Agric. Sci. Digest., 38 (1) 2018 : 1-10
Print ISSN:0253-150X / Online ISSN:0976-0547

AGRICULTURAL RESEARCH COMMUNICATION CENTRE
www.arccjournals.com

Diversity of weed species in wheat fields of district Rajouri, Jammu and Kashmir

Amandeep Singh*, Satvinder Singh and L.R. Dangwal
Herbarium and Plant Systematic Lab., Hemwati Nandan Bahuguna Garhwal Central University,
S.R.T Campus, Badshahi Thaul-249 199, Tehri Garhwal, Uttarakhand, India.
Received: 23-12-2016 Accepted: 09-01-2018 DOI: 10.18805/ag.D-4382

ABSTRACT
The present study was conducted to determine the diversity of weed species in wheat fields of the district Rajouri (J&K). For analyzing diversity 20 quadrats of (1m.×1m.) were randomly laid down in each block. In every set of quadrat frequency, density and abundance was observed throughout the cropping season and IVI (Important value index) was determined. During the course of field study it was reported that the maximum infestation was shown by grassy weed *Avena fatua* having maximum density (10.15, 12.12, 7.30, 9.35, 10.6, 8.55 from site 1-6 respectively) and IVI (35.71, 43.49, 30.27, 33.91, 32.59, 32.11 from site 1-6 respectively) in all the selected sites. While the least dominant weeds were *Calotropis procera, Conyza japonica, Cannabis sativa, Rumex acetosa, Euphorbia prolifera* and *Sonchus asper* etc. A total of 116 weed species belonging to 3 monocot and 27dicot families were reported from the target site.

Key words: Agricarian, Infestation, Weeds, Wheat.

INTRODUCTION

Wheat (*Triticumaestivum* L.) belongs to family "Poaceae" and genus"Triticum". It is one of the most important cereals grown extensively throughout the world. It contains 13% of protein and is a major staple food in India. The average per hectare yield of wheat in India is 2.71 tons (Anonymous, 1997) which is less as compared to advanced wheat growing countries. Many factors are responsible for low wheat production; weed interference is one of the most important factors to decrease the yield of wheat (Rabia *et al.,* 2003).

Weed is an unwanted plant that grows in association with crop plant and brings about significant decline in yield through its competition with crop plants for sunlight, space, moisture and nutrients etc. (Dangwal *et al.,* 2010). The ability of weeds to compete successfully with crops for available resources depends upon several interrelated factors. These include the timing of weed emergence in relation to crop emergence, the growth form of weeds and the density of weed present in the crop.

The Factors affecting weed communities composition within crops generally depends upon the farming practices used within the cultivated fields (Gaba *et al.,* 2010).These factors included crop type (Fried *et al.,* 2008), the main herbicide and fertilizer regimes associated with specific crop (Andersson and Milberg 1998),preceding crop (Fried *et al.,* 2008), tillage systems etc.(Cardina *et al.*, 2002). All these factors have been recognized to account for variations in weed communities. Beside this the effect of organic versus conventional management has also been reported to modify weed species diversity (Clough *et al.,* 2007).

There are different views about the magnitude of weed losses. According to Tiwari and Parihar (1993) weeds were responsible for causing up to34.3% loss in wheat yield under normal conditions. Gill *et al.* (1979) estimated 15-50% yield loss in wheat due to heavy weed infestations. According to Qureshi (1982) weeds were responsible for causing up to 30% yield loss in wheat. Dangwal *et al.* (2010) reported that weeds reduced the yield of wheat crop up to 25.35%.

The paper deals with the detailed analysis of weed diversity, categorization of weeds according to different sites and biological spectrum of weed flora in wheat fields.

Study area: The study area i.e. district Rajouri is located at western part of Jammu division in the foot hill of PirPanjal range. It lies in between 32^0-58/ and 33^0-35/ north latitude and 70^0 to 74^0-10/ East longitude at an elevation range of 470 – 6000m. asl. Covering an area of 2630 sq. kilometers. It is flanked by district Poonch in the north; district Jammu in the south, district Udhampur in the east and Mirpur (Pok) in the west. (Fig.1)

MATERIALS AND METHODS

The present communication pertains to diversity of weed species in wheat fields of district Rajouri Jammu and Kashmir. For analyzing diversity 20 quadrats were randomly laid down in 6 blocks (i.e. Sunderbani, Kalakote, Rajouri, Thanamandi, Budhal and Darhal) of district Rajouri during the period Oct. 2010- Mar.2014.The size of the quadrat was kept 1m. ×1m. as followed by Singh and Chalam 1936; Kershaw 1973 and Benton and Werner 1976). In every set of quadrat frequency, density and abundance was calculated

*Corresponding author's e-mail and address: amanguru83@gmail.com-Study Center of Botany, School of Environmental Biology, APS University Reva.

