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Assessment of Weed Flora Composition in Arable Fields of Bench Maji, Keffa and Sheka Zones, South West Ethiopia

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Abstract

Assessment of Weed Flora Composition on of weeds in arable fields were conducted in Bench Maji, Keffa and Sheka Zones, South West Ethiopia, during 2017 main and sub cropping seasons. The study was initiated to determine the weed flora, prevalence and distribution of weeds in the major crop fields. The result showed a total of one hundred thirty five weed species that were collected and recorded in 135 genera and 35 families. *Poaceae* (20), *Asteraceae* (21), *Fabaceae* (12) and *Polygonaceae* (7) were by far the richest taxa and accounted together (44.5 %) of the entire flora of the study area. The most frequent, abundant and dominant weed species were *Amaranthus graecizans L. Mimosa invisa, Amaranthus hybridus L.* and *Cynodon dactylon L.* The average values for frequency and dominance of weed species in arable fields ranged between 7-87% and 0.04 to 2.4%, respectively. Similarity indices of weed communities in different locations were also determined to be >60% across all locations sampled.

Keywords: Flora composition; Qualitative; Quantitative; Similarity index; Weed communities

Introduction

Weeds compete with cultivated food crops for limited resources such as water, nutrients and light [1-3]. Weeds infestation also encourage disease problems, serve as alternate host for deleterious insects and diseases, slow down harvesting operation, increase the cost of production, reduce the market value of crops and increase the risk of fire in perennial crops, plantation and forest reserves [4].

The nature of crop, cultural practices and cropping pattern or system, soil type, moisture availability, location and season have been reported to cause variation in the abundance or distribution of weed species that are found in a cropped field [4,5]. Density of single or many weed species can change depending on factors such as seed purity, choice of crops, rotations, sowing time and techniques, soil management, harvest time, fertilizing, chemical and mechanical weed control methods during a long period [3,6-8].

Therefore, survey of weed flora composition, distribution and intensity is essential for a comprehensive understanding of the weed problem that poses negative impacts on crop production in a given area. Such assessment of the nature of weed flora determines, to a large extent, the type of weed management measures to be adopted. To design effective weed control measures, identification, characterization, and quantification of weed species in a certain area are important steps to be followed. Information on weed density, distribution, and species composition may help to predict yield losses and such information helps in deciding whether it is economical to control a specific weed problem [9,10]. There is no detailed information available about the amount of crop yield losses due to weeds in Ethiopia. Furthermore, the relative importance of common weed species in the major crops and cropping systems is not well documented [11], especially in south western Ethiopia. Hence, this study was initiated to determine the weed flora, prevalence and distribution of weeds in the major crops of Bench Maji, Keffa and Sheka zones.

Materials and Methods

Description of the study areas

The study was conducted in selected Districts of Bench Maji (Guraferda, Menit Shasha, Menit Goldya, Semen Bench and Shey Bench) Keffa (Bita, Bonga Zuria, Chena, Ginbo and Decha) and Sheka (Andracha and Yeki) Zones in Southern Nations Nationalities and Peoples Region (SNNPRs) (Figure 1).

