http://www.pjbs.org

PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 7 (9): 1530-1534, 2004
ISSN 1028-8880

The Weed Flora of Winter Wheat in Şanliurfa, Turkey

Bekir Bükün
Department of Plant Protection, Faculty of Agriculture, University of Harran, 63040 Şanliurfa, Turkey

Abstract: The objective of this study was to survey the weeds in the pre-harvest of the winter wheat in grower fields of South Eastern region of Turkey (Şanliurfa and their districts, Central, Akçakale, Harran, Birecik, Bozova, Siverek, Suruç, Viranşehir). Fifty fields were evaluated, during period of April to May in 2003. The weeds were identified and counted inside a square (1.0x1.0 m), applied in each area in order to determine the frequency, density, abundance and relative importance. *Avena fatua* (25.16 individual m^2), *Galium aparine* (15.3 individual m^2), *Sinapis arvensis* (7.48 individual m^2), *Vaccaria pyramidata* (6.84 individual m^2), *Isatis tinctoria* (5.35 individual m^2), *Echinaria capitata* (4.95 individual m^2) and *Fumaria officinalis* were most common in winter wheat in the sampled areas. The botanical families Fabaceae with 14 species, Cruciferae with 13 species and Astereceae with 12 species. Apiaceae have quite a large number of species.

Key words: Weed flora, winter wheat, Şanliurfa, Turkey

INTRODUCTION

Winter wheat is the main source of food in Turkey. Şanliurfa have 426.000 ha winter wheat farmland. Climatically the area of work is arid region. Winter wheat was grown under rainfed condition. There are many factors restricted the yield of winter wheat crop such as inadequate adoption of improved production technology, lack of plant protection measures, harvesting and weeds are major constraints reducing the yield. As known weeds compete with crop plants for the nutrients, moisture, light and space[1]. The losses due to weeds in winter wheat have been reported vary from 20-30% in Turkey[2]. Proper weed management can significantly enhance the yield of winter wheat. Weeds must be controlled in order to maintain yields of crops. Özer *et al.*[3] reported that herbicide application alone have been lead to 20% yield increasing.

In order to determine the yield losses of winter wheat is related to weed species and their density the weed species and their abundance should be documented. Weed surveys are useful for determining the occurrence and relative importance of weed species in winter wheat crop production system[4]. If the maximum of weed population and characteristics of reproduction were known then this information could be used to guide producer's options in integrated management systems[5]. Due to significance of weeds and weed surveys, the study was undertaken. First step was record weed species, their distribution and importance values in winter wheat fields of Şanliurfa and their district during April and May, 2003. No such reference is available from the area. Thus the objective of this study were:

a) To determine the distribution and relative importance of weeds
b) In order to identify the current and potential weed problems associated with the winter wheat crop of the area.

As well as providing base information the data can also facilitate the establishment of properties for future research and weed control programs. Thus this research will provide a "snapshot" of the size and extend of weed population in winter wheat fields of agricultural ecoregion of Şanliurfa, Turkey. The results of research may also be helpful to agronomists, ecologists and scientists that involved in crop management.

MATERIALS AND METHODS

The winter wheat production system involves nine month cycle in which crop is sown in October/November and harvested in June in Şanliurfa. To determine the distribution and importance values of weeds in winter wheat fields of the area, a survey was carried out during April and May, 2003 when the crop was the near the earing stage.

Eight winter wheat growing districts of Şanliurfa were chosen and 50 locations were sampled over the area. All

Corresponding Author: Bekir Bükün, Department of Plant Protection, Faculty of Agriculture, University of Harran, 63040 Şanliurfa, Turkey Tel: +90 414 247 0386 Fax: +90 414 247 4480 E-mail: bbukun@harran.edu.tr

these location were rainfed. These are Central, Birecik, Bozova, Harran, Hilvan, Siverek, Suruç, Viranşehir. No herbicide was used at these sites throughout the growing season. Surveys were performed in ten fields in Hilvan and Viranşehir districts, seven fields in Central, Birecik, Bozova and Siverek and five fields in Suruç. These differences were due to different size of cultivated areas. Fields were selected randomly and were surveys following the methodology of Thomas[6] and McCully *et al.*[7] with some modifications.