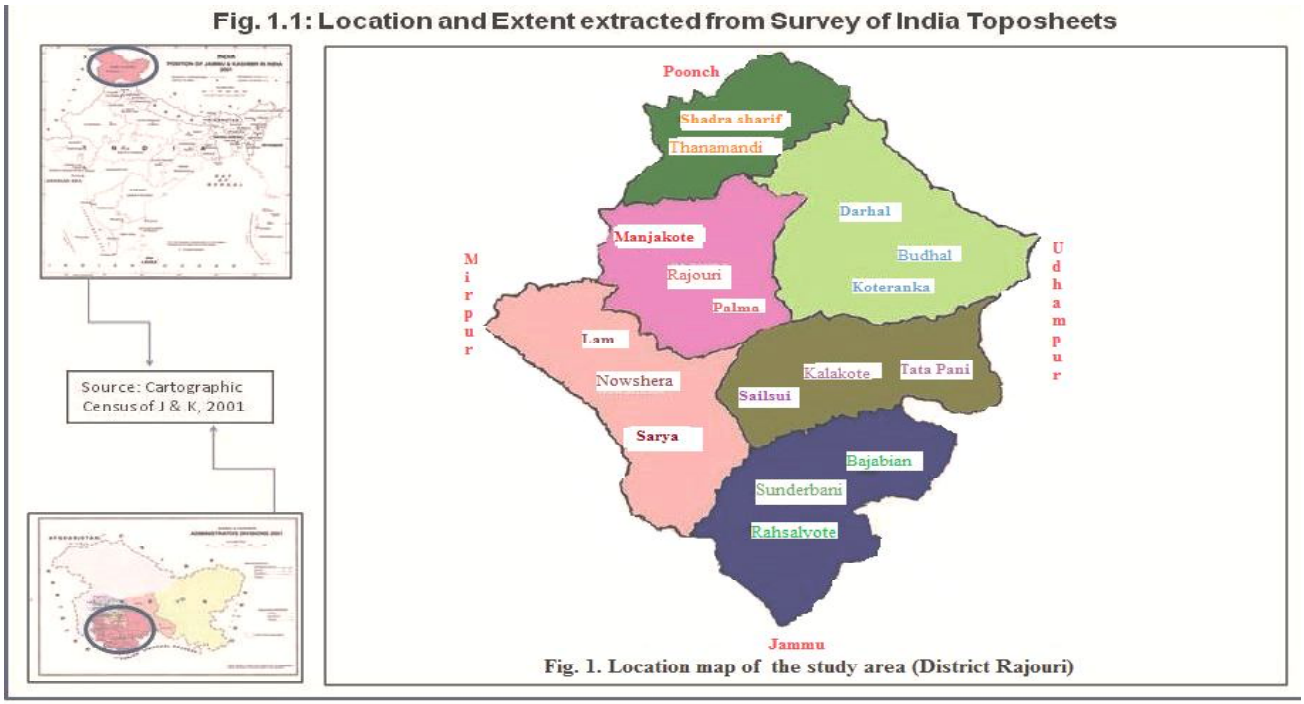

Fig 1: Showing the location map of the study area

as followed by Curtis and Mc In tosh 1950 by using the formulas:

$$\textbf{Frequency} = \frac{\text{Number of quadrats in which the species occured}}{\text{Total number of quadrats studied}} \times 100$$

$$\textbf{Density} = \frac{\text{Total number of individuals of species}}{\text{Total number of quadrats studied}}$$

$$\textbf{Abundance} = \frac{\text{Total number of individuals of species}}{\text{Total number of quadrats in which species occured}}$$

The IVI was determined as a sum of relative frequency, relative density and relative dominance by using the formulas as suggested by Curtis, (1956):

$$\textbf{Relativefrequency} = \frac{\text{Frquency of a species}}{\text{Frequecy of all the species}} \times 100$$

$$\textbf{Relativedensity} = \frac{\text{Density of a species}}{\text{Density of all the species}} \times 100$$

$$\textbf{RelativeDominance} = \frac{\text{Basal area of a species}}{\text{Total basal area of all the species}} \times 100$$

Important Value Index (IVI) = Relative frequency+ Relative density+ Relative dominance

The weed species which come inside different quadrats were collected, pressed, dried, preserved and properly identified with the help of available literature and monographs by Sharma and Kachroo (1983), Swami and Gupta (1998), Kaul (1986) and deposited in H.N.B. Garhwal Central University, S.R.T. Campus BadshshiThaul Tehri Garwal Herbarium.

RESULTS AND DISCUSSION

A total of 116 weed species belonging to 3 monocot and 27dicot families were reported from all the selected sites. The district's average data of density showed that the most densely populated weed of wheat fields was *Avena fatua* having densities of 10.15, 12.2, 7.30, 9.35, 10.6 and8.55 in Sunderbani, Rajouri, Budhal, Thanamandi, Kalakote and Darhal respectively. While the least thickly populated weeds were *Calotropis procera, Rumex acetosa*, *Cannabis sativa Rumex acetosa, Euphorbia prolifera and Sonchus asper* having densities of 0.10, 0.15, 0.15, 0.15, 0.05 and 0.05 in Sunderbani, Rajouri, Budhal, Thanamandi, Kalakote and Darhal respectively. It was reported during the study period that the most dominant weed species in all the target sites was *Avena fatua* having IVI of 35.71, 43.49, 30.27, 33.91, 32.59 and 32.11 in Sunderbani, Rajouri, Budhal, Thanamandi, Kalakote and Darhal respectively. The other dominant weeds which show maximum infestation were *Phalaris minor*, *Medicago polymorpha*, *Medicago lupulina*, *Phleum paniculatum*, *Annagalis arvense*, *Capsella bursa-pastoris*, *Chenopodium album*, Chenopodium murale, *Lathyrus aphaca* and *Melilotus indica,* etc.The least dominant weeds of the wheat fields were *Calotropis procera, Conyza japonica, Cannabis sativa, Rumex acetosa, Euphorbia prolifera* and *Sonchus asper* having IVI of 1.11, 1.25, 2.02, 1.48, 0.49 and 0.68 in Sunderbani, Rajouri, Budhal, Thanamandi, Kalakote and Darhal respectively (Table 1-6).The other weeds which show least infestation were *Cichorium endevia*, *Tagetus minuta*, *Datura stramonium*, *Verbena officinalis* and *Veronica anagallis* etc.

