

BIODIVERSITY OF WEED SPECIES IN CROP FIELDS OF PARNER TAHSIL FROM AHMEDNAGAR DISTRICT (MS), INDIA

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ABSTRACT

The present paper focuses on the weed flora of crop fields of Parner *tahsil* from Ahmednagar district of Maharashtra via survey conducted during 2010-2012. A total of 97 plant species belonging to 78 genera and 37 families were identified as crop land weeds, of these, dicotyledones share 79 species under 32 families (86.48%) and monocotyledons were represented by 18 species under 5 families (13.51%). The herbaceous weed flora was found to be dominant with 73 species, shrubs with 8 species, trees and climbing herbs with 4 species each while under shrubs were represented by 7 species. Asteraceae, Poaceae, Solanaceae, Amaranthaceae, Fabaceae and Euphorbiaceae were among the largest families represented by more than five species each. Some weed species were found to be used as food, fodder, medicines and pharmaceutical products.

Keywords: *Weeds, Crop Fields, Parner Tahsil, Maharashtra, India*

INTRODUCTION

Weeds are the unwanted plants growing in a place where some other plants are also growing or no other plant has grown at all. The weeds can be defined as the plants growing in wrong places from farmer's point of view. According to Bell (1905) weed is a plant of outside places. Weeds are aggressive, troublesome and undesirable elements of the world's vegetation. Shaw (1956) 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 (Dangwal *et al.*, 2010). 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 is 45% in India.

The reduction in various crop yield and produce efficiency ranges from 34.3% to 89.8% including wheat (15-30%), rice (30.35%), cotton (44.5%) sugarcane (38.8%) and maize, sorghum, pulses (18-85%) (Gupta, 2003). Besides the weed inflict allelopathic effects on crop plants which are large through their depressive root exudates.

Some weeds provide alternate host and vector of malaria, dengue fever, yellow fever (Petern, 1955) and other health hazard. They reduce human efficiencies by causing hay fever and asthma by pollen (*Parthenium hysterophorus*, *Ambrosia artimisiifolia*), allergenic disorders (*Parthenium hysterophorus*). However, besides such adverse effect, several weeds have been beneficial and used for food, fodder, medicine, fibre and other miscellaneous purposes (Patil *et al.*, 2010; Mujawar, 2012" a" and "b"). In addition, weeds also being hosts to several pathogens and other insect pests which are considered to be the natural enemies of the agricultural crops. Thus weeds can be important to man in many ways, not all of them disadvantageous.

The present investigation is related to the study of weed diversity of irrigated and non irrigated agricultural fields from Parner tahsil of Ahmednagar district. As regards the botanical exploration in Ahmednagar district, several people have made notable contributions, such as Billore and Hemadri (1969), Santapau (1951), Santapau and Irani (1962), Wadhwa and Ansari (1968), Rao (1960), Shirke (1983), Aher (2015), Waman *et al.*, (2013), Auti *et al.*, (2014), Mulay and Sharma (2012). However there

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is not even a single concrete report about diversity of weed species. Keeping this in view, present study was conducted as the first ever attempt from the region to explore and identify the weed diversity from crop fields.

Study Area

Parner is one of the Tahsil in Ahmednagar district of Maharashtra (India). Total area of the Tahsil is 1787 Sq. km. Area under agriculture is 1477 Sq. km. (76.55%). Except 14 villages, rest of the Tahsil totally depends on rain water for irrigation. The tahsil lies under drought prone areal. As there are extremities in temperature, humidity and average rainfall, it has very characteristic floral diversity. The study area lies between 18^o 49' 40" to 19^o 21' 13" N latitude and 74^o 10' 22" E to 74^o 38' 34" E longitude at an elevation of about 750-800 m above mean sea level.

The weather, in general, can be said to be hot and dry. The average temperature ranges from 25^{oc} to 36^{oc}. Relative humidity is extremely low for major part of the year (between 35 to 51%) while it is highest (83%) during monsoon.

In many parts of Parner tahsil, the soils though not very deep have a good admixture of lime and are open as a result of which they are well suited for the production of a number of rabi crops. However, on the terraces, the soils are too inferior and the hill-slopes are stony and poorer. Fairly productive black soils are seen only in low grounds.