Four 1x1 m quadrates were randomly along an inverted "W" pattern in each field. First quadrate was placed after walking 20 paces from one corner along the edge of field, turning 90° and moving 15 paces into fields this was to avoid edge effect. The distances between each quadrate depended upon the size and shape of the field. The larger fields were the greater distance between quadrates.

The weed species, densities and abundance of each weed was recorded within each quadrates. Frequency, relative frequency, density and relative density, abundance and relative abundance and importance values of species was calculated in related to Braun-Blanquet method[8].

Frequency	=	Number of quadrate that contain a individual species/number of total quadrate
Relative frequency	=	(Frequency of species/frequency of all species) x100
Density	=	Total number of individual species/total number of quadrate
Relative density	=	(Species density/total densities of all species) x100
Abundance	=	total number of per species/total quadrates that contain species
Relative abundance	=	(Species abundance/total abundance of all species) x100
Important values of species	=	Relative frequency+relative density+relative abundance

RESULTS AND DISCUSSION

According to the results of surveys belonging to 24 families 90 weeds species were determined (Table 1). Out of the 90 species recorded, only 12 species (11 of Poaceae and 1 of Liliaceae) were monocotyledonous while the remaining species were dicotyledonous. The major families were Fabaceae with 14 species, Cruciferae with 13 species and Astereceae with 12 species. Apiaceae was have 6 species, Labiateae have 5 species, Euphorbiaceae was have 4 species, Caryophyllaceae and Boraginaceae was have 3 species, Geraniaceae, Papaveraceae, Ranunculaceae and Rubiaceae were have 2 species, while the remaining families were represented by only single species (Table 1). The maximum number of species in Fabaceae, Cruciferae and Asteraceae might be due to better mechanism, more seeds and high adaptability of weed species under prevailing environmental conditions. Those species that have effective dispersal mechanism tend to be able to occupy habits characteristic of the early stages of succession following disturbance[1]. According to Taylor[9] the members of Asteraceae generally establish in areas of disturbance such as cultivated fields.

Density of species was found varied. The highest density were recorded for *A. fatua* (25.16 individual m^2), *G. aparine* (15.3 individual m^2), *S. arvensis* (7.48 individual m^2), *V. pyramidata* (6.84 individual m^2), *I. tinctoria* (5.35 individual m^2), *E. capitata* (4.95 individual m^2) and *F. officinalis* (4.47 individual m^2) (Table 1).

The following 9 species i.e *T. glastifolia, L. perenne, G. dissectum, P. rhoeas, C. scorpioides, S. media, M. chamomilla* and *S. pecten-veneris* had density of 1-2 individuals m^{-2} (Table 1). The remaining species had density less than 1 individual m^{-2}. The high density was found for *A. fatua* at Birecik (34.75 individual m^2), Viranşehir (40.00 individual m^2), Hilvan (26.5 individual m^2), Central district (21.5 individual m^2) and Bozova (12.00 individual m^2). However, *A. fatua* was not found in Siverek district this might be related to weed control strategies or herbicides usage in previous years in this area. Hallgren *et al.*[10] reported significant differences in weed flora composition between geographic regions and soil types.

The high density rates of weeds might be due to it is large seed bank provided the seeds are viable and conditions are favorable. High density of weeds might be the consequence of prolific seed production and high emergence potential. The large seed bank ensures the weed dense population as species with high seed out put high capacity to colonize and establish themselves[11]. Therefore, density of weeds occupying a certain area depends upon many factors, such as type of crops, climatic conditions, soil type, fertilizer level and methods of crop management[12]. It was observed that some weed species found only one or two district such as *C.syriaca*, was found at Suruç and Hilvan districts and *N.apiculata* in Harran and Birecik districts *S. spinosa* was found only in Birecik district.