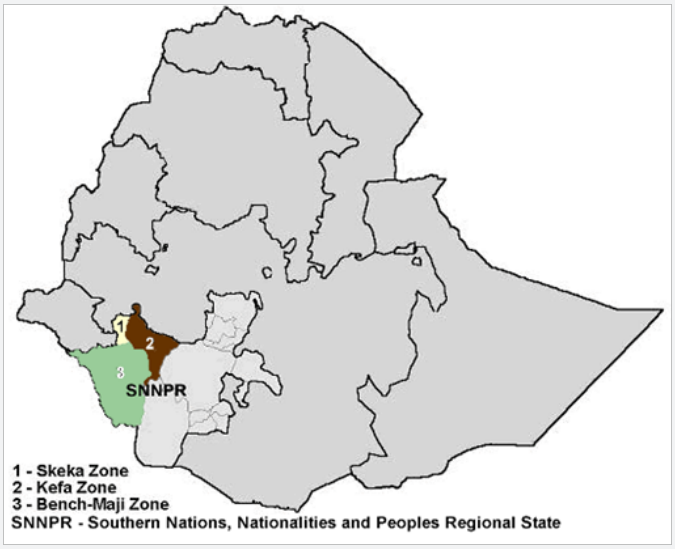

Figure 1

Bench Maji is one of the Zones of the Ethiopian Southern Nations, Nationalities, and Peoples' Region (SNNPR). Bench Maji is bordered on the south by the Ilemi Triangle, on the west by South Sudan, on the northwest by the Gambela Region, on the north by Sheka, on the northeast by Keffa, and on the east by Debub Omo. The administrative center of Bench Maji is Mizan Teferi; other towns include Maji. Bench Magi Zone is in SNNPRS and located at latitude from 5°.33'' to 7°.21''N and longitudes from 34°.88'' to 36°.14''E with an elevation ranging from 1200 to 1959 meters above sea level. The area receives mean annual rainfall ranging from 1500 to 1800mm (an average 1692mm) per year and has 15 °C to 27 °C range of temperature annually and the soil is loam or silty-loam soil type. The main food crops in this Zone include maize, godere (taro root), and enset, while sorghum, teff, wheat and barley are cultivated to a significant extent. Cash crops include fruits (bananas, pineapples, oranges) and spices (e.g. coriander and ginger). However, coffee is the primary cash crop.

Keffa: Keffa is a Zone in the Ethiopian Southern Nations, Nationalities, and Peoples' Region (SNNPR). Keffa is bordered on the south by Debub Omo, on the southwest by Bench Maji, on the west by Sheka, on the north by the Oromia Region, and on the east by Konta. The administrative center of Keffa is Bonga.

Sheka: Sheka is a Zone in the Ethiopian Southern Nations, Nationalities and Peoples' Region (SNNPR). Sheka is bordered on the south by Bench Maji, on the west by the Gambela Region, on the north by the Oromia Region, and on the east by Keffa. The administrative center of Sheka is Masha. Sheka Zone, lies between 7°24‟ to 7°52‟ N, 35°13‟ to 35°35‟ E and 900 to 2700m asl. The zone covers about 2175.25km2, out of which 47% is covered by forest, and 56, 24 and 20% is a highland, a mid altitude and lowland, respectively. It receives high amounts of rainfall, with an average between 1800 to 2200mm per annum. The major crops grown in the zone are maize, sorghum, millet, beans, coffee, ginger, turmeric, enset, wheat, barley and pea. The zone is divided into three administrative woredas‟ (districts), namely Yeki, Anderacha and Masha

Data collection

A survey of the weed flora in major crop fields in South Western Ethiopia was carried out during the rainy season from February to April and July to October 2016. One hundred eighty crop fields were surveyed. Representative districts within each zone were selected, then representative peasant associations within each district, villages within association, and farmers within villages. Third, fields were selected regardless of size, and on the grounds of accessibility (adjacent to road) and whether it carried the required crop or crop combination.

In each field, 4m^2 quadrats were used following an inverted W pattern [12]. In each field, a pattern of an inverted W [12] was followed continuously for every 2.5 to 3 hectares. The numbers of samples per hectare was determined by the species area curve and site condition [13]. The first quadrate sample was taken following the procedure of [14], where the surveyor walks 50 paces along the edge of the field, turns right angle, walks 50 paces into the field, throws quadrant, and starts taking sample. A preliminary species versus area analysis were suggested the sample size to be appropriate to detect almost all of the weed species in the small fields. Percentage cover (the ground area covered by the vertical projection of above-ground plant parts) was estimated by eye for each of the weed species in each quadrat.

Specimens of all plant species encountered in sampling areas were collected, tagged and pressed in the field using a newspaper and herbarium presser. Field notes were documented the colour of the flower, fruit, fragrance or any special features of the plants collected. When the plant specimens are completely dry, they were mounted on herbarium sheet of 16.5"×11" using glue, and

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labeled. Plant specimens in the field were identified using the available plant identification guides. Identification in the field was based on weed identification guides [11,15]. Those species that were difficult to identify in the field was tagged, pressed, and sent to the National herbarium of Addis Ababa University. Nomenclature followed flora of Ethiopia and Eritrea, volumes 2, 3, 4, 6, and 7 [16-18].