MATERIALS AND METHODS

The present study pertains to common weeds in irrigated and non-irrigated crop fields from the Parner tahsil (Dist. Ahmednagar) during 2010-2012. The exploration of the area under study includes planned study tours to various crop fields. Several field tours were made to cover the entire Parner tahsil during rabi as well as kharif seasons. Collections were made from wide range of agricultural fields include onion, bajara, pomegranate, jowar, sugarcane, wheat, groundnut, vegetable crops, black gram, green gram, pigeon pea, etc. Notes were written on habit, habitat, flowering and fruiting period, uses if any and general distribution.

Some common people as well as farmers were also interviewed to know the local name of the weeds. Plant species belonging to various life forms were collected and identified taxonomically with the help of standard taxonomic literature (Cooke, 1967; Singh *et al.*, 2001; Cooke 1958; Pradhan and Singh, 1999; Singh and Kartikeyan, 2000). The collected plant specimens were properly processed using prescribed techniques (Jain and Rao, 1967). Photographs were also taken. The collected specimens were preserved in the herbarium.

Major crops of the irrigated regions are pomegranate, sugarcane, onion, pea, tomato, groundnut, wheat, jowar, etc. The crops of non irrigated regions depend entirely upon rainwater which are bajara, soyabean, groundnut, green gram, black gram, pigeon pea, etc.

RESULTS AND DISCUSSION

In the present study, a total of 97 plant species belonging to 78 genera and 37 families were identified as weeds in crop fields from Parner tahsil of Ahmednagar district (Maharashtra). Of these, dicotyledon were represented by 79 species, 61 genera under 32 families whereas monocotyledons were represented by 18 species, 17 genera under 5 families.

Dicot weed species were found to be dominant with 81.44% and monocots showed 18.55% of the total weed flora. The botanical name, family, common name, habit, flowering and fruiting period of weed species is presented in Table 1.

The taxonomic categorization of species is presented in Table 2. These species are recorded exclusively from the irrigated and non irrigated crop fields. The first six largest families with more than five species are presented in Table 3. Asteraceae and Poaceae were the largest families represented by 10 species each followed by Solanaceae, Fabaceae and Amaranthaceae (represented by 8 species each), and Euphorbiaceae represented by 5 species. Monocotyledons were represented by family Lamiaceae, Poaceae, Liliaceae, Cyperaceae and Commelinaceae.

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Table 1: List of weeds from irrigated and non irrigated crop land

Sr. No.	Botanical name and family of the plant	Common Name	Flowering and Fruiting Period	Habit
1.	<i>Abutilon indicum</i> (L.) Sweet. Malvaceae	Mudra	Throughout year	the Shrub
2.	<i>Acacia arabica</i> Mimosaceae	Babul	June- Jan.	Tree
3.	<i>Acacia nilotica</i> (L.) Wild Mimosaceae	Wedi Babul	June - Sept.	Tree
4.	<i>Achyranthes aspera</i> L. Amaranthaceae	Aghada	Nov. - Jan.	Herb
5.	<i>Ageratum conyzoides</i> L. Cucurbitaceae	Osadi	Aug. - April	Herb
6.	<i>Alternanthera pungens</i> Kunth. Amaranthaceae	----	June- March	Herb
7.	<i>Alternanthera sessilis</i> Br. Amaranthaceae	Chimu-kata	Throughout year	the Herb
8.	<i>Alysicarpus pubescens</i> Law. Fabaceae	Lal Shevra	Sept.- Dec.	Herb
9.	<i>Amaranthus gengaticus</i> Amaranthaceae	Tandulcha	Aug- Feb.	Herb
10.	<i>Amaranthus spinosus</i> L. Amaranthaceae	Kante-math	July-Dec.	Herb
11.	<i>Amaranthus tricolor</i> L. Amaranthaceae	Chavalaayi	Aug.- Jan.	Herb
12.	<i>Argemone mexicana</i> L. Papavaraceae	Bilayat	Feb. -June	Herb
13.	<i>Aristolochia bracteolata</i> Lam. Aristolochiaceae	Badak Phul	Aug.- Nov.	Herb
14.	<i>Asphodelus tenuifolius</i> Cavan Liliaceae	----	Nov.- Feb.	Herb
15.	<i>Bacopa monnieri</i> L. Scrophulariaceae	Nir Bramhi	Dec.- April	Herb
16.	<i>Barleria prointis</i> L. Acanthaceae	Kate Koranti	Oct.- Nov.	Shrub
17.	<i>Basella rubra</i> L. Basellaceae	Velbondi	Oct.- Dec.	Herb
18.	<i>Bidens biternata</i> (Lour.) Merr. & Scherif. Asteraceae	Chikta	April- Oct.	Herb
19.	<i>Boerhavia erecta</i> L. Nyctaginaceae	Punarnava	Throughout year	the Herb
20.	<i>Boerhavia diffusa</i> L. Nyctaginaceae	Ghentuli	Aug.- Dec.	Herb
21.	<i>Brachiaria eruciformis</i> (J.E.Sm.) Griseb. Poaceae	Shimpi	Dec.- March	Herb
22.	<i>Brachiaria ramosa</i> (L.) Stapf Poaceae	----	July- Oct.	Herb