The most abundant species were *A. fatua* (157.25), *E. capitata* (82.50), *L. perenne* (66.30), *S. arvensis* (46.78) and *F. officinalis* (44.75). The minimum abundance was found for the *E. viscosus, B. perennis, C. draba, M. arvensis, M. leavis, E. rigida, E. aleppica, E. cyparissias* and *E. helioscopia* as a 0.25.

The final quantitative measure computed was importance value of weed species at various sites. The important values of different species varied from 0.44 to 48.30 (Table 1). *A. fatua* was top ranking. The decreasing order was *G. aparine, S. arvensis, V. pyramidata,*

Table 1: Weed species, their families, individual number of weeds, quadrate number that contain species, frequency, relative frequency, density, relative density, Abundance, Relative abundance and importance value of weed flora of Şanliurfa and their districts

Plant species	Individual number	Quadrate number	Frequency	Relative frequency (%)	Density	Relative density (%)	Abundance	Relative abundance (%)	Importance value
Araceae									
Arum sp.	4	8	0.04	0.81	0.02	0.02	0.50	0.06	0.89
Aristolochiaceae									
Aristolochia maurorum L.	32	16	0.08	1.62	0.16	0.17	2.00	0.23	2.03
Berberidaceae									
Leontic leontopetalum L.	2	4	0.02	0.41	0.01	0.01	0.50	0.06	0.48
Anchuza azurea Miller	2	4	0.02	0.41	0.01	0.01	0.50	0.06	0.48
Boraginaceae									
Buglossoides arvensis (L.) Johnston	192	16	0.08	1.62	0.96	1.02	12.00	1.40	4.04
Myosotis arvensis (L.) Hill.	1	4	0.02	0.41	0.01	0.01	0.25	0.03	0.44
Caryopyllaceae									
Setellaria media (L.) Vill.	2	4	0.02	0.41	0.01	0.01	0.50	0.06	0.48
Silene conoidea L.	234	24	0.12	2.44	1.17	1.24	9.75	1.14	4.82
Vaccaria pyramidata Medik.	1368	36	0.18	3.65	6.84	7.27	38.00	4.43	15.35
Astereceae									
Bellis perenis L.	1	4	0.02	0.41	0.01	0.01	0.25	0.03	0.44
Centauria calcitrapa L.	104	16	0.08	1.62	0.52	0.55	6.50	0.76	2.93
Centauria solstitialis L.	4	4	0.02	0.41	0.02	0.02	1.00	0.12	0.54
Centauria veretrum L.	2	4	0.02	0.41	0.01	0.01	0.50	0.06	0.48
Cirsium arvense (L.) Scop.	180	24	0.12	2.44	0.90	0.96	7.50	0.87	4.27
Echinops viscosus D.C.	1	4	0.02	0.41	0.01	0.01	0.25	0.03	0.44
Lactuca seriola L.	6	4	0.02	0.41	0.03	0.03	1.50	0.17	0.61
Matricaria chamomilla L.	216	16	0.08	1.62	1.08	1.15	13.50	1.57	4.35
Senecio vernalis Waldst. and Kit.	1	4	0.02	0.41	0.01	0.01	0.25	0.03	0.44
Silybum marianum (L.) Gaertner	60	16	0.08	1.62	0.30	0.32	3.75	0.44	2.38
