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Qualitative and Quantitative Assessment of Weed in the Major Wheat Growing Areas of Western Oromia Region, Ethiopia

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Abstract
A weed population survey was undertaken to determine prevalence and distribution of weeds , and asses weed flora shift in major wheat growing districts of western Oromia, namely Getema, Gudeya-Bila, Jima-Arjo, Abay-Coman, Horo and Jima-Geneti. The first three districts are found East Wollega zone and the rests are from Horo-Guduru wollega zone. A totally of 48 wheat fields were assessed using quadrant counts ($0.25m^{-2}$) once at tillering stage of crop. Result revealed that a total of 51 weed species with 46 weed genera belongs to 19 families were recorded. Graminaea and compositae were most abundant and diversified families based on the number of species recorded. Individual weed species shown variation in their abundance, dominance and frequency. The most frequent weed species in the wheat fields irrespective of the soil, climate and crop varieties were *Acanthuspermum hispidum*, *Avena fatua, Commelina latifolia, Guizota scarba, Polygnom nepalens, Setaria pumila, Spergula arvense and Trichodesma zeylanicum*, and also were considered as the most important species in the surveyed areas. From Similarity indices variation was noted between locations. Accordingly, districts having similarity indices more than 60% indicating similarities in weed community. Thus, when devising a weed control strategies same control option would be considered for the location that have similar weed flora and vise versa.
Keywords: Flora Composition, Similarity Index, Survey, Weed Prevalence, Wheat

1. INTRODUCTION

Wheat (*Triticum aestivum* L.) is an essential grain food component and is a very important commodity among cereal crops (Montazeri *et al.,* 2005). It is one of the major cereal cultivated in Ethiopian highlands (Hailu, 2003). In Ethiopia, wheat covered an area of 1,706,323.86 ha with a total production of 40,391, 13.674 tons with yield average of 2.35 t ha-1 during 2012/2013 main cropping season (CSA, 2013). In area coverage, it is the fourth important cereal crop after Tef, maize and sorghum. This is below the average which is about 2.5t/ha. Multifaceted biotic & a biotic factor are responsible for this low yield. cultivation of unimproved low yield varieties, insufficient and erratic rainfall, poor agronomic practices , disease and insect pests are among the most important constraints to wheat production in Ethiopia (Hailu,1991; Dereje and yaynu,2000).

Weeds are constant component of agro-ecosystem (Mennan and Isik, 2003). They are undesirable plants, which infest different crops and inflict negative effect on crop yield either competition for water or nutrients or space or light (Reddy and Reddi, 2011). There are innumerable reports on the inhibitory effects of weeds on crop plants (Javaid *et al.,* 2007). Weeds are one of the major factors reducing crop yield, deteriorate quality of crops and reduce farmers' income. Weed infestation is a very serious and less attended issue in Ethiopia. Ineffective weed management is considered as the main factor for low average yield of wheat resulting in average annual yield loss of 35% (Esheteu *et al*., 2006). It causes yield reduction in wheat from 10- 65% (Genene and Habtamu, 2001). In line with this, weeds in wheat fields of different parts of western Oromia cause serious yield losses. Both broad and grassy weed species are responsible for crop yield reduction, which have now became a threat to the nutritional requirement of mankind.

Weed flora of crop differs from area to area and field to field depending on environmental conditions, irrigation, fertilizer use, soil type, weed control practices and cropping sequences (Anderson and Beck, 2007; Chhokar and Malik, 2002; Chhokar *et al.*, 2007a&b; Dixit *et al*., 2008a&b; Froud-Williams *et al.*, 1983). Weed growth, population density, and distribution vary from place to place depending up on the soil and climatic factors that affect weed flora, and farmers' management practices (Saavedra *et al*., 1990). On the other hand, density of single or many weed species can changed depending on factors such as seed purity, choice of crop rotation, harvest time, fertilizing, chemical and mechanical weed control method during long period (Albrech, 19 95; Mennan and Isik,2003).