Data Analysis

The data on weed species were summarized using the formula described by [19] as depicted below.

Frequency (constancy): Is the percentage of sampling plots (vegetation registrations) on which a particular weed species is found. It explains as how often a weed species occurs in the survey area. Frequency is calculated for all weed species as follows:

$$F= 100*X/N$$

Where, F= frequency; X = number of occurrences of a weed species; N= sample number

Abundance

Population density of weed species expressed as the number of individuals of weed plants per unit area.

$$A = \Sigma W/N$$

Where, A = abundance; W = number of individual species/ sample; N = sample number

Dominance

Abundance of an individual weed species in relation to total weed abundance.

$$D = A*100/\Sigma A$$

Where, D = dominance; A = abundance; ΣA = total abundance (of all species)

Similarity index/Community index

Is the similarity of weed communities between different locations or crop types or grazing areas.

$$SI = 100*Epg/(Epg + Epa +Epb)$$

Where, SI = Similarity index; Epg = number of species found in both locations; Epa = number of species found in location I; Epb = number of species found in locations II

Result and Discussion

Weed flora composition

One hundred thirty five weed species were collected and identified from the surveyed 180 fields of selected districts of the Bench Maji, Keffa and Sheka Zones. These weed species were distributed in 135 genera within 35 families. The large majority of these, 109 were dicotyledonous species, 22 grasses, and 4 sedges. The seven major families, based on the number of taxa were: *Asteraceae* (15.6%), *Poaceae* (14.8%), *Fabaceae* (8.9%), *Polygonaceae* (5.2%), *Acanthaceae* (4.4%), *Solanaceae* (4.4%) and *Amaranthaceae* (3.0%) accounted for 56.3% of the total weed flora. Moreover, *Asteraceae*, *Poaceae* and Fabaceae were also found to be most important in other studies in the tropics. These families were also reported to be economically important and common in different parts of the country [3,8,19]. Moreover, these families are very rich in species diversity so it is usual that they contain many plant species. Asteraceae, Poaceae and Fabaceae were also found to be most important in other studies in the tropics [10] (Table 1).

Table 1: Number and proportion of weed species within the thirty five diverse families.

Families	Number of species	Percent Flora
Asteraceae	21	15.6
Graminea	20	14.8
Fabaceae	12	8.9
Polygonaceae	7	5.2
Acanthaceae	6	4.4
Solanaceae	6	4.4
Amaranthaceae	4	3
Boraginaceae	4	3
Caryophyllaceae	4	3
Chenopodiaceae	4	3
Cyperaceae	4	3
Euphorbiaceae	4	3
Rubiaceae	4	3
Convolvulaceae	3	2.2
Lamiaceae	3	2.2
Malvaceae	3	2.2
Capparaceae	2	1.5
Commelinaceae	2	1.5
Oxalidaceae	2	1.5
Papaveraceae	2	1.5
Primulaceae	2	1.5
Verbenaceae	2	1.5
Aizoaceae	1	0.7
Apiaceae	1	0.7
Cruciferreae	1	0.7
Cucurbitaceae	1	0.7
Loranthaceae	1	0.7
Nyctaginaceae	1	0.7
Orobanchaceae	1	0.7
Plantaginaceae	1	0.7
Portulaceae	1	0.7
Rosaceae	1	0.7
Scrophulariaceae	1	0.7
Tiliaceae	1	0.7
Urticaceae	1	0.7
Zygophyllaceae	1	0.7