Table 1: Diversity of weeds in wheat fields of block Sunderbani

Botanical Name	Freq.	Density	Abundance	R/F	R/D	R/A	IVI
Avena fatua	80	10.15	12.68	4.77	15.14	15.80	35.71
Phalaris minor	80	8.55	10.68	4.77	12.76	12.42	29.95
Medicago polymorpha	65	4.05	6.23	3.88	6.04	2.10	12.02
Lathyrus aphaca	60	2.55	4.25	3.58	3.80	1.32	8.70
Lathyrus sphaericus	20	0.65	3.25	1.19	0.97	0.60	2.76
Trifolium repens	25	1.10	4.40	1.49	1.64	1.59	4.72
Polygonum persicaria	20	1.05	5.25	1.19	1.56	0.98	3.73
Polygonum barbatum	25	0.90	3.60	1.49	1.34	0.74	3.57
Silene conoidea	40	0.90	2.25	2.38	1.34	1.58	5.30
Rumex acetosa	40	1.20	3.00	2.38	1.79	4.73	8.90
Parthenium hysterophorus	40	0.65	1.62	2.38	0.97	1.75	5.10
Amaranthus viridis	25	0.65	2.60	1.49	0.97	0.94	3.40
Lepidium virginicum	35	0.70	2.00	2.08	1.04	1.45	4.57
Achyranthes aspera	35	0.80	2.28	2.08	1.19	1.90	5.17
Cassia occidentalis	20	0.30	1.50	1.19	0.44	0.96	2.59
Scandix pectin-veneris	35	1.30	3.71	2.08	1.94	1.88	5.90
Avena sativa	25	0.80	3.20	1.49	1.19	1.41	4.09
Ranunculus arvensis	25	0.75	3.00	1.49	1.11	1.16	3.76
Fumaria indica	40	1.25	3.12	2.38	1.86	2.46	6.70
Anagallis arvensis	45	3.25	7.22	2.68	4.85	3.37	10.90
Verbascum thapsus	25	0.30	1.20	1.49	0.44	1.18	3.11
Lolium temulentum	30	1.30	4.33	1.79	1.94	2.02	5.75
Cynodon dactylon	30	0.90	3.60	1.79	1.34	0.46	3.59
Trifolium tomentosum	25	1.10	4.40	1.49	1.64	1.14	4.27
Silybum marianum	35	0.45	1.28	2.08	0.67	1.72	4.47
Polygonum recumbens	20	0.40	2.00	1.19	0.59	0.45	2.23
Vicia sativa	30	0.85	2.83	1.79	1.26	0.88	3.93
Breea arvensis	20	0.45	2.25	1.19	0.67	1.68	3.54
Capsella bursa-pastoris	30	1.25	4.16	1.79	1.86	1.16	4.81
Taraxacum officinale	25	0.40	1.60	1.49	0.59	0.83	2.91
Calotropis procera	10	0.10	1.00	0.59	0.14	0.38	1.11
Galinsoga parviflora	35	0.90	2.57	2.08	1.34	1.58	5.00
Ranunculus scleratus	40	0.80	2.00	2.38	1.19	1.74	5.31
Coronopus didymus	35	0.80	2.28	2.08	1.19	0.74	4.01
Euphorbia helioscopia	35	0.85	2.42	2.08	1.26	1.85	5.19
Melilotus indica	25	0.85	3.40	1.49	1.26	0.88	3.63
Vicia hirsuta	40	1.60	4.00	2.38	2.38	1.99	6.75
Stellaria media	45	3.05	6.77	2.68	4.55	1.58	8.81
Conyza bonarensis	30	0.85	2.83	1.79	1.26	2.11	5.16
Chenopodium album	35	0.90	2.57	2.08	1.34	2.05	5.47
Convolvulus arvensis	25	0.60	2.40	1.49	0.89	0.37	2.75
Rumex dentatus	35	0.70	2.00	2.08	1.04	2.10	5.22
Chenopodium ambrosioides	25	0.60	2.40	1.49	0.89	1.24	3.62
Sonchus asper	20	0.30	1.50	1.19	0.44	1.21	2.84
Bidens pilosa	30	0.50	1.66	1.79	0.74	1.24	3.77
Oxalis corniculata	20	0.65	3.25	1.19	0.97	0.33	2.49
Solanum surattense	15	0.20	1.33	0.89	0.29	0.70	1.88
Malva parviflora	30	1.00	3.33	1.79	1.49	1.86	5.14
Datura stramonium	15	0.15	1.00	0.89	0.22	0.37	1.48
Euphorbia heterophylla	15	0.55	3.66	0.89	0.82	1.54	3.25
Chenopodium murale	15	0.25	1.66	0.89	0.37	0.57	1.83
Verbena officinalis	20	0.30	1.50	1.19	0.44	0.96	2.59
Euphorbia prolifera	10	0.25	2.50	0.59	0.37	0.62	1.58
Galium aparine	20	1.30	6.5	1.19	1.94	1.07	4.20
Total freq. of all the specie= 1675			**Total frequency of all the species= 67.00**				

Table 2: Diversity of weeds in wheat fields of block Rajouri

Botanical Name Site	Freq.	Density	Abundance	R/F	R/D	R/A	IVI
Avena fatua	70	12.2	17.42	4.74	17.15	21.60	43.49
Phalaris minor	55	6.95	12.63	3.72	9.77	11.53	25.02
Juncus bufonius	35	3.25	9.28	2.37	4.57	1.07	8.01
Centaurea iberica	20	0.35	1.75	1.35	0.49	0.89	2.73
Lamium amplexicaule	30	2.45	8.16	2.03	3.44	1.89	7.36
Gnaphalium polycaulon	30	0.75	2.50	2.03	1.05	1.49	4.57
Anagallis arvensis	65	4.35	6.69	4.40	6.11	4.81	15.32
Saponaria vaccaria	25	0.55	2.20	1.69	0.77	1.15	3.61
Stellaria media	25	2.50	10.00	1.69	3.51	1.38	6.58
Medicago polymorpha	55	7.00	12.72	3.72	9.84	3.87	17.43
Bidens bipinnata	35	0.65	1.85	2.37	0.91	1.43	4.71
Saussurea heteromalla	25	0.60	2.40	1.69	0.84	2.59	5.12
Euphorbia hirta	35	2.00	5.71	2.37	2.81	1.54	6.72
Capsella bursa-pastoris	25	1.20	4.80	1.69	1.68	1.19	4.56
Eclipta prostrata	20	0.50	2.50	1.35	0.70	1.05	3.10
Coronopus didymus	40	1.60	4.00	2.71	2.25	1.59	6.55
Convolvulus arvensis	25	0.95	3.80	1.69	0.84	0.63	3.16
Conyza bonarensis	25	0.60	2.40	1.69	0.84	1.52	4.05
Vicia hirsuta	35	1.45	4.14	2.37	2.03	1.92	6.32
Lathyrus aphaca	30	2.40	8.00	2.03	3.37	1.32	6.72
Amaranthus viridis	20	0.45	2.25	1.35	0.63	0.69	2.67
Oxalis corniculata	20	1.10	5.50	1.35	1.54	0.60	3.49
Cannabis sativa	15	0.20	1.33	1.01	0.28	0.88	2.17
Cynodon dactylon	30	1.50	5.00	2.03	2.10	0.83	4.96
Ageratum conyzoides	25	0.40	1.60	1.69	0.56	1.06	3.31
Chenopodium album	35	0.75	2.14	2.37	1.05	1.82	5.24
Solanum nigrum	20	0.25	1.25	1.35	0.35	0.44	2.14
Parthenium hysterophorus	20	0.20	1.00	1.35	0.28	0.57	2.20
Aervam lanata	35	0.80	2.28	2.37	1.12	1.50	4.99
Sonchus asper	20	0.20	1.00	1.35	0.28	0.86	2.49
Malva parviflora	25	0.75	3.00	1.69	1.05	1.49	4.23
Euphorbia helioscopia	35	0.85	2.42	2.37	1.19	1.97	5.53
Ranunculus scleratus	30	0.60	2.00	2.03	0.84	1.39	4.26
Silybum marianum	25	0.30	1.20	1.69	0.42	1.22	3.33
Rumex dentatus	20	0.30	1.50	1.35	0.42	0.96	2.73
Fumaria indica	30	1.00	3.33	2.03	1.40	2.10	5.53
Malvastrum coromandelianum	20	0.40	2.00	1.35	0.56	0.57	2.48
Achyranthes aspera	20	0.30	1.50	1.35	0.42	0.76	2.53
Trifolium repens	20	0.80	4.00	1.35	1.12	1.23	3.70
Vicia sativa	20	0.70	3.50	1.35	0.98	0.77	3.10
Chenopodium ambrosoides	15	0.30	2.00	1.01	0.42	0.66	2.09
Silene conoidea	30	0.70	2.33	2.03	0.98	1.31	4.32
Blumea mollis	15	0.35	2.33	1.01	0.49	0.69	2.19
Chenopodium murale	15	0.25	1.66	1.01	0.35	0.60	1.96
Siegesbeckia orientalis	10	0.15	1.50	0.67	0.21	0.53	1.41
Euphorbia heterophylla	15	0.35	2.33	1.01	0.49	1.00	2.50
Lolium temulentum	20	0.75	3.75	1.35	1.05	1.16	3.56
Taraxacum officinale	25	0.40	1.60	1.69	0.56	0.88	3.13
Melilotus indica	20	0.75	3.75	1.35	1.05	0.83	3.23
Youngia japonica	15	0.25	1.66	1.01	0.35	0.55	1.91
Polygonum aviculare	25	1.20	4.80	1.69	1.68	1.32	4.69
Rumex acetosa	10	0.15	1.50	0.67	0.21	0.63	1.51
Lepidium virginicum	15	0.25	1.66	1.01	0.35	0.55	1.91
Breea arvensis	15	0.30	2.00	1.01	0.42	1.19	2.62
Ranunculus arvensis	15	0.25	1.66	1.01	0.35	0.60	1.96
Conyza ambigua	15	0.35	2.33	1.01	0.49	0.73	2.23
Conyza japonica	10	0.20	2.00	0.67	0.28	0.30	1.25
Total freq. of all the species = 1475		**Total density of all the species = 71.10**					