Therefore, 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 specific weed problem (Kropff and Spitters,19 91). Thus, survey of weed flora is a continuous process and it should be done periodically. However, little effort has been done on weed assessment in wheat growing areas of western Oromia. Keeping this point in view, survey was conducted to determine the prevalence and distribution of weeds in the major wheat growing areas of western Oromia.

2. MATERIALS AND METHOD

2.1. Study Sites

Survey of weed flora was conducted in two major wheat growing zones of western Oromia region namely, Horro-guduru Wollega and East Wollega in 2014/15 during the main rainy season. The activity was done by selecting representative district from each zones based on wheat dominance. From Horo-Guduru wollega zone, Abay-Coman, Horro and Jima-Genati districts were assessed, and in West-Wollega zone, Getema, Gudeya-Bila and Jima-Arjo were assessed. The surveyed areas' northern and southern boundaries coincide with 8.707408 to 9.97033 N latitudes, and 36.43234 to 37.54855 E longitudes with an altitude range of 2007 up to 2804 m.a.s.l. Each districts of survey coverage were further stratified into kebeles. The kebeles again were stratified in to farmer's field within the distance of five (5) Km between each stop (fields). Totally of fourthy-eight (48) wheat fields were surveyed in which 31 was in Horo-Guduru wollega, and 17 form West-Wollega zone. The survey was done ones at tillering stage of crop.

2.2. Data Collection and Weed Identification

Qualitative and quantitative weed data was collected in all assessed wheat fields. The frist quadrant sample was taken following the procedure of (Kevme *et al*..,19 91), where the surveyor walks 50 paces along the edges of the field, turns right angle, walk 50 paces in to the field, throws quadrants and starts taking sample and each field was sampled three(3) times by 30m distance. The number of weeds recorded by species in each 0.25 m^{-2} quadrant. Weed species in the fields were identified using available weed identification guides (Terry and Michick 19 87; Stour and Parker 19 89; MCIn tyre 19 91).

2.3. Data Analysis

The data on weed species composition was analysed by abundance (A), dominance (D), frequency (F), and similarity index (SI) determinations using the formula (1 – 4) described by Taye and Yohannes (1998) as follows.

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

$$F = 100 * \frac{X}{N} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (1)$$

Where, F= frequency of particular weed species; X= number of samples in which particular weed species occurs; N= total number of samples

Abundance (A) = It is defined as population density of a weed species expressed as the number of individuals of weed plants per unit area. This was calculated as follows,

$$A = \frac{(\sum W)}{N} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (2)$$

Where, A= abundance; ∑W= sum of individuals of particular weed species; N= total number of samples

Dominance (D) = Is abundance of an individual weed species in relation to the total weed abundance (infestation level). It was measured as follows,

$$D = \frac{A * 100}{\sum W} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (3)$$

Where, D= dominance of particular weed species; A = abundance of the same species; ∑W = total abundance of all weed species

Similarity Index (SI): It is expressed as similarity of weed communities among different locations. It was calculated as follows,

$$SI = (Epg)/(Epg + Epa + Epb)\, x100 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (4)$$

Where, SI= similarity index; Epg = number of weed species found in all locations; Epa = number of species only in location a; Epb = number of species only in location b.

3. RESULTS AND DISCUSSION

3.1. Weed species Composition in Assessed areas

A total of fifty-two (51) weed species were recorded and identified from the surveyed 48 wheat field in the selected zones of Western Oromia. All of the species under survey area (51) of them were identified at species level. These weed species were distributed in (46) genera with 19 families. The large majority of them, 32 were dicotyledonous species, 16 mono cotyledon species, and 3 were sedges. The three major families based on number of taxa (species) were: Graminaea (16), Composteae (10), and Cyperaceae (3) accounted for 57% of the total weed flora. Among these families' graminaea and compostea are the most important families in wheat growing areas. These families are very rich in species diversity, so it is usual that they contain many weeds. The remaining families included one to two species each. This result is also in confimity of the finding Pulchen (1990) who described that the botanical family regarded as highly diversed, should contain more than five (5)

species.