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23.	<i>Caesulia axillaris</i> Roxb. Asteraceae	Maka	Sept.- Nov.	Herb
24.	<i>Calotropis gigantea</i> (L.) R.Br. Asclepediaceae	Mandar	Feb. - July	Shrub
25.	<i>Calotropis procera</i> (Ait)R.Br. Asclepediaceae	Rui	Dec.- Feb.	Shrub
26.	<i>Cardiospermum helicacabum</i> L. Sapindaceae	Kapal phodi/Kanphuti	December	Climbing herb
27.	<i>Cassia tora</i> L. Fabaceae	Takla	Nov-. Dec.	Herb
28.	<i>Catharanthus pusillus</i> (Murr.) G.Don Apocynaceae	Ran-kel	July- Oct.	Herb
29.	<i>Celosia argentea</i> L. Amaranthaceae	Kombada	Sept.-March	Herb
30.	<i>Centella asiatica</i> (L.) Urb Apiaceae	Bramhi	Most part of the year	Herb
31.	<i>Chenopodium album</i> L. Chenopodiaceae	Chakvat	Nov.- April	Herb
32.	<i>Chloris vargata</i> Sw. Poaceae	Gondvel	Aug.- Jan.	Herb
33.	<i>Cleome gynandra</i> L. Cleomaceae	Pandhari Tilwan	June- Sept.	Herb
34.	<i>Cleome simplicifolia</i> (Camb.) Hook Cleomaceae	Gavati Tilwan	July- Nov.	Herb
35.	<i>Cleome viscosa</i> L. Cleomaceae	Piwali Tilwan	May- Oct.	Herb
36.	<i>Commelina benghalensis</i> L. Commelinaceae	Lamb kena	July- Nov.	Herb
37.	<i>Convolvulus arvensis</i> L. Convolvulaceae	Chandvel	July- March	Climbing herb
38.	<i>Crotalaria hebecarpa</i> (DC.) Rudd. Fabaceae	Godhadi	July- Feb.	Herb
39.	<i>Croton bonplandianus</i> Baill. Euphorbiaceae	Jamalgota	April- August	Under shrub
40.	<i>Cullen corylifolia</i> Heyne Fabaceae	Bavachi	Sept- Jan.	Herb
41.	<i>Cuscuta reflexa</i> Roxb. Cuscutaceae	Amar Bel	Jan.- March	Herb
42.	<i>Cyanotis cristata</i> (L.) D.Don. Commelinaceae	Abhali	Aug.- Oct.	Herb
43.	<i>Cynadon dactylon</i> L. Poaceae	Harli	Most part of the year	Herb
44.	<i>Cynotis cucullata</i> (Roth.) O. Ktze Commelinaceae	----	March- Aug.	Herb