Table 3: Diversity of weeds in wheat fields of SiteBudhal

Botanical Name	Freq.	Density	Abundance	R/F	R/D	R/A	IVI
Avena fatua	65	7.30	11.23	4.54	12.14	13.59	30.27
Rumex nepalensis	35	0.45	1.28	2.44	0.47	2.12	5.30
Trifolium pretense	25	0.90	3.60	1.74	1.49	1.45	4.68
Chenopodium album	30	0.95	3.16	2.09	1.58	2.59	6.26
Malva verticillata	50	1.35	2.70	3.49	2.24	3.18	8.91
Sonchus brachyotus	30	0.60	2.00	2.09	0.99	1.56	4.64
Trifolium repens	30	1.50	5.00	2.09	2.49	2.60	7.18
Argemone Mexicana	40	0.80	2.00	2.79	1.33	2.48	6.60
Sonchus oleraceus	30	0.45	1.50	2.09	0.74	1.56	4.39
Veronica persica	30	1.65	5.50	2.09	2.74	2.04	6.87
Eclipta prostrata	20	0.65	3.25	1.39	1.08	1.53	4.00
Oxalis corniculata	40	2.10	5.25	2.79	3.49	1.30	7.58
Ranunculus leatus	35	0.55	1.57	2.44	0.91	1.77	5.12
Medicago lupulina	55	5.20	9.45	3.84	8.65	3.87	16.36
Anagallis arvensis	45	4.10	9.11	3.14	6.82	5.09	15.05
Conyza stricta	35	0.85	2.42	2.44	1.41	1.16	5.01
Cardamine hirsuta	25	0.40	1.60	1.74	0.66	0.79	3.19
Bidens bipinnata	20	0.30	1.50	1.39	0.49	0.74	2.62
Euphorbia hirta	25	1.80	7.20	1.74	2.99	1.11	5.84
Oenothera rosea	35	1.60	4.57	2.44	2.66	2.98	8.08
Stellaria media	40	4.35	10.87	2.79	7.23	2.70	12.72
Euphorbia chamaesyce	30	1.80	6.00	2.09	2.99	1.11	6.19
Conyza Canadensis	25	0.55	2.20	1.74	0.91	1.02	3.67
Papaver dubium	40	1.60	4.00	2.79	2.66	2.98	8.43
Chenopodium giganteum	15	0.20	1.33	1.04	0.33	0.99	2.36
Duchesnea indica	30	0.70	2.33	2.09	1.16	1.04	4.29
Vicia hirsuta	25	2.20	8.80	1.74	3.66	3.27	8.67
Capsella bursa-pastoris	30	1.55	5.16	2.09	2.57	1.73	6.39
Achyranthes bidentata	30	0.65	2.16	2.09	1.08	1.93	5.10
Geranium occellatum	25	0.65	2.60	1.74	1.08	1.53	4.35
Datura stramonium	25	0.30	1.20	1.74	0.49	1.45	3.68
Ajuga bracteosa	20	0.50	2.50	1.39	0.83	0.62	2.84
Plantago major	15	0.25	4.00	1.04	0.41	0.58	2.03
Amaranthus viridis	25	0.60	2.80	1.74	0.99	1.04	3.77
Achyranthes aspera	25	0.70	1.60	1.74	1.16	1.99	4.89
Parthenium hysterophorus	25	0.40	2.00	1.74	0.66	1.29	3.69
Chenopodium ambrosoides	20	0.50	4.25	1.39	0.83	1.24	3.46
Lepidium virginicum	25	0.85	2.60	1.74	1.41	2.11	5.26
Youngia japonica	20	0.65	3.75	1.39	1.08	1.61	4.08
Taraxacum officinale	30	0.75	2.50	2.09	1.24	1.86	5.19
Solanum nigrum	30	0.75	2.50	2.09	1.24	1.49	4.82
Sigesbeckia orientalis	20	0.25	1.25	1.39	0.41	0.99	2.79
Potentilla gerardiana	15	0.80	5.33	1.04	1.33	1.19	3.56
Cannabis sativa	15	0.15	1.00	1.04	0.24	0.74	2.02
Saussurea heteromalla	25	0.40	1.60	1.74	0.66	1.93	4.33
Geranium wallichianum	20	0.40	2.00	1.39	0.66	0.54	2.59
Galinsoga parviflora	30	1.50	5.00	2.09	2.49	3.16	7.74
Plantago lanceolata	20	0.50	2.50	1.39	0.83	1.30	3.52
Cardamine impatiens	20	0.65	3.25	1.39	1.08	1.04	3.51
Vicia sativa	15	1.45	9.66	1.04	2.41	1.80	5.25
Total freq. of all the specie= 1430			**Total density of all the species = 60.1**				

