Pak. J. Weed Sci. Res. 10(3-4):133-138, 2004

DISTRIBUTION OF *Chenopodium album* IN SOME IRRIGATED AND RIVERIAN WHEAT FIELDS OF LAHORE DISTRICT

Manzoor Ahmad Malik[1]

ABSTRACT

This study is based on the survey conducted to assess the relative abundance and importance of Chenopodium album growing in non-saline/partially saline irrigated and non-irrigated riverian wheat fields from the viewpoint of interference with wheat growth. Quadrate method was used to determine the ecological attributes i.e. frequency, constancy and density of Chenopodium album during periodic field survey from January to April 2002 in various villages of Lahore district. Chenopodium album was found abundant in most of non-saline irrigated (74%) and non-irrigated riverian (61%) wheat fields while it was frequent in partially saline irrigated wheat fields (53%) during February 2002. In April 2002, it became frequent in non-saline irrigated (52%) and non-irrigated riverian (43%) wheat fields. It showed high degree of constancy (class V & IV) in most of the wheat fields. High density of Chenopodium album was found in wheat fields of riverian lands (96%) as compared to the non-saline (18%) and partially saline (15%) wheat fields. It was concluded that this species has wide ecological amplitude as it was occurring in a variety of agro-ecological conditions. It was dense in riverian wheat fields whereas it showed sparse distribution in partially saline irrigated areas. Its density decreased with the passage of time because of intra- as well as inter-specific competition.

Key words: *Chenopodium album Common lambsquarters* distribution lahore.

INTRODUCTION

Chenopodium album L. *(Common lambsquarters*) is an annual, herbaceous, broadleaf weed, which grows to a height of 40 to 100 cm in cultivated fields and waste places and used as leafy vegetable. It can adapt to different environmental conditions over a wide range of pH and soil types. The climate of the survey area is classified as sub-humid subtropical continental and. the soils are transported and alluvium. Weeds are plants that interfere with the growth of desirable plants and that are unusually competitive, persistent and pernicious (Ross and Lembi, 1999) and are the major pests of crop husbandry, which need to be managed properly for realizing higher yield (Hassan and Marwat, 2001). The losses occur due to competition for nutrients, water, solar radiation, space and other growing factors adversely affecting the quantity and quality of the product.

Wheat (*Triticum aestivum* L.) is the leading winter cereal crop of Pakistan occupying the largest area under any single crop. It is staple food of masses and enjoys the pivotal position in the Pakistan agricultural system. Punjab is the main agricultural province of Pakistan with a total agricultural area of 17.31×10^6 hectares, which is about 69% of total cropped area of Pakistan. It contributes a major share of the agricultural economy of the country, providing around 72% of wheat to the national food basket every year, beside other cereals (Wahid, 1998).

1 Department of Botany, Government Dyal Singh College, Lahore.

Since *C. album* is widespread weed of wheat (Saeed *et al.*, 1987, Shamsi and Ahmad, 1984, 1988, Naeem and Shad, 1987, 1994 and Hussain *et al.*, 1991; 1993) and wheat is the major crop of the area, this study was taken to make a quantitative assessment of this weed in wheat crop. No work has been carried out on the distribution of *C. album* in irrigated (non-saline/partially saline) and non-irrigated riverian wheat fields in Lahore district. The present study might help to provide a base for the future extensive work on the ecology for managing *C. album*. It is therefore, considered worthwhile to carry out the present investigation.

Mungbean *(Vigna radiata* L. Wilczek.*)* is emerging to be an important crop, as it is one of the best substitutes to meet the food needs of the large population of the developing countries. In spite of short duration, nutritional superiority and nitrogen fixing character, it is a rainy season crop facing the weeds as main competitor. Weeds are most serious pests reducing the growth and yield of crop. Modern agricultural practices contribute mostly on protection of the crop against competition from weeds. Weeds reduce yield by competing with crop plants for space, light, nutrients and carbon dioxide. There are different views about the intensity of weed losses but it is established fact that weeds cause great losses to crops, depending upon the degree of weed infestation, duration of weed competition, and soil and climatic conditions.

There is no specific way to control weeds of all types because of different kinds of social, economical and environmental factors influence the choice of control method to be used. Quarshi *et al* (2002) reported that weed could be controlled by manual, cultural and chemical methods. Although weed management practices like hand weeding and herbicide application are effective in weed control but are uneconomical due to higher costs (Cheema et al 2003). Moreover the chemical weed control method is hazardous for health and causes environmental pollution.