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Frequency and abundance

The weed flora in arable fields of Bench Maji, Keffa and Sheka Zones were dominated by large number of species. This large number of weeds in arable fields can be attributed to its long duration of rain fall, heavy fertilization and constant moist condition which are required by the crops that create conducive conditions for the growth of weeds. Averaged over locations, the frequency value of the species ranged from 7-87%. The highest frequency value (87%) recorded by *Amaranthus graecizans L.* followed by *Mimosa invisa* (78%) and *Amaranthus hybridus L.* (75%). Whereas, the least frequency value recorded from *Galinsoga parviflora* (7%) followed by *Digitaria abyssinica*, and *Phalaris paradoxa* that recorded (4%). The abundance value of the species varied from 0.04 to 2.4 plants m^{-2}. The highest abundance value (2.4 plants m^{-2}) was recorded by *Mimosa invisa* followed by *Amaranthus hybridus L.* (2.16 plantsm^{-2}), *Cynodon dactylon (L.) Pers.* (1.72 plants m^{-2}) and *Amharanthus spinosus L.* (1.68 plants m^{-2}). Whereas, the least abundance value (0.04 plants m^{-2}) was recorded for *Tragus racemosus (L.)* All. (Table 2). Similar results were found from [3,4,8,10]; reported that if the specific plant species had higher frequency and dominance value, it indicate the economic importance of it. Therefore, this study confirmed that Mimosa Invesa is one of the major social, environmental and economic threats in the study area. In general, there were positive and significant correlations among frequency, abundance and dominance, that is the higher the frequency of the weed species, the higher will be its abundance and dominance and vice versa.

Table 2: Weed Species composition in Bench Maji, Keffa and Sheka Zones of 12 districts after main (long) and short rainy season during 2017.

	Species	Family	Life form	Frequency	Abundence	Dominance
				F= X/N*100	A = W/N	D = A*100/∑A
1	Abyssinian grass	Poaceae	Grass	21	0.12	0.18
2	Acalypha crenata A. Rich.	Euphorbiaceae	A herb	12	0.32	0.49
3	Acanthospermum hispidium DC.	Asteraceae	A herb	14	0.32	0.49
4	Agerantum conyzoides	Asteraceae	Herb	23	0.16	0.24
5	Alchemilla abyssinica Fresen.	Rosaceae	A herb	20	0.12	0.18
6	Alternanthera pungens Kunth	Amaranthaceae	P herb	22	0.2	0.31
7	Alysicarpus quartinianus A. Rich	Fabaceae	A herb	20	0.12	0.18
8	Amaranthus graecizans L.	Amaranthaceae	A herb	87	1.4	2.14
9	Amaranthus hybridus L.	Amaranthaceae	Herb	75	1.8	2.75
10	Amharanthus spinosus L.	Amaranthaceae	Herb	56	1.68	2.57
11	Anagallis arvensis L.	Primulaceae	A herb	27	0.4	0.61
12	Anthriscus sylvestris (L.) Hoffm.	Apiaceae	A herb	27	0.4	0.61
13	Antirrhinum orontium L.	Scrophulariaceae	A herb	19	0.08	0.12
14	Argemone mexicana L	Papaveraceae	Herb	54	1.28	1.96
15	Argemone ochroleuca Sweet	Papaveraceae	A herb	25	0.32	0.49
16	Asystasia schimperi T. Anderss.	Acanthaceae	A herb	19	0.08	0.12
17	Avena fatua L.	Poaceae	A grass	20	0.12	0.18
18	Avena vaviloviana	Poaceae	Grass	23	0.08	0.12
19	Barleria eranthemoides R. Brown	Acanthaceae	P shrub	18	0.04	0.06
20	Bidens pachyloma (Oliv. & Hiern) Cuf.	Asteraceae	A herb	20	0.12	0.18
21	Bidens pilosa	Asteraceae	Herb	20	0.28	0.43
22	Blepharis ciliaris L.	Acanthaceae	A herb	24	0.28	0.43
23	Boerhavia erecta L.	Nyctaginaceae	P herb	24	0.28	0.43
24	Cassia mimosoides L.	Fabaceae	A herb	18	0.04	0.06
25	Chenopodium fasciculosum	Chenopodiaceae	Herb	65	1.16	1.77
26	Chenopodium oplifolium	Chenopodiaceae	Herb	45	1.4	2.14
27	Chenopodium opulifolium Schr.	Chenopodiaceae	A herb	29	0.48	0.73
28	Chenopodium procerum	Chenopodiaceae	Herb	67	1	1.53
29	Cleome monophylla L.	Capparaceae	A herb	35	0.72	1.1
30	Commelina benghalensis L.	Commelinaceae	Herb	17	0.88	1.34
31	Commelina latifolia A. Rich	Commelinaceae	P herb	68	0.92	1.41
32	Convolvulus arvensis L.	Convolvulaceae		17	0.48	0.73