Table 4: Diversity of weeds in wheat fields of Thanamandi

Botanical Name	Freq.	Density	Abundance	R/F	R/D	R/A	IVI
Geranium ocellatum	25	0.60	2.40	1.68	0.82	1.22	3.72
Avena fatua	75	9.35	12.46	5.05	12.85	16.01	33.91
Phalaris minor	60	6.70	11.16	4.04	9.20	10.75	23.99
Anagallis arvensis	55	4.85	8.81	3.70	6.66	5.19	15.55
Capsella bursa-pastoris	25	2.00	8.00	1.68	2.74	1.92	6.34
Ageratum conyzoides	20	0.65	3.25	1.34	0.89	1.66	3.89
Saussurea heteromalla	20	0.30	1.50	1.34	0.41	1.25	3.00
Silybum marianum	15	0.20	1.33	1.01	0.27	0.79	2.07
Sonchus oleraceus	45	0.70	1.55	3.03	0.96	2.09	6.08
Veronica persica	45	1.95	4.33	3.03	2.68	2.08	7.79
Oenothera rosea	40	1.70	4.25	2.69	2.33	2.72	7.74
Aerva lanata	20	0.55	2.75	1.34	0.75	1.00	3.09
Stellaria media	25	2.05	8.20	1.68	2.81	1.09	5.58
Euphorbia heterophylla	20	0.55	2.75	1.34	0.75	1.53	3.62
Chenopodium album	45	0.95	2.11	3.03	1.30	2.23	6.56
Potentilla gerardiana	30	1.10	3.66	2.02	1.51	1.41	4.94
Malva parviflora	25	1.15	4.60	1.68	1.58	2.21	5.47
Medicago polymorpha	55	5.65	10.27	3.70	7.76	3.02	14.48
Fumaria indica	40	1.55	3.87	2.69	2.13	2.65	7.47
Ranunculus scleratus	30	0.85	2.83	2.02	1.16	1.91	5.09
Euphorbia hirta	30	2.25	7.50	2.02	3.09	1.68	6.79
Rumex dentatus	25	0.45	1.80	1.68	0.61	0.91	3.20
Lepidium virginicum	15	0.45	3.00	1.01	0.61	0.96	2.58
Cichorium endivia	50	1.25	2.50	3.36	1.71	1.87	6.94
Euphorbia helioscopia	40	0.80	2.00	2.69	1.09	1.79	5.57
Lamium amplexicaule	20	1.55	7.75	1.34	2.13	1.16	4.63
Ajuga bracteosa	20	0.55	2.75	1.34	0.75	0.58	2.67
Lolium temulentum	30	1.15	3.83	2.02	1.58	1.72	5.32
Ranunculus arvensis	15	0.35	2.33	1.01	0.48	0.82	2.31
Melilotus indica	25	0.90	3.60	1.68	1.23	0.96	3.87
Centaurea iberica	20	0.25	1.25	1.34	0.34	0.61	2.29
Youngia japonica	20	0.45	2.25	1.34	0.61	0.96	2.91
Coronopus didymus	10	0.60	6.00	0.67	0.82	0.57	2.06
Bidens pilosa	20	0.35	1.75	1.34	0.48	0.89	2.71
Amaranthus viridis	20	0.70	3.50	1.34	0.96	1.04	3.34
Achyranthes aspera	15	0.30	2.00	1.01	0.41	0.73	2.15
Silene conoidea	25	0.70	2.80	1.68	0.96	1.27	3.91
Lathyrus aphaca	30	3.30	11.00	2.02	4.53	1.76	8.31
Trifolium repens	20	0.95	4.75	1.34	1.30	1.42	4.06
Chenopodium ambrosioides	15	0.30	2.00	1.01	0.41	0.64	2.06
Euphorbia chamaesyce	20	1.45	7.25	1.34	1.99	0.77	4.10
Conyza bonarensis	15	0.40	2.66	1.01	0.55	0.98	2.54
Neslia apiculata	25	0.90	3.60	1.68	1.23	1.05	3.96
Vicia hirsuta	10	1.05	10.50	0.67	1.44	1.34	3.45
Convolvulus arvensis	20	0.55	2.75	1.34	0.75	0.35	2.44
Partheniumhysterophorus	20	0.35	1.75	1.34	0.48	0.97	2.79
Cannabis sativa	15	0.40	2.66	1.01	0.55	1.71	3.27
Euphorbia prolifera	10	0.30	3.00	0.67	0.41	0.77	1.85
Alternanthera sessilis	15	0.25	1.66	1.01	0.34	0.37	1.72
Cynodon dactylon	20	1.40	7.00	1.34	1.92	0.74	4.00
Rumex acetosa	10	0.15	1.50	0.67	0.20	0.61	1.48
Solanum nigrum	20	0.30	1.50	1.34	0.41	0.51	2.26
Geranium wallichianum	20	0.60	3.00	1.34	0.82	0.70	2.86
Gnaphalium polycaulon	20	0.50	2.50	1.34	0.68	0.96	2.98
Blumea mollis	15	0.25	1.66	1.01	0.34	0.48	1.83
Juncus bufonius	10	0.80	8.00	0.67	1.09	0.25	2.01
Oxalis corniculata	15	0.60	4.00	1.01	0.82	0.32	2.15
Vicia sativa	10	1.10	11.00	0.67	1.51	1.17	3.35
Conyza japonica	15	0.40	2.66	1.01	0.55	0.59	2.15
Total freq,of all the species =1485Total density of all the species =72.75							