The total numbers of weeds were 44 and 49 at Horro-guduru Wollega and East Wollega zones respectively, as shown in (Table 1- 2). Moreover, five (5) species were found only in East Wollega zone and two (2) species only in Horo-Guduru Wollega zone. In this study, the average species per field was 24.1 and 24.6 at Horo-Guduru and East Wollega zone, respectively, which is estimated to be high. This may be mainly ascribed to poor field management, low seed quality, delay in time of weeding, using selective herbicide and etc. This result is in conformity with the work of Hidalgo *et al. (*19 90) who stated that flora diversity is estimated to be high if the average number of species per field were greater than nineteen (19).

3.2. Weed species frequency, Abundance and dominance in Assessed Horo-Guduru wheat growing areas

From the results of survey, out of 44 weed species recorded in Horo Guduru wollega zone, 26 were broadleaved weeds, 15 grassy weeds and 3 sedge. The frequency, abundance and dominance levels of individual weed species ranged from 3.23 up to 67.74%, 0.06 up to 3.29 % and 0.17 up to 8.64%, respectively (Table 1). The most frequent weed species observed were *Polygnom nepalens, Commalina latifolia, Trichodesma zeylanicum, Spergula arvense, Raphanus raphanus, Acanthuspermum hispidum, Avena fatua* and *Guzotia scaraba* (Table 1). Whereas, *Anchusa officinalis, Senecio Vulgaris, Sorghum halepense, Rumex abyssinicus, Tagetes minuta, cyperus esculenta, Tribulus terrestris* and *Amaranthes hybridus* where the least frequent one.

Anchusa officinalis, Senecio vulgaris, Sorghum halepense, Rumex abyssinicus, Tagetes minuta, cyperus esculenta, Tribulus terrestris, Elusina indica, Setaria faberi, Digitaria absinica, Andropogon abyssinicus, Achyranthes aspera, Amaranthes hybridus, Brassica nigra, echinocholia clona, Avena vaviloviana, Spilanthes mauritiana, Anthemis trigreensis, Caylusea abyssinica and Cyperus assimilis were the least abundant having abundance level of less than 0.5% contributed up to 11.1 % infestation. Commalina latifolia., Acanthuspermum hispidum, Guzotia scaraba , Raphanus raphanus , Avena fatua , Snowdenia polystachya, Polygnom nepalens and Spergula arvense were the major dominant weed species with dominance level greater than 3 % contributed up to 47.6 % of total infestation , whereas Senecio Vulgaris, Sorghum halepense , Rumex abyssinicus, Tagetes minuta and cyperus esculenta were least dominant with dominance level less 0.5 % (Table 1). They contributed up to 1.2 % of total infestation. Megersa et al. (2016) reported that Guizotia scarba, Polygonum nepalenseL, Spergula arvensisL, Rhaphanus raphanistrumL, Achyranthes aspera, Avena fatua and Setaria pumila were the most dominant weed species in experimental fields of wheat at 80 days after sowing (DAS).

Table 1.Weed Composition, frequency, abundance and dominance in Assessed Horro-Guduru wheat growing areas