Use of *sorgaab* (sorghum water extract) for weed suppression and increase in crop yield has been reported in field studies by Cheema and Khaliq (2000). Ali *et al* (2004) reported that allelopathic plants containing allelochemicals in low quantity act as hormones and in high amount act as herbicides. Therefore, Allelopathy has emerged as an important area of weed control research and has been accepted very recently as important ecological phenomena.

The evidence of Allelopathic compounds in sorghum (*Sorghum bicolor*) and their subsequent effects on other plants inspired the idea of conducting field study to explore the feasibility of using Eucalyptus (*Eucalyptus camaldulensis*) and Acacia (*Acacia nilotica*) water extracts also as natural herbicides to control weeds in mungbean crop and to study their effects on growth and yield of mungbean in comparison with hand weeding and herbicides.

Materials and Methods

The study area covers various villages in Lahore district of Punjab province, Pakistan except the Indian border in the east. Studies were carried out on irrigated (non-saline, partially saline) and non-irrigated riverian wheat fields to find out differences, if any, in the distribution of *C. album*. Field survey was conducted to assess the relative abundance and importance of the weed from viewpoint of interference with wheat growth. Ecological characteristics i.e. frequency, constancy and density of *C. album* was investigated during periodic field surveys.

Frequency and Constancy

Sixty wheat fields (50x50m^2 each) were selected in non-saline/partially saline irrigated and non-irrigated riverian areas. The frequency and constancy was studied twice during February and April 2002. Frequency of weed was determined by quadrat method (Oosting, 1956). Quadrat (1 m^2) was thrown 25 times at random in each of the wheat field and presence of weed in each quadrat was recorded. Relative percent frequency (frequency index) of *C. album* in a field was calculated from the data to assign species to different frequency classes. This frequency index of *C. album* in different fields was used to prepare Synthesis or Association Tables (Hanson and Churchil, 1961) to determine average frequency and constancy of this weed and was classified into various classes of frequency following Raunkiaer (1934). Braun-Blanquet (1932) recognized five constancy classes as reported by Hanson and Churchill (1961) and Whittaker (1978).

Density

Studies on the density of *C. album* in above wheat fields was carried out. Fifteen wheat fields of the study area were selected for this purpose. In January 2002, four permanent quadrats (1 m^2 each) were laid out at random in each of the selected fields. The selected areas were protected from possible animal or human disturbance. The number of weed and wheat plants in each quadrat were counted in January, February, March and April, 2002, respectively to record data on changes in weed and wheat density per unit area over time.

Results And Discussion

Studies on the frequency, constancy and density of *C. album* are crucial and highly desirable to understand their mode of occurrence and persistence in nature, limits of their distribution and timing of infestation of the crops. Survey on density per unit area of these weeds will provide guide-lines in setting up of laboratory and field experiments.

Frequency and Constancy

Data on frequency and constancy of *C. album* in non-saline/ partially saline irrigated and non-irrigated riverian wheat fields of Lahore districts during February and April 2002 is given in Table-1. *C. album* was the most common species at the time of observation I and II. It was abundant (74%, 61%) in most of the non-saline and riverian wheat fields while it was frequent (53%) in partially saline wheat fields at the time of observation I in February 2002. In observation II it became frequent (52%, 43%) in non-saline irrigated and riverian wheat fields while it was occurring as an occasional (27%) weed in partially saline wheat fields during April 2002. It showed high degree of constancy (with constancy class IV & V) in most of the fields during both the observations and was widespread in all the fields.

A comparative study of these wheat fields indicate that *C. album* is the major and predominant weed species with a very high degree of constancy. These results are supported by the work of Shinwari *et al.* (1990); Hussain *et al.* (1991) and Boz *et al.* (2000) who recorded 50-80% frequency of *C. album* in their studies. Girma *et al.* (2000) noticed that it was frequently occurring broadleaf weed in wheat fields of Ethiopia and was abundant in Poland (Holdynski *et al.* 1986) and Turkey (Kaya and Zengin 2000). The findings of Berezkin and Skorolupova (1987) and Andreasen *et al.* (1996) also validate our observations.