Table 5: Diversity of weeds in wheat fields of Kalakote

Botanical Name	Freq.	Density	Abundance	R/F	R/D	R/A	IVI
Silybum marianum	30	0.70	2.33	1.99	0.81	2.28	5.08
Avena fatua	80	10.6	13.25	5.31	12.37	14.91	32.59
Ageratum conyzoides	35	1.00	2.86	2.32	1.16	2.29	5.77
Siegesbeckia orientalis	30	0.30	1.00	1.99	0.35	0.84	3.18
Phalaris minor	75	8.05	10.73	4.98	9.39	10.62	24.99
Eclipta prostrata	30	1.05	3.50	1.99	1.22	1.75	4.96
Vicia hirsuta	35	2.30	6.57	2.32	2.68	2.43	7.43
Melilotus indica	35	1.95	5.57	2.32	2.27	1.71	6.30
Ranunculus arvensis	30	0.75	2.50	1.99	0.87	0.99	3.85
Rumex acetosa	25	0.45	1.80	1.66	0.52	1.50	3.68
Chenopodium album	40	1.75	4.38	2.65	2.04	3.39	8.08
Neslia apiculata	45	2.05	4.55	2.99	2.39	1.98	7.36
Stellaria media	25	2.45	9.80	1.66	2.86	1.08	5.60
Conyza Canadensis	35	0.90	2.57	2.32	1.05	1.50	4.87
Medicago polymorpha	65	9.25	14.23	4.31	10.79	4.07	19.17
Euphorbia helioscopia	30	1.10	3.66	1.99	1.28	2.03	5.30
Cynodon dactylon	20	1.45	7.25	1.32	1.69	0.64	3.65
Chenopodium ambrosioides	25	0.40	1.60	1.66	0.46	0.70	2.82
Silene conoidea	35	0.95	2.71	2.32	1.10	1.42	4.84
Euphorbia hirta	25	2.30	9.20	1.66	2.68	1.42	5.76
Solanum nigrum	20	0.45	2.25	1.32	0.52	0.63	2.47
Rumex dentatus	30	1.15	3.83	1.99	1.34	2.93	6.26
Conyza bonarensis	20	0.50	2.50	1.32	0.58	1.01	2.91
Achyranthes aspera	30	1.05	3.50	1.99	1.22	2.12	5.33
Convolvulus arvensis	20	1.20	0.60	1.32	1.40	0.63	3.35
Lathyrus aphaca	35	3.25	9.29	2.32	3.79	1.43	7.54
Torilis leptophylla	25	2.30	9.20	1.66	2.68	2.02	6.36
Cannabis sativa	15	0.20	1.33	0.99	0.23	0.70	1.92
Malva parviflora	30	1.20	0.40	1.99	1.40	1.90	5.29
Saussurea heteromalla	15	0.20	1.33	0.99	0.23	0.69	1.91
Youngia japonica	30	0.85	2.83	1.99	0.99	1.49	4.47
Lepidium sativum	15	0.25	1.66	0.99	0.29	0.40	1.69
Sonchus asper	25	0.30	1.20	1.66	0.35	1.03	3.04
Anagallis arvensis	50	6.40	12.80	3.32	7.47	5.63	16.42
Euphorbia heterophylla	20	0.70	3.50	1.32	0.81	1.60	3.73
Amaranthus viridis	20	0.50	2.50	1.32	0.58	0.62	2.52
Euphorbia prostrata	25	1.70	6.80	1.66	1.98	0.75	4.39
Laggera aurita	20	0.60	0.30	1.32	0.70	0.90	2.92
Capsella bursa-pastoris	40	2.80	0.70	2.65	3.26	2.22	8.13
Ranunculus scleratus	25	0.80	3.20	1.66	0.93	1.48	4.07
Trifolium repens	20	1.05	5.25	1.32	1.23	1.29	3.84
Taraxacum officinale	15	0.20	1.33	0.99	0.23	0.35	1.57
Parthenium hysterophorus	30	0.55	1.83	1.99	0.64	1.26	3.89
Fumaria indica	35	1.20	3.43	2.32	1.40	2.00	5.72
Lolium temulentum	25	1.95	7.80	1.66	2.27	2.57	6.50
Coronopus didymus	25	1.15	4.60	1.66	1.34	0.91	3.91
Malvestrum coromandelianum	10	0.20	2.00	0.66	0.23	0.23	1.20
Chenopodium murale	05	0.15	3.00	0.33	0.17	0.29	0.79
Lepidium virginicum	05	0.15	3.00	0.33	0.17	0.26	0.76
Oxalis corniculata	10	0.45	4.50	0.66	0.52	0.20	1.38
Breea arvensis	05	0.05	1.00	0.33	0.05	0.16	0.54
Trifolium tomentosum	10	0.80	8.00	0.66	0.93	0.70	2.29
Stellaria media	05	0.45	9.00	0.33	0.52	0.20	1.05
Blumea mollis	20	0.45	2.25	1.32	0.52	0.71	2.55
Bidens pilosa	10	0.10	1.00	0.66	0.11	0.21	0.98
Avena sativa	10	0.55	5.50	0.66	0.64	0.82	2.12
Euphorbia prolifera	05	0.05	1.00	0.33	0.05	0.11	0.49
Frequency of all the species= 1505Density of all the species =85.65							