No.	Botanical Name	Family	Characteristics			Freq.	Abund.	Dom.
1	*Acanthuspermum hispidum*	Compositae	a	d	rs	64.5	2.3	6.0
2	*Achyranthes aspera*	Amaranthaceae	a	d	rs	16.1	0.2	0.5
3	*Agratum conyzoides*	Compositae	a	d	rs	38.7	1.6	4.3
4	*Amaranthes hybridus*	Amaranthaceae	a	d	rs	6.5	0.2	0.6
5	*Anagalis arvense*	Primulaceae	a	d	rs	22.6	0.6	1.5
6	*Anchusa officinalis*	Boraginaceae	a	d	rs	3.2	0.1	0.2
7	*Andropogon abyssinicus*	Gramineae	a	m	rs	9.7	0.2	0.5
8	*Anthemis trigreensis*	Compositae	a	d	rs	19.4	0.4	1.0
9	*Avena fatua*	Gramineae	a	m	rs	67.7	3.3	8.6
10	*Avena vaviloviana*	Gramineae	a	m	rs	19.4	0.3	0.8
11	*Bidens paylochoma*	Compositae	a	d	rs	22.6	0.6	1.6
12	*Brassica nigra*	Cruciferea	a	d	rs	9.7	0.2	0.6
13	*Caylusea abyssinica*	Resedaceae	a	d	rs	16.1	0.4	1.1
14	*Commalina latifolia*	Commelinaceae	a	m	rs	51.6	2.2	5.8
15	*Corrigiola capensis*	Caryophyllaceae	a	d	rs	32.3	1.0	2.6
16	*Cyperus assimilis*	Cyperaceae	p	m	rs	16.1	0.4	1.1
17	*Cyperus esculenta*	Cyperaceae	p	m	rs	6.5	0.1	0.3
18	*Cyperus rutundus*	Cyperaceae	p	m	rs	16.1	0.6	1.5
19	*Digitaria absinica*	Gramineae	a	m	rs	9.7	0.2	0.5
20	*Echinocholia clona*	Gramineae	a	m	rs	9.7	0.3	0.7
21	*Elusina Indica*	Gramineae	a	m	rs	9.7	0.2	0.5
22	*Eragrostis cilianensis*	Gramineae	a	m	rs	16.1	0.5	1.2
23	*Galinsoga palviflora*	Compositae	a	d	rs	25.8	0.8	2.1
24	*Galium sporium*	Rubiaceae	a	d	rs	32.3	1.4	3.7
25	*Guzoita Scarba*	Compositae	a	d	rs	67.7	1.9	4.9
26	*Lolium temulantum*	Gramineae	a	m	rs	35.5	1.0	2.6
27	*Medicago polymorpha*	Leguminosae	a	d	rs	32.3	0.9	2.4

No.	Botanical Name	Family	Characteristics			Freq.	Abund.	Dom.
28	*Oplismenus hirtellus*	Gramineae	a	m	rs	45.2	1.5	4.0
29	*Phalaris paradoxa*	Gramineae	a	m	rs	9.7	0.6	1.7
30	*Plantago lanceolata*	Plantaginaceae	a	d	rs	32.3	1.1	2.8
31	*Polygnom nepalens*	Polygonaceae	a	d	rs	51.6	1.9	4.9
32	*Raphanus raphanustrum*	Cruciferea	a	d	rs	58.1	1.8	4.8
33	*Rumex abyssinicus*	Polygonaceae	p	d	rs	3.2	0.1	0.3
34	*Senecio Vulgaris*	Compositae	a	d	rs	3.2	0.1	0.2
35	*Setaria faberi*	Gramineae	a	m	rs	9.7	0.2	0.5
36	*Setaria Pumila*	Gramineae	a	m	rs	41.9	1.4	3.6
37	*Snowdenia polystachya*	Gramineae	a	m	rs	35.5	1.9	5.0
38	*Sorghum halepense*	Gramineae	a	m	rs	3.2	0.1	0.2
39	*Spergula arvense*	Caryophyllaceae	a	d	rs	58.1	2.9	7.5
40	*Spilanthes mauritiana*	Compositae	a	d	rs	9.7	0.4	1.0
41	*Tagetes minuta*	Compositae	a	d	rs	3.2	0.1	0.3
42	*Tribulus terrestris*	Zygophyllaceae	a	d	rs	6.5	0.1	0.3
43	*Trichodesma zeylanicum*	Boraginaceae	a	d	rs	54.8	1.0	2.6
44	*Trifolium rueppellianum*	Leguminosae	a	d	rs	32.3	1.2	3.0

3.3. Weed species frequency, Abundance and dominance in Assessed East Wollega wheat growing areas

Among 49 weed species recorded in East wollega, 29 were broadleaved and 17 grassy weeds and 3 sedge (Table 2). The frequency, abundance and dominance level of individual weed species ranged from 5.88 to 82.35%, 0.18 up to 6.41 and 0.15 up to 9.30%, respectively. The major frequent weeds were *Oplismenus hirtellus, Polygnom nepalens, Corrigiola capensis Setaria Pumila, Acanthuspermum hispidum, plantago lanceolata, Commalina latifolia, Agratum conyzoides* and *Trichodesma zeylanicum.* Whereas, *Tribulus terrestris, Achyranthes aspera, Anthemis trigreensis* and *Stachys arvensis* were less frequent.

