Pteridophytes were noticed during the study. Members of both dicots and monocots were found in all the locations studied. Among monocots, only Commelinaceae, Cyperaceae and Poaceae were noticed in the study area. Dicots dominant over the monocots in all the locations studied. Gopinathan Nair and Chami (1963) found dicotyledons to be dominant in coconut gardens. Commelinaceae, Cyperaceae and Poaceae are the major monocot families and Asteraceae, Fabaceae and Rubiaceae are the predominant dicot families seen in coconut gardens. They also concluded that the weeds of the families Cyperaceae and Poaceae are the most troublesome. In this study also the weeds of the families Cyperaceae and Poaceae are the most predominant. But in the case of dicots Amaranthaceae (7 species) was found as dominant family followed by Convolvulaceae and Euphorbiaceae (each of 6 species).

Sit et al. (2007) reported that 17 families of dicots, three families of monocots (Poaceae, Cyperaceae and Araceae) and four members of pteridophytes were noticed in palm gardens including coconut plantations in Plains of Eastern Himalayan region of West Bengal. The present study revealed that only one species of pteridophyte was recorded from coconut plantations in Sivagangai district of Tamil Nadu.

Souza et al. (2003) found the plants of Poaceae, Euphorbiaceae, Fabaceae, Cyperaceae and Verbenaceae to be predominant weeds in Cupuacu and peach palm gardens. Tahira et al. (2010) studied the weed flora of *Curcuma longa* fields in Kasur district of Pakistan and 14 weed species belonging to eight angiosperm families (Asteraceae, Brassicaceae, Chenopodiaceae, Euphorbiaceae, Malvaceae, Poaceae, Ranunculaceae and Solanaceae).

The present investigation reveals that the prevalence of dicot weed species was higher in all conditions under study than that of the monocots. Restriction of some weed species to particular areas supports the fact that

they require special conditions for growth, whereas the presence of some weeds in all the study areas shows that they can grow under varied light conditions.

Conclusions

While making culture operations in Coconut plantations, 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. As per the available literatures about weeds, these are having nutritional and medicinal values. So, attention should also be made on proper utilization of these plants.

Conflict of interest statement

Authors declare that they have no conflict of interest.

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