Table 6: Species diversity of weeds in wheat fields of Site 6.Darhal

Botanical Name	Freq.	Density	Abundance	R/F	R/D	R/A	IVI
Convolvulus arvensis	20	0.75	3.75	1.65	1.11	0.47	3.23
Malvestrumcoromandelianum	15	0.35	2.33	1.23	0.52	0.48	2.23
Capsella bursa-pastoris	30	1.70	5.66	2.47	2.52	1.61	6.60
Parthenium hysterophorus	10	0.15	1.50	0.82	0.22	0.41	1.45
Conyza Canadensis	25	0.65	2.60	2.06	0.96	1.03	4.05
Amaranthus hybridus	35	0.40	1.14	2.89	0.59	1.18	4.66
Campanula benthamii	25	0.90	3.60	2.06	1.33	1.33	4.72
Nasturtium indicum	15	0.50	3.33	1.23	0.74	0.74	2.71
Conyza stricta	30	0.80	2.66	2.47	1.18	1.27	4.92
Avena fatua	60	8.55	14.25	4.95	12.71	14.45	32.11
Oxalis corniculata	15	0.65	4.33	1.23	0.96	0.34	2.53
Cardamine impatiens	20	0.70	3.50	1.65	1.04	0.96	3.65
Vicia sativa	20	2.50	12.50	1.65	3.71	2.64	8.00
Youngia japonica	20	0.55	2.75	1.65	0.81	1.16	3.62
Stellaria media	25	4.10	16.40	2.06	6.09	2.16	10.31
Silene conoidea	30	0.80	2.66	2.47	1.18	1.44	5.09
Medicago polymorpha	45	5.40	12.00	3.71	8.02	2.85	14.58
Rumex acetosa	35	0.40	1.14	2.89	0.59	1.52	5.00
Calotropis procera	20	0.30	1.50	1.65	0.44	0.82	2.91
Trifolium repens	25	0.85	3.40	2.06	1.26	1.26	4.58
Conyza bonarensis	10	0.15	1.50	0.82	0.22	0.38	1.42
Cannabis sativa	15	0.15	1.00	1.23	0.22	0.63	2.08
Achyranthes aspera	15	0.30	2.00	1.23	0.44	0.73	2.40
Anagallis arvensis	35	4.60	13.14	2.89	6.84	4.86	14.59
Chenopodium album	35	0.70	2.00	2.89	1.04	1.63	5.56
Lolium temulentum	20	0.80	4.00	1.65	1.18	1.18	4.01
Potentilla fragarioides	20	0.70	3.50	1.65	1.04	0.90	3.59
Coronopus didymus	25	1.10	4.40	2.06	1.63	1.04	4.73
Melilotus indica	10	0.65	6.50	0.82	0.96	0.68	2.46
Euphorbia helioscopia	20	0.45	2.25	1.65	0.66	0.99	3.30
Solanum nigrum	20	0.25	1.25	1.65	0.37	0.42	2.44
Phalaris minor	35	5.30	15.14	2.89	7.88	8.39	19.16
Phleum paniculatum	35	6.30	18.00	2.89	9.36	9.31	21.56
Cynodon dactylon	35	1.75	5.00	2.89	2.60	0.92	6.41
Polygonum aviculare	10	0.20	2.00	0.82	0.29	0.21	1.32
Amaranthus viridis	10	0.20	2.00	0.82	0.29	0.29	1.40
Bidens pilosa	20	0.20	1.00	1.65	0.29	0.51	2.45
Galinsoga parviflora	20	0.55	2.75	1.65	0.81	0.99	3.45
Fumaria indica	25	1.30	5.20	2.06	1.93	2.61	6.60
Ranunculus leatus	20	0.25	1.25	1.65	0.37	0.69	2.71
Euphorbia hirta	20	1.25	6.25	1.65	1.85	0.92	4.42
Euphorbia chamaesyce	05	0.30	6.00	0.41	0.44	0.16	1.01
Malva parviflora	25	0.75	3.00	2.06	1.11	1.42	4.59
Vicia hirsuta	15	1.70	11.33	1.23	2.53	2.15	5.91
Eclipta prostrata	20	0.50	2.50	1.65	0.74	1.00	3.39
Cichorium endivia	10	0.25	2.50	0.82	0.37	0.37	1.56
Verbena officinalis	10	0.10	1.00	0.82	0.14	0.33	1.29
Chenopodium ambrosioides	10	0.20	2.00	0.82	0.29	0.42	1.53
Lepidium virginicum	15	0.25	1.66	1.23	0.37	0.53	2.13
Ageratum conyzoides	15	0.15	1.00	1.23	0.22	0.38	1.83
Sonchus oleraceus	15	0.15	1.00	1.23	0.22	0.44	1.89
Campanula pallid	10	0.40	4.00	0.82	0.59	0.59	2.00
Geranium wallichianum	10	0.20	2.00	0.82	0.29	0.23	1.34
Saussurea heteromalla	15	3.15	2.10	1.23	4.68	12.97	18.88
Rumex dentatus	15	0.20	1.33	1.23	0.29	0.61	2.13
Taraxacum officinale	10	0.10	1.00	0.82	0.14	0.21	1.17
Artemisia nilagirica	10	0.15	1.50	0.82	0.22	0.51	1.55
Ranunculus arvensis	05	0.10	2.00	0.41	0.14	0.23	0.78
Oenothera rosea	05	0.15	3.00	0.41	0.22	0.24	0.87
Argemone Mexicana	05	0.15	3.00	0.41	0.22	0.32	0.95
Sonchus asper	05	0.05	1.00	0.41	0.07	0.20	0.68
Bidens bipinnata	05	0.10	2.00	0.41	0.14	0.21	0.76
Freq. of all the species = 1210Density of all the species= 67.25							

It is reported during the study period that the grassy weeds like *Aven afatua*, *Phalaris minor* and *Lolium temulentum* belonging to family Poaceae were virulent weeds of wheat, they also fall under surpassing category being equal or taller than wheat plants. Their roots penetrate up to the same depths occupied by the crop plants thus they are direct competitor of crop plants for nutrients. Moreover, the similarity of these weeds to crop plants at early growth stages makes it very difficult for farmers to distinguish them while hand weeding. The weed *Chenopodium album* is the most devasting as its seeds spread before harvesting of wheat crop and remains in the soil to germinate in next season.

Earlier, the similar type of work has been done by various workers. Gupta *et al.,* (2008) studied the dynamics of cereal crop weeds of Doon valley of Uttarakhand with special reference to wheat, maize and rice fields. They reported 151 weed species belonging to 31 families. Among these 77 weeds were reported from wheat fields. Salonen *et al.,*(2001) determined weed species composition and the level of weed infestation in organically growing spring cereals including wheat of southern and central Finland. Keric and Yarci (1999) recorded 93 weeds occurring in wheat from the agricultural areas of Enez, Turkey. Tursun (2002) reported that the weeds like *Avena* spp., *Vicia* spp. and *Convolvulus* spp. were the most dominant weeds in wheat crop of Kahramanmaras, Turkey.

Rabia *et al.,*(2003) studied the weed diversity of wheat crop in Khairpur district of Sindh, Pakistan by using quadrat method and reported that the weeds like *Chenopodium ficifolium*, *Anagallis arvensis* and *Melilotus indica* show maximum density. Dhole *et al.,* (2013) studied the weed diversity of wheat crop fields from Marathwada region and reported a total of 30 weed species related to 15 families. Khobragade and Sathawane (2014) studied weed diversity in rabi wheat crop of Bhandara district (MS), India and reported a total of 76 weed species belonging to 27 families. Singh *et al.,* (2007) studied the phytosociological association of weeds in winter crops of Kashmir valley. Khan *et al*., (2009) studied the diversity of weeds associated with *rabi* and *kharif* crops of sewa river catchment area in the north west Himalaya. Dangwal *et al.,*(2011) studied the diversity of weeds in wheat fields of tehsil Nowshera district Rajouri by using quadrat method and reported that the predominant weeds showing maximum infestation were *Avena fatua* and *Phalaris minor* etc.