Among the weed species occurred in East wollega zone, Commelina latiloflia, Trichodesma zeylanicum, Setaria Pumila, plantago lanceolata, trifolium rueppellianum, Agratum conyzoides, Dinebra retroflexa and Guzoita scarba were abundant contributed up to 47.7% infestation of assessed wheat fields. Tribulus terrestris, Achyranthes aspera, Stachys arvensis, Nicandra physalodes, Anthemis trigreensis, Anchusa officinalis, Andropogon abyssinicus, Brassica nigra, Corchorus trilocularis, Avena vaviloviana, Sonchus olerums, Medicago polymorpha, Elusina indica and cyperus esculenta were the least abundant with abundance level less than 0.5 % which contributed up to 4.3% infestation of assessed wheat fields.

Trichodesma zeylanicum, Setaria pumila, plantago lanceolata, trifolium rueppellianum, Agratum conyzoides and Guzoita scarba were dominant in the crop field, contributing to 43.1% of the total weed infestation while, Tribulus terrestris, Achyranthes aspera, Stachys arvensis, Nicandra physalodes, Anthemis trigreensis, Anchusa officinalis, Andropogon abyssinicus, Brassica nigra, Corchorus trilocularis and Avena vaviloviana were least dominant having dominance level of less than 5 % contributing to 2.2% of the total weed infestation (Table 2). The variation observed in abundance, dominance and frequency of weed species might be attributed to difference in farmer's practices, ecological variation like soil types and climatic conditions. This result is consistent with the findings of Jones et al. (1999) and Mennan and Isik (2003) who stated that difference in altitude, climate, soil types and field management practices applied to the different survey strata could be the cause that affected the distribution, abundance and dominance of the weed species

Table 2. Weed Composition, Frequency, Abundance and Dominance in Assessed East Wollega Wheat Growing Areas

No.	Botanical Name	Family	Characteristics			Freq.	Abund.	Dom.
1	*Acanthuspermum hispidum*	Compositae	a	d	rs	70.6	3.0	4.0
2	*Achyranthes aspera*	Amaranthaceae	a	d	rs	5.9	0.1	0.2
3	*Agratum conyzoides*	Compositae	a	d	rs	82.4	6.4	8.5
4	*Amaranthes hybridus*	Amaranthaceae	a	d	rs	29.4	0.5	0.7
5	*Anagalis arvense*	Primulaceae	a	d	rs	29.4	1.1	1.4
6	*Anchusa officinalis*	Boraginaceae	a	d	rs	11.8	0.2	0.2
7	*Andropogon abyssinicus*	Gramineae	a	m	rs	11.8	0.2	0.2
8	*Anthemis trigreensis*	Compositae	a	d	rs	5.9	0.2	0.2
9	*Avena fatua*	Gramineae	a	m	rs	41.2	1.2	1.6
10	*Avena vaviloviana*	Gramineae	a	m	rs	17.6	0.3	0.4
11	*Bidens paylochoma*	Compositae	a	d	rs	17.6	0.5	0.7