Table-1. Percentage frequency and constancy of *Chenopodium album* in wheat fields

Statistic	Non saline irrigated fields		Non-irrigated riverian fields		Partially saline irrigated fields	
	I	II	I	II	I	II
Mean % Frequency	74.0	52.0	60.8	43.0	53.0	27.3
Mean Frequency class	D	C	D	C	C	B
Category	A	F	A	F	F	O
Constancy %	100	95	85	80	90	75
Constancy class	V	V	V	IV	V	IV

I = First Observation (February, 2002); II = Second Observation (April, 2002);

A = Abundant; F = Frequent O = Occasional (Each figure is a mean of twenty replicates)

Density

Density of *C. album* during January, February, March and April 2002 in non-saline/ partially saline irrigated and non-irrigated riverian wheat fields is given in Table-2. *C. album* showed very high population density in the earliest stages of growth during January 2002 and declined over time. Its density is highest in riverian fields (96%). It showed a decline (21%) at the time of last observation. In non-saline irrigated wheat fields it showed drastic reduction in its density i.e. from 18% to only 4%. Partially saline wheat fields showed less density in all the observation as compared to the non-saline and riverian wheat fields. Total number of weed and wheat plants m^{-2} in different fields were highly variable and that there was a reduction in weed density with the passage of time. Consequently weed: wheat ratio in all the fields in April was lower as compared to their corresponding values in January.

It is inferred from the above results that *C. album* showed a reduction in its relative density from January to April. There was a marked reduction in the total weed density per unit area in all fields in April as compared to their corresponding densities in January. There was also a slight reduction in wheat density per unit area in some of the fields. Present findings are supported by the work of Shamsi and Bashir. (1988) who concluded that weed: wheat ratio values in different wheat fields in April markedly lower than their corresponding February values. On the basis of relative density *C. album* was the predominant weed in wheat fields (Jain *et al.* 1996). These findings are in agreement with the work of Raatikainen, 1983; Thomas, 1991; Frick and Thomas, 1992 and Hassainein *et al,*. 1998. Thomas and Wise (1988) reported equal abundance of *C. album* in wheat fields of Canada. Similar findings were also communicated by Hussain *et al.* 1991, who observed that it was the most densely populated weed of wheat in the studies area.

Table-2. Density of *C. album* in wheat fields from January to April, 2002

Species	Non saline irrigated Fields				Non-irrigated riverian Fields				Partially saline irrigated fields			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
C. album	18 (4.90)	12 (5.45)	9 (7.32)	4 (5.33)	96 (18.82)	61 (19.55)	44 (18.41)	21 (13.04)	15 (4.78)	12 (4.38)	9 (3.67)	5 (2.36)
Total weeds	368	220	123	75	510	312	239	161	314	274	245	212
Wheat	147	134	123	114	136	119	113	111	151	132	120	113
C. album : wheat ratio	0.12:1	0.09:1	0.07:1	0.04:1	0.71:1	0.51:1	0.39:1	0.19:1	0.10:1	0.09:1	0.08:1	0.04:1

I = First observation (January, 2002) II = Second observation (February, 2002)
III = Third observation (March, 2002) IV = Fourth observation (April, 2002).

Figures in parentheses give relative density i.e., *C. album* expressed as % of total weeds (Each figure is a mean of twenty replicates).

REFERENCES CITED

Andreasen, C., H. Stryhn and J.C. Streibig. 1996. Decline of the flora in Danish arable fields. J. Applied Eco. 33 (3):619-626.

Berezkin, Yu. N. and T.P. Skorolupova. 1987. Dicotyledonous annual weeds. Zashchita-Rastenii, Moscow 4:26-27.

Boz, O., M.N. Dogan and S. Dura. 2000. A survey study on distribution and density of weed species occurring in wheat fields of Denizli province. Turkiye Herboloji Dergis, 3(1):37-52.

Frick, B. and A.G. Thomas. 1992. Weed surveys in different tillage systems in southwestern Ontario field crops. Canadian J. Plant Sci. 72 (4):1337-1347.

Girma, K., S. Maru., A. Gorfu., W. Tilahum and M. Kassaye 2000. Survey of weed community structure in bread wheat in three districts of Arsi Zone in south-eastern Ethiopia. The Eleventh Regional Wheat Workshop for Eastern Central and Southern Africa, Addis Ababa, Ethiopia, 22 September 2000, 291-301.

Hanson, H. C. and E. D. Churchil. 1961. The Plant Community. Reinhold Publishing Corporation, New York.