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33	Conyza bonariensis (L.) Cronq.	Asteraceae	A herb	24	0.28	0.43
34	Corchorus olitorius	Malvaceae		17	0.2	0.31
35	Corchorus trilocularis L.	Tiliaceae	A herb	39	0.88	1.34
36	Coreopsis borianiana	Asteraceae	Herb	14	0.08	0.12
37	Corrigiola littoralis L.	Caryophyllaceae	A herb	19	0.08	0.12
38	Crotalaria incana L.	Fabaceae	A herb	24	0.28	0.43
39	Crotalaria laburnifolia L.	Fabaceae	A herb	18	0.04	0.06
40	Cucumis fcifolius A. Rich.	Cucurbitaceae	P herb	18	0.04	0.06
41	Cuscuta spp	Convolvulaceae	Parasite	45	0.92	1.41
42	Cynodon dactylon (L.) Pers.	Poaceae	P grass	60	1.72	2.63
43	Cynodon nlemfuensis	Poaceae	Grass	36	1.28	1.96
44	Cynoglossum lanceolatum Forssk	Boraginaceae	Herb	32	1	1.53
45	Cyperus assimilis Steud	Cyperaceae	Sedge	36	0.96	1.47
46	Cyperus esculantus L.	Cyperaceae	Sedge	34	1.4	2.14
47	Cyperus rotundus L.	Cyperaceae	Sedge	39	1.68	2.57
48	Datura stramonium L.	Solanaceae	A herb	44	1.08	1.65
49	Digitaria abyssinica	Poaceae	Grass	4	1.36	2.08
50	Digitaria ternata (A. Rich) Stapf	Poaceae	A grass	18	0.04	0.06
51	Dolichos formosus A. Rich.	Fabaceae	P herb	19	0.08	0.12
52	Droguetia iners (Forssk.) Schweinf.	Urticaceae	P herb	18	0.04	0.06
53	Eleusine indica (L.) Gaertn	Poaceae	Grass	17	0.92	1.41
54	Eragrostis cilianensis (All.) Vign. Ex Janchen	Poaceae	A grass	22	0.2	0.31
55	Eriocloa fatmensis	Poaceae	Grass	12	0.2	0.31
56	Erucastrum arabicum Fisch.	Cruciferae (Brassicaceae)	Herb	25	0.08	0.12
57	Euphorbia heterophylla L	Euphorbiaceae	Herb	24	0.2	0.31
58	Euphorbia hirta L.	Euphorbiaceae	A herb	37	0.8	1.22
59	Euphorbia schimperiana Scheele	Euphorbiaceae	A herb	18	0.04	0.06
60	Fimbristylis hispidula (VA herbl.) Kunth	Cyperaceae	A sedge	18	0.04	0.06
61	Flaveria trinervia (Spreng.) C. Mohr	Asteraceae	A herb	20	0.12	0.18
62	Galinsoga parviflora Cav	Asteraceae	Herb	7	1	1.53
63	Galium hamatum L.	Rubiaceae	A herb	22	0.2	0.31
64	Galium spurium L.	Rubiaceae	Herb	8	0.48	0.73
65	Glycine wightii (Wight & Arn.) Verdc.	Fabaceae	P herb	20	0.12	0.18
66	Guzotia scabra (Vis.) Chiov.	Asteraceae	A herb	44	1.08	1.65
67	Gynandropsis gynandra (L.) Briq.	Capparaceae	A herb	23	0.24	0.37
68	Heliotropium cinerascens Steud. ex DC.	Boraginaceae	Herb	9	0.2	0.31
69	Heliotropium zeylanicum (Burm.) Lam.	Boraginaceae	A herb	48	1.24	1.89
70	Hibiscus trionum L.	Malvaceae	A herb	28	0.44	0.67
71	Hygrophila auriculata	Acanthaceae		6	0.2	0.31
72	Indigofera schimperi Jaub. & Spach.	Fabaceae	P shrub	18	0.04	0.06
73	Ipomoea eriocarpa R. Br.	Convolvulaceae	A herb	19	0.08	0.12
74	Justica schimperi (Hochst.) Dandy	Acanthaceae	P shrub	22	0.2	0.31
75	Kohautia spp.	Rubiaceae	A herb	19	0.08	0.12
76	Lamium amplexicaule L.	Lamiaceae	A herb	18	0.04	0.06
77	Lantana camara L.	Verbenaceae	Shrub	45	0.32	0.49
78	Launaea cornuta	Asteraceae	Herb	32	0.2	0.31
79	Launaea cornuta (Oliv. & Hiern) C. Jeffrey	Asteraceae	P herb	47	1.2	1.83