No.	Botanical Name	Family	Characteristics			Freq.	Abund.	Dom.
12	*Brassica nigra*	Cruciferea	a	d	rs	11.8	0.2	0.2
13	*Caylusea abyssinica*	Resedaceae	a	d	rs	35.3	1.0	1.3
14	*Commalina latifolia*	Commelinaceae	a	m	rs	70.6	3.5	4.6
15	*Corchorus trilocularis*	Tilaceae	a	d	rs	17.6	0.2	0.2
16	*Corrigiola capensis*	Caryophyllaceae	a	d	rs	58.8	2.9	3.9
17	*Cynodon dactylon*	Gramineae	p	m	rs	29.4	0.9	1.2
18	*Cyperus assimilis*	Cyperaceae	a	m	rs	23.5	1.1	1.5
19	*Cyperus esculenta*	Cyperaceae	a	m	rs	23.5	0.4	0.5
20	*Cyperus rutundus*	Cyperaceae	a	m	rs	23.5	1.1	1.4
21	*Digitaria absinica*	Gramineae	a	m	rs	17.6	0.5	0.6
22	*Digitaria ternata*	Gramineae	a	m	rs	29.4	1.5	2.0
23	*Echinocholia clona*	Gramineae	a	m	rs	29.4	1.4	1.9
24	*Elusina indica*	Gramineae	a	m	rs	23.5	0.4	0.5
25	*Eragrostis cilianensis*	Gramineae	a	m	rs	29.4	1.1	1.5
26	*Galinsoga palviflora*	Compositae	a	d	rs	47.1	1.6	2.2
27	*Galium sporium*	Rubiaceae	a	d	rs	35.3	0.8	1.0
28	*Guzoita scarba*	Compositae	a	d	rs	82.4	7.0	9.3
29	*Lolium temulantum*	Gramineae	a	m	rs	29.4	0.9	1.3
30	*Medicago polymorpha*	Leguminosae	a	d	rs	11.8	0.4	0.5
31	*Nicandra physalodes*	Solanaceae	a	d	rs	11.8	0.1	0.2
32	*Oplismenus hirtellus*	Gramineae	a	m	rs	52.9	2.6	3.4
33	*Oxalis corniculata*	Labiate	a	d	rs	11.8	0.6	0.8
34	*Phalaris paradoxa*	Gramineae	a	m	rs	23.5	1.4	1.9
35	*Plantago lanceolata*	Plantaginaceae	a	d	rs	70.6	4.7	6.3
36	*Polygnom nepalens*	Polygonaceae	a	d	rs	52.9	1.6	2.2
37	*Raphanus raphanustrum*	Cruciferea	a	d	rs	23.5	0.5	0.7
38	*Senecio Vulgaris*	Compositae	a	d	rs	23.5	0.8	1.1
39	*Setaria faberi*	Gramineae	a	m	rs	11.8	0.9	1.3
40	*Setaria pumila*	Gramineae	a	m	rs	64.7	4.5	6.0
41	*Snowdenia polystachya*	Gramineae	a	m	rs	29.4	2.3	3.0
42	*Sonchus olerums*	Compositae	a	d	rs	11.8	0.4	0.5
43	*Sorghum halepense*	Gramineae	a	m	rs	29.4	1.0	1.3
44	*Spergula arvense*	Caryophyllaceae	a	d	rs	47.1	2.0	2.7
45	*Spilanthes mauritiana*	Compositae	a	d	rs	29.4	1.2	1.6
46	*Stachys arvensis*	Oxalidaceae	a	d	rs	5.9	0.1	0.2
47	*Tribulus terrestris*	Zygophyllaceae	a	d	rs	5.9	0.1	0.2
48	*Trichodesma zeylanicum*	Boraginaceae	a	d	rs	82.4	3.9	5.2
49	*Trifolium rueppellianum*	Leguminosae	a	d	rs	47.1	5.8	7.7

3.4. Similarity Index (SI)

Results of data regarding to similarity indices revealed that weed species composition was different within and across zones. Accordingly, except for Getema and Jima-Arjo districts in East Wollega zone, weed species composition in wheat fields was similar (SI > 60%) among the surveyed sites (Tables 3). Similarly, weed species composition was similar between assessed districts of Horo-Guduru Wollega zone except for Abay-Coman and any other district (Tables 3). This might be because of the variation in soil, climatic and human practices among these locations. Similarly, Chhokar and Malik (2002); Anderson and Beck (2007) and Dixit *et al*. (2008a&b) reported that weed flora of crop differs from area to area and field to field depending on environmental conditions, irrigation, fertilizer use, soil type, weed control practices and cropping sequences.

Table 5. Similarity Indices of Weed Communities in Wheat at Assessed Locations of Western Oromia.