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45.	<i>Cyperus rotundus</i> L. Cyperaceae	Nagarmotha	July- Dec.	Herb
46.	<i>Datura inoxia</i> Mill. Solanaceae	Dhotra	Sept.- March	Under shrub
47.	<i>Datura metal</i> L. Solanaceae	Kala Dhotra	June- Oct.	Herb
48.	<i>Digera muricata</i> (L.) Mart. Amaranthaceae	Kunjir	Aug.- Dec.	Herb
49.	<i>Digeria stricta</i> Roth. ex F. and S. Poaceae	----	Aug.- Oct.	Herb
50.	<i>Dinebra retroflexa</i> (Vahl.) Panz. Poaceae	Velu	August	Herb
51.	<i>Eclipta alba</i> L. Asteraceae	Maka	Oct.- Dec.	Herb
52.	<i>Eragrostis uniolooides</i> (Retz.) Nees Poaceae	Siteche Pohe	Sept.- Dec.	Herb
53.	<i>Euphorbia geniculata</i> L. Euphorbiaceae	Dudhi	Sept.- March	Herb
54.	<i>Euphorbia heterophylla</i> L. Euphorbiaceae	Dudhani	Throughout year	the Herb
55.	<i>Euphorbia hirta</i> L. Euphorbiaceae	Dudhi	Throughout year	the Herb
56.	<i>Evolvulus alsinoides</i> L. Convolvulaceae	Vishnukrant	Throughout year	the Herb
57.	<i>Gynandropsis pentaphylla</i> D.C. Prodr. Cleomaceae	----	June- Aug.	Shrub
58.	<i>Heteropogon contortus</i> (L.) P. Beauv. Poaceae	----	Dec. - June	Herb
59.	<i>Indigofera glandulosa</i> Wendl. Fabaceae	Barbada	Aug.- Nov.	Herb
60.	<i>Kyllinga triceps</i> Rottb. Cyperaceae	----	September	Herb
61.	<i>Lagascea mollis</i> Cav. Asteraceae	Jharwad	Throughout year	the Herb
62.	<i>Lantana camara</i> L. Verbenaceae	Ghaneri	Throughout year	the Shrub
63.	<i>Launaea procumbens</i> (Roxb.) Asteraceae	Pathri	Oct.- Feb.	Herb
64.	<i>Leucaena leucocephala</i> (Lam) de Wit Fabaceae	Subabhul	Feb.- June	Tree
65.	<i>Leucas aspera</i> (Willd.) Link. Lamiaceae	Shankroba	Sept.- March	Herb
66.	<i>Leucas longifolia</i> Benth.	Dudhani	Sept.- March	Herb

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67.	Lamiaceae <i>Merremia gigantea</i> L.	---	March- May	Herb
68.	Convolvulaceae <i>Mimosa pudica</i> L.	Lajalu	Sept.- March	Herb
69.	Mimosaceae <i>Oxalis corniculata</i> L.	Ambushi	Jan.- May	Herb
70.	Oxalidaceae <i>Parthenium hysterophorus</i> L.	Gajar gawat	Throughout year	the Herb
71.	Asteraceae <i>Paspalum scrobiculatum</i> L.	----	July- Dec.	Herb
72.	Poaceae <i>Pergularia daemia</i> (Forssk.) Chiov.	Utarni	July- Feb.	Climbing herb
73.	Asclepiadaceae <i>Phyllanthus amarus</i> Schum. & Thonn.	Bhuiavali	July- Aug.	Herb
74.	Euphorbiaceae <i>Physalis minima</i> L.	Ran Popati	Oct.- March	Herb
75.	Solanaceae <i>Physalis peruviana</i> L.	Popati	July- Nov.	Herb
76.	Solanaceae <i>Polygala arvensis</i> Willd.	Sanjivani	June- Feb.	Herb
77.	Polygalaceae <i>Portulaca oleracea</i> L.	Ghol	Throughout year	the Herb
78.	Portulacaceae <i>Ranunculus muricatus</i> L.	----	July- Dec.	Herb
79.	Ranunculaceae <i>Sesbania grandiflora</i> Poir.	Hadga	Various times	Tree
80.	Fabaceae <i>Setaria verticillata</i> (L.) Beauv.	Dangani	December	Herb
81.	Poaceae <i>Sida acuta</i> Burm.	Chikana	Sept.- Feb.	Under shrub
82.	Malvaceae <i>Sida cordifolia</i> L.	Chikana/Bala	Sept.- Feb.	Shrub
83.	Malvaceae <i>Sida spinosa</i> L.	Jangli Methi	Aug.- April	Under shrub
84.	Solanaceae <i>Solanum nigrum</i> L.	Kanguni	Aug.- Jan.	Under shrub
85.	Solanaceae <i>Solanum virginianum</i> L.	Kateringni	June- Jan.	Under shrub
86.	Solanaceae <i>Solanum xanthocarpum</i> L.	Bhuiringni	June	Herb
87.	Solanaceae <i>Sonchus asper</i> Hill	Mhatara	June- Oct.	Herb
88.	Asteraceae <i>Striga densiflora</i> Benth.	Bambaku	Oct.- Jan.	Herb
89.	Scrophulariaceae <i>Tephrosia purpurea</i> (L.) Pers.	Unhali	Aug.- Sept.	Herb
	Fabaceae			