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80	Leucas martinicesis (Jacq.) Ait.f.	Lamiaceae	A herb	56	1.56	2.38
81	Lolium temulentum L.	Poaceae	Grass	21	0.36	0.55
82	Lysimachia ruhmeriana Vatke	Primulaceae	A herb	22	0.2	0.31
83	Medicago polymorpha L.	Fabaceae	A herb	34	0.68	1.04
84	Mimosa invisa	Fabaceae	Herb	78	2.4	3.67
85	Mollugo nudicaulis Lam.	Aizoaceae	A herb	20	0.12	0.18
86	Nicandra physalodes	Solanaceae	Herb	9	0.24	0.37
87	Ocimum basilicum L.	Lamiaceae	A herb	23	0.24	0.37
88	Oldenlandia herbacea L.	Rubiaceae	Herb	10	0	0
89	Oplismenus compositus (L.) P. Beauv.	Poaceae	P grass	19	0.08	0.12
90	Orobanche ramosa L	Orobanchaceae	Herb	32	0.28	0.43
91	Oxalis corniculata L	Oxalidaceae	Herb	4	0.36	0.55
92	Oxalis latifolia H. B. K.	Oxalidaceae	P herb	26	0.36	0.55
93	Oxygonum sinuatum (Meissn.) Dammer	Polygonaceae	A herb	45	1.12	1.71
94	Parthenium hysterophorus L.	Asteraceae	A herb	71	2.16	3.3
95	Pennisetum clandestinum	Poaceae	Grass	4	0.36	0.55
96	Phalaris paradoxa L.	Poaceae	Grass	4	0.44	0.67
97	Physalis philadelphica Lam.	Solanaceae	A herb	19	0.08	0.12
98	Plantago lanceolata L.	Plantaginaceae	B herb	29	0.48	0.73
99	Polygonum aviculare L.	Polygonaceae	A herb	18	0.04	0.06
100	Polygonum barbatum L.	Polygonaceae	A herb	18	0.04	0.06
101	Polygonum nepalense Meisn	Polygonaceae	Herb	12	0.36	0.55
102	Polygonum nepalensis Spreng.	Polygonaceae	A herb	22	0.2	0.31
103	Portulaca oleracea L	Portulacaceae		15	0.28	0.43
104	Rhynchosia spp.	Fabaceae	P herb	18	0.04	0.06
105	Ruellia patula Jaquin	Acanthaceae	A herb	18	0.04	0.06
106	Rumex abyssinicus Jacq.	Polygonaceae	Herb	22	1.28	1.96
107	Rumex bequaertii De Wild.	Polygonaceae	P herb	24	0.28	0.43
108	Schkuhria pinnata (Lam.) Thell.	Asteraceae	A herb	18	0.04	0.06
109	Scleranthus annuus L.	Caryophyllaceae	A herb	18	0.04	0.06
110	Senecio abyssinicus Oliv. & Hiern	Asteraceae	A herb	18	0.04	0.06
111	Senna didymobotrya (Fresen.)	Fabaceae	Herb	23	0.6	0.92
112	Senna occidentalis (L.) Link	Fabaceae	A herb	23	0.24	0.37
113	Setaria verticillata (L.) Beauv.	Poaceae	A grass	25	0.32	0.49
114	Seteria verticillata (L.) Beauv.	Poaceae	Grass	25	1.4	2.14
115	Sida acuta Burm. F.	Malvaceae	P herb	38	0.84	1.28
116	Snowdenia polystachya (Fresen.) Pilg.	Poaceae	A grass	33	0.64	0.98
117	Solanum dubium Fresen.	Solanaceae	P shrub	23	0.24	0.37
118	Solanum incanum L.	Solanaceae	P shrub	21	0.16	0.24
119	Solanum nigrum L.	Solanaceae	A herb	39	0.88	1.34
120	Sonchus asper (L.) Hill	Asteraceae	A herb	25	0.32	0.49
121	Spergula arvensis L.	Caryophyllaceae		17	0.36	0.55
122	Sporobolus ioclados (Trin.) Nees	Poaceae	P grass	18	0.04	0.06
123	Stellaria media L.	Caryophyllaceae		4	0.36	0.55
124	Tagetes minuta L.	Asteraceae	Herb	25	0.2	0.31
125	Tagetus minuta L.	Asteraceae	A herb	57	1.6	2.44
126	Tapinanthus globiferus	Loranthaceae		18	0.04	0.06
127	Tragus racemosus (L.) All.	Poaceae	A grass	18	0.04	0.06