Districts	Gudeya-Bila	Gatema	Jima-Arjo	Horro	Jima-Genati	Abay-Coman
Gudeya-Bila	100	62.2	61.9	72.3	71.1	48.6
Gatema		100	55.3	74.5	70.6	33.3
Jima-Arjo			100	61.5	60.5	35
Horro				100	70.5	43.2
Jima-Genati					100	58.1
Abay-Coman						100

4. CONCLUSIONS

Generally, from this weed population survey, it can be concluded that, the assessed wheat growing districts of western Oromia are highly diversified in weed species and contains of different individual species with varied level of abundance, dominance and frequency. The most dominant families according to the frequency and number of weed species were Graminaea and compositae and also were considered as the most important species in the surveyed areas.

Weed species composition varied between and within the locations in zones at all surveyed areas. Thus, when devising a weed control strategy in the future, different weed management options would be required for the locations differing in weed flora composition whereas the same weed management practices would be advised for the locations that shown the similarity indices greater than(>60). Further, identification of weed species composition, characteristics, competition and flora change in these potential wheat producing areas is necessary to adopt effective weed management option and would encourage the farmers to produce wheat in these high potential wheat producing areas.

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest

REFERENCES

Abrham, GH and Esayas, T. 2002. Quantitative and qualitative survey of weeds growing in association with cotton at Middle Awash. Werer Agricultural Research Center (WARC). Progress report for the period 2001/2002. WARC.

Anderson RL and Beck DL (2007). Characterizing weed communities among various rotations in central south Dakota. *Weed Technology* 21: 76-79.

Arnon 1972.Crop production in dry regions. Leonard. Hill Book London.Pp 4-7.

Burril, L.C., J. Cardenas and E. Locatelli 1976. *Field Manual for Weed Control Research.* International Plant Protection Center, Oregon State University, Corvallia, Oregon 9733 111JSA.

Chhokar RS, Sharma RK, Jat GR, Pundir AK, and Gathala MK (2007b). Effect of tillage and herbicides on weeds and productivity of wheat under rice-wheat growing system. *Crop Protection* 26: 1689-1696.

Chhokar RS, Sharma RK, Pundir AK and Singh RK (2007a). Evaluation of herbicides for control of *Rumex dentatus*, *Convolvulus arvensis* and *Malva parviflora*. *Indian Journal of Weed Science* 39: 214-218.

Chhokar RS and Malik RK (2002). Isoproturon resistant *Phalaris minor* and its response to alternate herbicides. *Weed Technology* 16: 116-123

Ciba-Geigy. 1980. *Grass weeds 1*. Ciba-Geigy Ltd., Basle, Switzerland.

Central Statistical Authority (CSA), 2013/14. Agricultural Sample Survey, Area and Production of temporary Crops, Private Peasant Holding for the 2012/13 *Meher Season*. Addis Ababa, Ethiopia

CSA (Central Statistical Agency). 2008. Agricultural Sample Survey of the Federal Democratic Republic of Ethiopia 2004/05. Report on land utilization of private peasant holdings, '*Meher*' season. Addis Ababa, Ethiopia.

Dixit A, Gogoi AK and Varshney JG (2008b). Weed Atlas- District-wise distribution pattern of major weed flora in prominent crops. Vol II, National Research Centre for Weed Science, Jabalpur, India, Pp 88.

Dixit A, Gogoi AK and Varshney JG (2008a). Weed Atlas- District-wise distribution pattern of major weed flora in prominent crops. Vol I, National Research Centre for Weed Science, Jabalpur, India, Pp 127.

Esheteu Bekele, Ferdu Azerefegne, and Tsedeke Abate, 2006. Facilitating the Implementation and Adoption of Integrated Pest Management (IPM) in Ethiopia: Planning workshop from October 13-15th 2003 at the Melkassa Agricultural Research Center, EARO

Froud-Williams RJ, Chancellor RJ and Drennan DSH (1983). Influence of cultivation regime upon buried weed seeds in arable cropping systems. *Journal of Applied Ecoloogy* 20: 199-208.

Genene Gezu and Habtamu Soboka, 2001. Agronomic research recommendation and seed production maintenance techniques for major crops training manual for DA of highland Bale Sinan- Ethiopia Pp 9-15.