As the Rajouri district of Jammu and Kashmir is a remote district. Several workers have tried to explore the ethno botanical as well as taxonomical aspects of weeds but the studies on species diversity of weeds in cereals crops are still unscreened. Hence in the present study attempts were made to screen out the structure of weed community associated with wheat crop.

The study provides a preliminary data of the different categories of weeds in wheat crop fields. The study is helpful to farmers, agriculturalists and researchers related to this field for identification of weeds and to understand distribution and growth pattern of weeds associated with wheat fields. Further research work is required for distribution and quantification of weeds for ecological management.

REFERENCES

Andersson, T.N., and Milberg, P. (1998). Weed flora and the relative importance of site, crop, crop rotation and nitrogen. *Weed Sci*. **46**: 30–38.

Anonymous (1997).Quaterly bulletin of statistics.F.A.O (Food and Agriculture organization).p. 10.

Benton, A.M. and Werner W.E. (1976). Field Biology and Ecology. Mc Graw Hill Co., NewYork.

Cardina, J., Herms, C.P., and Doohan, D.J. (2002). Crop rotation and tillage system effects on weed seed banks. *Weed Sci*. **50**: 448–460.

Clough, Y., Kruess, A. and Tscharntke, T. (2007). Organic versus conventional arable farming functional grouping helps understand staphylinid response. *Agric. Ecosys. Environ.***118**: 285–290.

Curtis, J.T. (1956). The vegetation of Wisconsin.An ordination of plants communities. University Wisconsin Press, Madison, Wisconsin, pp 655.

Curtis, J.T. and McIntosh., R.P. (1950). The Interrelation of certain analytic and synthetic phytosociological characters. *Ecology* **31:** 434-455.

Dangwal, L. R., Singh, A., Sharma, A. and Singh, T. (2011). Diversity of Weed Species in Wheat Fields of Block Nowshera District Rajouri (J and K).*Indian. J. Weed Sci*. **43** (1 and 2) : 94-96.

Dangwal, L.R.., Singh, A., Singh, T. and Sharma,C. (2010)**.** Effects of weeds on the yield of wheat crop in tehsil Nowshera.*Journal of American science* **6** (10): 405-407.

Dhole, J.A., Lone, K.D.,Dhole ,N.A. and Bodke. S.S. (2013). Studies on weed diversity of Wheat (*Triticumaestivum*L.) crop fields of Marathwada Region.*Int. J. Curr. Microbiol. App. Sci.* **2** (6): 293-298.

Fried, G., Norton,L.R., and Reboud, X. (2008). Environmental and management factors determining weed species composition and diversity in France. *Agric. Ecosys. Environ*. **128**: 68–76.

Gaba, S., Chauvel, B., Dessaint, F., Bretagnolle, V. and S., Petit. (2010)**.** Weed species richness in winter wheat increases with landscape heterogeneity.*Agric. Ecosys. Environ* **138**: 318–323.

Gill, H.S., Walia, U.S. and L.S. Brar. (1979). Chemical weed control in wheat (*Triticumaestivum* L.) with particular reference to *Phalaris minor* Retz. and wild oat (*Avenaludoviciana* Dew.) *Pesticides*. **13**(12): 15-20.

Gupta, A., Joshi, S.P. and Manahas, R. K. (2008). Multivariate analysis of diversity and composition of weeds communities of wheat fields in doonvalley *India. Trop. Ecol.* **49**:103-112.

Kaul, M.K. (1986). Weed flora of Kashmir Valley. Scientific Publishers, Jodhpur, Inda.

Kershaw, K.A. (1973). Quntitative and Dynamic Plant Ecology.2nd edition, ELBS and Edward Arnol Publ. Ltd., London.p.308.

Khan, M., Kumar, S., and Hamal, I.A. (2009). Diversity of weeds associated with rabi and kharif crops of sewa river catchment area in the north west Himalaya. *The Bioscan*. **4(3):** 437-440.

Khobragade, D.P. and Sathawane, K.N. (2014).Weed diversity in rabi wheat crop of Bhandara District (MS), India. *Int. J. of Life Sciences*.Special issue. **A2:** 128-131.

Kirec, M., and Yarci. C. (1999). The flora ofthe agricultural areas in Enez (Enirne) and environs.*Turk. J. of Bot*. **23** (1):53- 62.

Qureshi, F.A. (1982). Weed problems of Pakistan.In identification and control of weed manual, PARC, Islamabad.p 5-6.

Rabia, A.M., Raza bhatti, G.and Khalid, S. (2003). Weed diversity of wheat crop in Khairpurdistrict,Sindh. *Pak. J. Weed Sci. Res.* **9** (1-2):99-103.

Salonen, J., Hyvonen,T. and Jalli, H. (2001)**.** Weed flora in organically grown spring cereals in Finland. *Agric. Food. Sci.Finland*. **10** (3): 231-242.

Sharma, B.M. andKachroo, P. (1981). Flora of Jammu and Plants of Neighbourhood. Bishen Singh Mahendra pal Singh, Dehradun.

Singh, B.N. and Chalam, G.V. (1936). Unit of quantative analysis of weed flora on arableland.*J. Amer. Soc. Agron*., **28**: 556-561.

Singh, K.N., Ara, S.,Wani, G.A., Hasan, B. and B.A., Khanday.(2007). A phyto-sociological association of weeds in winter crops of Kasmir valley. *Indian J. Weed Sci*. **39**:(1-2), 33-40.

Swami, A. and Gupta, B.K. (1998). Flora of Udhampur.Bishen Singh Mahendra Pal Singh, Dehradun.

Tiwari, R..B. and Parihar S.S. (1993).Weed management studies in wheat. *Ind. J .weed sci*. **25** (3-4):120-22.

Tursun, N. (2002). Determination of weedsin wheat fields in Kahramanmaras, Turkey. *Turkiye Herboloji Dergisi*. **5**(1): 1-11.