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128	Tribulus terrestris L.	Zygophyllaceae	A herb	26	0.36	0.55
129	Trichodesma zeylanicum (L.) R. Br.	Boraginaceae	A herb	28	0.44	0.67
130	Urochloa panicoides P. Beauv.	Poaceae	A grass	18	0.04	0.06
131	Verbena offcinalis L.	Verbenaceae	P herb	19	0.08	0.12
132	Xanthium abyssinicum Wallroth	Asteraceae	A herb	45	1.12	1.71
133	Xanthium spinosum L.	Asteraceae	A herb	22	0.2	0.31
134	Xanthium strumarium	Asteraceae	Herb	12	0.32	0.49
135	Zinnia peruviana L.	Asteraceae	A herb	20	0.12	0.18

Similarity index

Similarity index is the similarity of plant species composition among different districts in three Zones. The result showed a similarity index value of 64-93%, 70 - 84% and 50% among the districts of Bench Maji,Keffa and Sheka Zones respectively (Table 3). This suggests that the weed species composition among the different the districts were similar by 64-93%, 70 - 84% and 50%. As described by [19], if the index of similarity is below 60%, it is said that the two locations have different weed communities. Since similarity indices for the different location were greater than 60% it can be concluded that the locations exhibited similar weed community and thus, require similar management options. The difference in altitude, climate, soil types and field management practices applied to the different district could be the cause that affected the distribution, abundance and dominance of the weed species [5,7,20]. Similarly, weed species composition was dissimilar between districts of Sheka Zone [10,21]; noted that weed growth, population density and distribution vary from place to place depending upon soil and climatic factors that affect the weed flora, and farmers' management practices (Table 4 & 5).

Table 3: Similarity index of weed species in the five district of Bench Maji Zone.

Locations	Guraferda	Menit Goldiya	Menit Shasha	Semen Bench	Shey Bench
Guraferda	100	64	71	74	66
Menit Goldiya		100	71	74	66
Menit Shasha			100	83	73
Semen Bench				100	93
Shey Bench					100

Table 4: Similarity index of weed species in the five district of Keffa Zone.

Locations	Bonga Zuria	Chena	Decha	Ginbo	Bita
Bonga Zuria	100	70	72	71	70
Chena		100	72	72	71
Decha			100	73	72
Ginbo				100	84
Bita					100

Table 5: Similarity index of weed species in the two district of Sheka Zone.

Locations	Andracha	Yeki
Andracha	100	50
Yeki		100

Conclusion

Based on the study, the total of one hundred thirty five different weed species were identified. The importance of each species was determined by calculating the frequency, abundance and dominance values. In the experiment identified a large and diversified weed flora. Within the weed spectrum surveyed in both in district, dominant weed species were identified at both three Zones. The most dominant families according to the frequency and number of weed species were *Asteraceae, Poaceae, Fabaceae, Polygonaceae, Acanthaceae* and *Solanaceae*. Weed species composition varied between districts within the same district and across districts at both Zones. Thus, when devising a weed control strategy in the future, different weed management options would be required for the districts differing in weed flora composition.

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