Hailu G (2003). Wheat production and research in Ethiopia. IAR, Addis Ababa, Ethiopia.

Hailu, 1991; Dereje and yaynu, 2000). Yield limiting factors to wheat production and research in Ethiopia. Pp 9-13

Javaid, A., R. Bajwa, N. Rabbani & T. Anjum. (2007). Comparative tolerance of six rice (*Oryza sativa* L.) genotypes to allelopathy of purple nutsedge (*Cyperus rotundus* L.). *Allelopathy J.,* 20 (1): 157-166.

Kedir, N, Feyissa, T and Tilahun, G. 1999b. Results of weed survey in the major field pea and faba bean growing-areas of the Bale highlands. *Arem*. 5: 109-121.

Kedir, N, Feyissa, T and Tilahun, G. 1999a. Results of weed survey in the major barley- and wheat growing areas of the Bale highlands. *Arem* 5:85-95.

Kevin V, M McCully, G Sampson and A Watson. 1991. Weed survey of Nova Scotia Lawbush Blueberry (*Vaccinium angustifolium*). *Weed Sci*. 39:180-18.

McIntyre, G.E. 1991. Weeds of sugarcane in Mauritius: their description and control. Kin Keong Printing Singapore.

Megersa K, Geleta G, Chemeda B and Hailu F, (2016). Evaluation of Post-emergence Herbicides against Major Grass weeds in Wheat (*Triticum spp*) Field. *Proceeding of Review Workshop on Completed Research Activities of Crop Research Directorate,* Pp.35-45. November 17-21, 2015, Adami-Tulu, Ethiopia.

Mennan H and D Isik. 2003. Invasive weed species in onion production systems during the last 25years in Amasya, Turkey. *Pak. J. Bot*. 35 (2):155 – 160.

Michael, PW. 1982. The role of weed identification in weed management in advancing countries. FAO, Rome.

Montazeri M, Z and E, Baghestani MA (2005). Weeds and their control in wheat fields of Iran, first ed. *Agric. Res. Edu. Org. Press, Tehran.*

Pohlan J. 1984. Arable farming 3/4 Weed control.Institute of tropical Agriculture, Plant protection section, Germany.

Pulschen L. 1990. Compositional, synecology and sociological structure of the agrestal flora in Shewa province, Ethiopia. Angew. Botanik 64: 445 – 456

Reddy, T.Y. & G.H.S. Reddi. (2011). Principles of Agronomy. Kalyani Publishers, Noida, India. Pp.527.

Saavedra, L. Torres, G. Hernan, G. Dez, B. and Hidalgo, B. 1990. Influence of environmental factors on weed flora of field crops. Quvir Valley.

Smith, C.W. and J.T Cotheren. 1999. Cotton: origin, history, technology and production. John Wiley and sons, Inc. New York.

Stroud, A. and Parker, C. 1989. A weed identification guide for Ethiopia. FAO, Rome.

Tadesse, E., and Ahmed, S. 1985. A review of weed research in Ethiopia. In: Proc. of the First Crop Protection Symposium Inst. Agric. Res., Ethiopia, 4-7 February 1985, Addis Ababa.

Taye, T and Yohannes, L. 1998. Qualitative and quantitative determination of weeds in teff in west Shewa Zone. Arem 4: 46-60.

Terry, P.J., and R.W. Michieka. 1987. Common weeds of East Africa/Magugu YaAfrika Mashakari.FAO, Rome.

Thankur, C. 1984. Weed Science. Metropolitan Book Co.Pvt, New Delhi, India.

Thomas AG.1985. Weed survey system used in Saskatchewan for cereals and oilseed crops.

Weed Sci. 33:34-43. Walia, U.S., K.B. Dhali.wal and L.S. Brar. 1998. Competitive interaction between wheat and wild oat in relation to wild oat population density. *In:* conference towards sustainable development Chandigarh, India, 15-17 Nov. pp.430-34.

Shad, 1987; Status of Weed Science activities in Pakistan. Prog. Farm. 7(1):10-16.