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90.	<i>Thalspi arvense</i> L. Brassicaceae	Ran Mohari	March- April	Herb
91.	<i>Tinospora cordifolia</i> DC Menispermaceae	Gulwel	June- Nov.	Climber
92.	<i>Tribulus terrestris</i> L. Zygophyllaceae	Gokhru	Throughout year	the Herb
93.	<i>Tridax procumbens</i> L. Asteraceae	Ekdandi	Througout year	the Herb
94.	<i>Triumfetta rotundifolia</i> Lam. Tiliaceae	Zinjud	Nov.- Feb.	Herb
95.	<i>Withania somnifera</i> Dunal Solanaceae	Ashwangandha	Aug.- Nov.	Herb
96.	<i>Xanthium indicum</i> Koen. Asteraceae	Landga	Sept.- Nov.	Under shrub
97.	<i>Xanthium strumarium</i> L. Asteraceae	Ghagara	Aug.- Oct.	Shrub

The first six largest families represent 49.48% of the total weed species. *Amaranthus*, *Sida*, *Euphorbia*, *Cleome* and *Solanum* are the largest genera each representing three genera. Out of 97 species, 73 species are herbs (76.04%), 8 species are shrubs (8.33%), 7 are under shrubs (7.21%) and 4 species (4.165) falls under climber and tree category each (Figure 1). Onion, sugarcane, pea, pomegranate, tomato, potato are the major cash crops from the region.

Table 2: Showing family, genus and species wise distribution of the weeds

	Total No. of Family	Percentage	Total No. of Genera	Percentage	Total No. of Species	Percentage
Dicotyledons	32	86.48	61	78.20	79	81.44
Monocotyledons	05	13.51	17	21.79	18	18.55
Total	37		78		97	

The Parner tahsil lies under drought prone area. Of the 131 villages, 14 villages are under Kukadi irrigation canal and rest of the part depend either on rain water or small irrigation projects for irrigation. *Tridax procumbens*, *Cynadon dactylon*, *Parthenium hysterophorus*, *Cassia tora*, *Argemone mexicana*, *Achyranthus aspera*, *Digera muricata*, *Euphorbia geniculata*, *Datura inoxia*, *Setaria verticillata*, *Abutilon indicum* are predominant weeds found in irrigated crops.

Table 3: Species wise dominant weed families

Family	No. of Species
Asteraceae	10
Poaceae	10
Solanaceae	08
Amaranthaceae	08
Fabaceae	07
Euphorbiaceae	05

Non irrigated crop fields are highly infested with *Celosia argentea*, *Tribulus terrestris*, *Tridax procumbens*, *Xanthium indicum*, *Commelina benghalensis*, *Cyperus rotundus*, *Datura metal*, *Parthenium hysterophorus*, *Lantana camera*, *Eclipta alba*, *Xanthium strumarium*, etc. *Cuscuta reflexa* is a parasitic weed found in the fields of Lucerne grass in the study area. The weeds like *Xanthium strumarium*, *Cynadon dactylon*, *Celosia argentea*, *Trbulus terrestris*, *Sonchus asper* are troublesome even at the time

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of harvesting of the crop. These species are recorded exclusively from the cultivated fields. The fruit crop fields surveyed indicates that there is no presence of any additional species.