Sonchus oleraceus L.	2	4	0.02	0.41	0.01	0.01	0.50	0.06	0.48
Xanthium strumarium L.	5	4	0.02	0.41	0.03	0.03	1.25	0.15	0.58
Convolvulaceae									
Convolvulus arvensis L.	72	16	0.08	1.62	0.36	0.38	4.50	0.52	2.53
Cruciferae									
Alyssum szowitsianum Fish. and Mey.	10	8	0.04	0.81	0.05	0.05	1.25	0.15	1.01
Cardaria draba (L.) Desv.	1	4	0.02	0.41	0.01	0.01	0.25	0.03	0.44
Conringia orientalis (L.) Andrz.	30	4	0.02	0.41	0.15	0.16	7.50	0.87	1.44
Chorispora syriaca Boiss.	24	8	0.04	0.81	0.12	0.13	3.00	0.35	1.29
Hirschfeldia incana (L.) Lagreze-Fossat.	33	12	0.06	1.22	0.17	0.18	2.75	0.32	1.71
Isatis tinctoria L.	1071	36	0.18	3.65	5.36	5.69	29.75	3.47	12.81
Malcolmia exacoides (DC) Spreng.	84	12	0.06	1.22	0.42	0.45	7.00	0.82	2.48
Malcolmia crenulata (DC) Boiss.	34	8	0.04	0.81	0.17	0.18	4.25	0.50	1.49
Myagrum perfoliatum L.	18	12	0.06	1.22	0.09	0.10	1.50	0.17	1.49
Neslia apiculata Fisch. et May.	48	12	0.06	1.22	0.24	0.25	4.00	0.47	1.94
Raphanus raphanistrum L.	52	16	0.08	1.62	0.26	0.28	3.25	0.38	2.28
Sinapis arvensis L.	1496	32	0.16	3.25	7.48	7.94	46.75	5.45	16.64
Taxiera glastifolia (DC) Jaub. et Sp.	564	24	0.12	2.44	2.82	3.00	23.50	2.74	8.17
Dipsacaceae									
Cephalaria syriaca (L.) Schrad.	39	12	0.06	1.22	0.20	0.21	3.25	0.38	1.80
Euphorbiaceae								0.00	0.00
Euphorbi rigida Bieb.	1	4	0.02	0.41	0.01	0.01	0.25	0.03	0.44
Euphorbia aleppica L.	1	4	0.02	0.41	0.01	0.01	0.25	0.03	0.44
Euphorbia cyparissias L.	1	4	0.02	0.41	0.01	0.01	0.25	0.03	0.44
Euphorbia helioscopia L.	24	12	0.06	1.22	0.12	0.13	2.00	0.23	1.58
Fumariaceae									
Fumaria officinalis L.	895	20	0.10	2.03	4.48	4.75	44.75	5.22	12.00
Geraniaceae								0.00	0.00
Erodium romanum (Burn) L'Her.	4	8	0.04	0.81	0.02	0.02	0.50	0.06	0.89
Geranium dissectum L.	368	16	0.08	1.62	1.84	1.95	23.00	2.68	6.26
Poaceae									
Avena fatua L.	5032	32	0.16	3.25	25.16	26.72	157.25	18.33	48.31
Cynodon dactylon (L.) Pers.	18	4	0.02	0.41	0.09	0.10	4.50	0.52	1.03
Echinaria capitata (L.) Desf.	990	12	0.06	1.22	4.95	5.26	82.50	9.62	16.10
Hordeum spontaneum C.	11	4	0.02	0.41	0.06	0.06	2.75	0.32	0.79
Lolium multiflorum Lam.	62	5	0.03	0.51	0.31	0.33	12.40	1.45	2.28
Lolium perenne L.	532	8	0.04	0.81	2.66	2.83	66.50	7.75	11.39
Lolium temulantum L.	2	4	0.02	0.41	0.01	0.01	0.50	0.06	0.48
Phalaris brachystachys Link.	3	4	0.02	0.41	0.02	0.02	0.75	0.09	0.51

Table 1: Continue

Plant species	Individual number	Quadrate number	Frequency	Relative frequency (%)	Density	Relative density (%)	Abundance	Relative abundance (%)	Importance value
Phalaris paradoxa L.	2	4	0.02	0.41	0.01	0.01	0.50	0.06	0.48
Poa bulbosa L.	4	4	0.02	0.41	0.02	0.02	1.00	0.12	0.54
Sorghum halepense (L.) Pers.	2	4	0.02	0.41	0.01	0.01	0.50	0.06	0.48
Guttiferae								0.00	0.00
Hypericum perforatum L.	18	8	0.04	0.81	0.09	0.10	2.25	0.26	1.17
Labiatae									
Lamium amplexicaule L.	8	8	0.04	0.81	0.04	0.04	1.00	0.12	0.97
Marrubium remotum KIT	20	8	0.04	0.81	0.10	0.11	2.50	0.29	1.21
Molucella leavis L.	1	4	0.02	0.41	0.01	0.01	0.25	0.03	0.44
Salvia syriaca L.	2	4	0.02	0.41	0.01	0.01	0.50	0.06	0.48
Salvia spinosa L.	33	12	0.06	1.22	0.17	0.18	2.75	0.32	1.71
Fabaceae									
Coronilla scorpiodes (L.) Koch.	252	16	0.08	1.62	1.26	1.34	15.75	1.84	4.80
Glycrrhiza glabra L.	2	4	0.02	0.41	0.01	0.01	0.50	0.06	0.48
Hippocrepis unisiliquosa L.	2	4	0.02	0.41	0.01	0.01	0.50	0.06	0.48
Lathyrus blepharicarpus Boiss.	4	8	0.04	0.81	0.02	0.02	0.50	0.06	0.89
Lotus corniculatus L.	2	4	0.02	0.41	0.01	0.01	0.50	0.06	0.48
Medicago lupulina L.	6	8	0.04	0.81	0.03	0.03	0.75	0.09	0.93
Medicago sativa L.	8	8	0.04	0.81	0.04	0.04	1.00	0.12	0.97
Pisum elatius MB.	6	4	0.02	0.41	0.03	0.03	1.50	0.17	0.61
Trifolium sp.	86	8	0.04	0.81	0.43	0.46	10.75	1.25	2.52
Vicia cracca L.	55	20	0.10	2.03	0.28	0.29	2.75	0.32	2.64
Vicia hybrida L.	16	16	0.08	1.62	0.08	0.08	1.00	0.12	1.83
Vicia narbonenis L	68	16	0.08	1.62	0.34	0.36	4.25	0.50	2.48
Vicia sativa L.	48	16	0.08	1.62	0.24	0.25	3.00	0.35	2.23
Astragalus sp.	4	8	0.04	0.81	0.02	0.02	0.50	0.06	0.89
Liliaceae									
Ornithogalum narbonense L.	1	4	0.02	0.41	0.01	0.01	0.25	0.03	0.44
Malvaceae									
Malva sylvestris L.	6	8	0.04	0.81	0.03	0.03	0.75	0.09	0.93
Papaveraceae									
Glauciums corniculatum (L.) Rud.	8	4	0.02	0.41	0.04	0.04	2.00	0.23	0.68
Papaver rhoeas L.	315	28	0.14	2.84	1.58	1.67	11.25	1.31	5.83
Polygonaceae									
Polygonum aviculare L.	2	4	0.02	0.41	0.01	0.01	0.50	0.06	0.48
Ranunculacea									
Adonis aestivalis L.	84	16	0.08	1.62	0.42	0.45	5.25	0.61	2.68
Ranunculus arvensis L.	80	16	0.08	1.62	0.40	0.42	5.00	0.58	2.63
Rubiaceae									
Asperula orientalis Bois. and Hohen.	36	16	0.08	1.62	0.18	0.19	2.25	0.26	2.08
Galium aparine L.	3060	36	0.18	3.65	15.30	16.25	85.00	9.91	29.82
Scrophulariaceae									
Kixia spuria (L.) Dumort.	168	12	0.06	1.22	0.84	0.89	14.00	1.63	3.74
Apiaceae									
Anethum graveolens L.	4	8	0.04	0.81	0.02	0.02	0.50	0.06	0.89
Bifora radians Bieb.	3	4	0.02	0.41	0.02	0.02	0.75	0.09	0.51
Conium maculatum L.	40	16	0.08	1.62	0.20	0.21	2.50	0.29	2.13
Daucus carota L.	24	12	0.06	1.22	0.12	0.13	2.00	0.23	1.58
Scandix pecten-veneris L.	216	16	0.08	1.62	1.08	1.15	13.50	1.57	4.35
Torilis leptophylla (L.) Rchh.	195	12	0.06	1.22	0.98	1.04	16.25	1.89	4.15
Total	18830		4.93	100.00	94.15	100.00	857.65	100.00	300.00