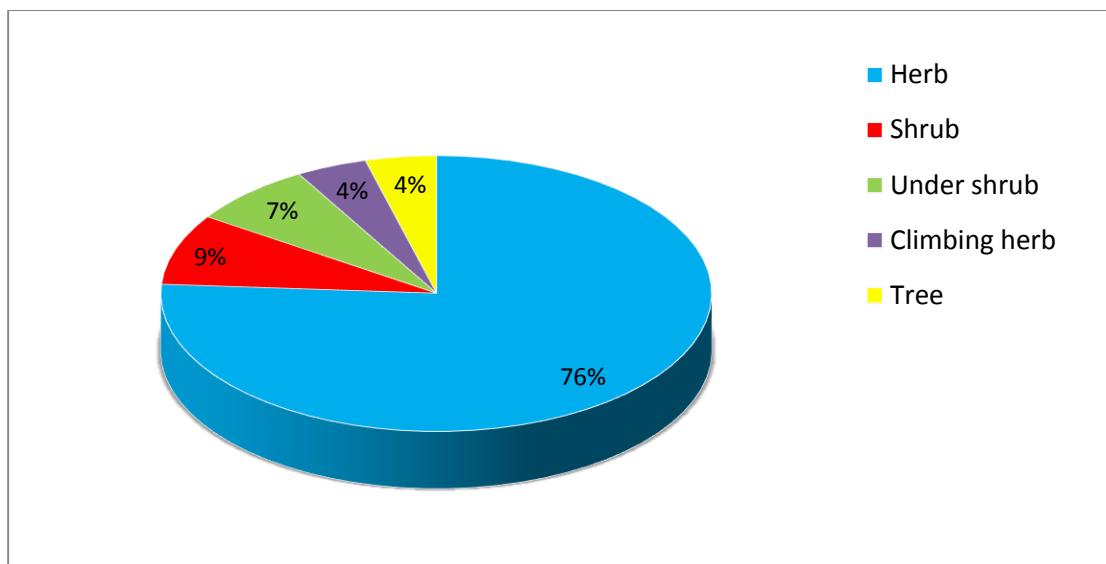


Figure 1: Showing habit wise percentage of weeds

Although some of the weeds are beneficial and very useful as forage to domestic animals, in traditional medicines, food and pharmaceutical products (Patil *et al.*, 2010; Mujawar, 2012). *Cynadon dactylon*, *Celosia argentia*, *Commelina benghalensis*, *Heteropogon contortus*, *Paspalum scrobiculatum*, are used as forage weeds by farmers for their domestic animals. *Boerhavia erecta*, *Calotropis gigantea*, *Amaranthus tricolor*, *Withania somnifera*, *Acacia nilotica*, *Achyranthus aspera* *Datura metal*, *Tridax procumbens* and *Cyperus rotundus* are important ethnomedicinally important weeds from the region. *Amaranthus roxburghianus*, *Amaranthus spinosus*, *Barleria proinitis*, *Chenopodium album*, *Digeria muricata*, *Sesbania grandiflora*, *Launaea procumbens* are used as vegetables and also for the preparation of various recipes in the study area.

The present information on the distribution of different weed species in various crop fields is an important investigation and has an applied significance in the effective weed management and crop yield improvement process. The weed flora work at regional level would be of good source of information on technical and taxonomic data.

Conclusion

It is well known that weed competition in crops is one of the major causes of low productivity and therefore it becomes essential to protect the crops from the weed infestation. Based on the present study, it is concluded that, out of 97 weed species dicotyledones were represented by 78 species with 61 genera under 32 families. The monocotyledons includes 18 species with 17 genera under 5 families. Majority of the weed species are herbaceous (76.04%), followed by shrubs (8.33%), undershrubes (7.29%) and climbing herb and tree species (4.16%). Not all the weed species have negative value but some are beneficial and useful in traditional medicines, vegetables, forage to domestic animals and even in pharmaceutical products. However industrialization, over population, climatic changes and use of weedicides has definitely affected weed diversity of the region. The results obtained regarding the taxonomy of weeds have clearly established the fact that the weed diversity in this region is high and significant.

ACKNOWLEDGEMENT

The author is thankful to University Grants Commission, Western Regional Office, Pune for providing financial assistance in the form of minor research project.

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