F. officinalis, L. perenne and *T. glastifolia*, respectively (Table 1). These species have high importance value and they were best adapted species adjusted into agricultural exploitation of unused resources, created by current winter wheat cropping system of the area.

Results revealed that *A. fatua, G. aparine, S. arvensis, V. pyramidata, F. officinalis, L. perenne* and *T. glastifolia* were well adjusted weeds in the winter wheat cropping system. The prevalence of these weeds might be due to their prolific seeds out put which ensure their large seed quantity in the fields.

The most persistent and abundant weeds are easily dispersed and persist along time in the soils as a dormant seeds. The study focus on the flora of winter wheat in Şanliurfa; Turkey and give an opinion about which strategy should be apply for the proper weed control.

REFERENCES

1. Nasir, Z.A. and S. Sultan, 2004. Survey of weeds in mustard fields of district Chakwal, Pakistan. Pak. J. Biol. Sci., 7: 279-286.

2. Tepe, I., 1997. Türkiye'de tarim ve tarim dişi alanlarda sorun olan yabanci otlar ve mücadeleleri, Yüzüncü yil üniversitesi yayinlari, No. 18, Van,Turkey, pp: 237.
3. Özer, Z., I. Kadioğlu, H. Önen and N. Tursun, 1997. Herboloji (Yabanci ot bilimi), Gaziosmanpaşa Üniversitesi, Ziraat Fakültesi yayinlari No: 20, Tokat,Turkey, pp: 388.
4. Frick, B. and A.G. Thomas, 1992. Weed survey in different tillage systems in South Western, Ontaria, field crops. Can. J. Plant Sci., 72: 1337-1347.
5. Korres, N.E and R.J. Froud-Williams, 2002. Effects of winter wheat cultivars and seed rate on the biological characteristics of naturally occurring weed flora. Weed Res., 42: 417-428.
6. Thomas, A.G., 1985. Weed survey system used in Saskatchewan for cereal and oilseed crops. Weed Sci., 33: 34-43.
7. McCully, K.V., M.G. Sampson and A.K. Watson, 1991. Weed survey of Nova Scotia, Lowbush blueberry (*Vaccinium angustifolium*) fields. Weed Sci., 39: 180-185.
8. Braun-Blanquet, J., 1950. Sociologia vegetal, Estudios de las comunidades vegetales. Buenos Aires, Acme Agency, pp: 444.
9. Taylor, R.J., 1995. Northwest Weeds: the Ugly and Beautiful Villains of Fields, Gardens and Road Sides. Mountain Press publishing Company, Missoula, Montana., pp: 177 in Nasir, Z.A., S. Sultan, 2004. Survey of weeds in mustard fields of district Chakwal, Pakistan. Pak. J. Biol. Sci., 7: 279-286.
10. Hallgren, E.M.W. Palmer and P. Milberg, 1999. Data diving with cross validation:and investigation of broad-scale gradient in Swedish weed communities. J. Ecol., 87: 1037-1051.
11. Nizami, M.I., 1989. The role of soil variability in weed research. Pak. J. Weed Sci. Res., 2: 29-33.
12. Buhler, D.D., K.A. Kohler and R.L. Thompson, 2001. Weed seed bank dynamics during a five year crop rotation. Weed Tech., 15: 170-176.