Hassan, G. and K. B. Marwat. 2001. Integrated weed management in agricultural crops. National workshop on technologies for sustainable agriculture, Sept. 24-26. NIAB, Faisalabad.

Hassanein, E. E., A. I. Marsafy, E. I. Wekil, H. R.; Yehia, E. I. S.E. Khanagry, A.A. Mohamed and J. Maillet. 1998. Weed survey in wheat crop in Upper Egypt. Comptes-rendus 6eme symposium Mediterranean EWRS, Montpellier, France, 13-15 Mai, 247-248.

Holdynski, C., T. Korniak and B. Polakowski. 1986. Weed infestation of field crops in Olsztyn District in relation to soil-agricultural complexes. Acta Academiae Agricultural Technicae Olstenensis, Agricultura 43:31-42.

Hussain, M., A..R.Bajwa, S.A. Saeed and A.R. Rao. 1991. Spectrum, frequency and density of weeds in wheat (*Triticum aestivum* L.) Pak. J. Weed Sci. Res. 4 (1): 43-47.

Hussain, F., M. Ayaz., S. Havat and A.R. Saljoqi. 1993. Life form leaf spectra seed output and biomass of weeds in the wheat fields of Mavar-Jandool, district Dir, Pakistan. Sarhad J. Agric. 9(6):539-542.

Jain, K.K., N.R. Paradkar and K.K. Agrawal. 1996. Major weed flora of soybean and wheat fields at Powarkheda (M.P.). World Weeds 3 (3-4):183-186.

Kaya, Y. and H. Zengin 2000. Determination of weeds and their life forms and phytogeographic regions in wheat fields of Pasinler Plain. Turkiye-Herboloji-Dergisi 3(1):17-26.

Naeem, S. and R.A. Shad. 1987. Distribution of *Convolvulus arvensis L.* and *Fumaria indica* L. in different rainfall regions of rainfed wheat. Advances in Weed Science: A case study of Indo-Pakistan subcontinent,319-323.

Naeem, S., R.A. Shad, T. Ahmad and M.A. Sher. 1994. Effect of soil Texture on the weed flora composition of rainfed wheat fields in Islamabad/Rawalpindi. Pak. J Weed Sci. Res. 7(1-2): 25-32.

Oosting, H.J. 1956. The study of plant communities. *In* An Introduction to Plant Ecology, second edition. W.H. Freeman and Company, San Francisco and London.

Raatikainen, M. and T. Raatikainen. 1983. Survey on cultivation of winter wheat and its effect on weeds in Finland. J Sci. Agric. Soc. Finland 55(5):385-423.

Raunkiaer, C. 1934. The life forms of plants and statistical plant geography. The co-edited paper of C. Raunkiaer, Clarendon Press, Oxford.

Ross, M.A. and C.A. Lembi. 1999. Applied Weed Science ,Prentice Hall, Upper Saddle River, New Jersey, USA.

Saeed, S.A., A.R. Rao., M. Hussain., A.M. Bajwa and M. Yaqoob. 1987. Weed infestation, competition, and control in wheat *Triticum aestivum* L. Advances In Weed Science: A case study of Indo-Pakistan Subcontinent: 99-110.

Shamsi , S.R.A. and B. Ahmad. 1984. Ecophysiological studies on some important Weeds of wheat. Final Technical Report. Pak. Sci. Found. Res. Proj.PU/AGR (84). Deptt. of Botany. University of the Punjab, Lahore, Pakistan.

Shamsi, S.R.A.and B. Ahmad.1988. Studies on phenology, Germination Ecology and control of some important weeds of wheat. Final Technical Report Pak. Sci. Found. Res. Pro. P-PU/AGR(86). Deptt. of Botany, University of the Punjab, Lahore, Pakistan.

Shinwari, Z. K., S. Gorsi and M.R. Awan. 1990. Taxonomic study on the weeds of wheat fields in Attock District. Pak. J. Weed Sci. Res. 3 (1): 31-41.

Thomas, A.G. and R.F. Wise. 1988. Weed survey of Saskatchewan winter wheat fields 1987. Publication, Weed Survey Series, Agric. Canada. 88:2.

Thomas A.G. 1991. Floristic composition and relative abundance of weeds in annual crops of Manitoba. Canadian J. Plant Sci.71(3):831-839.

Wahid, A. 1998. Studies on the impact of ambient air pollution on the growth and yield of wheat and rice. Ph.D. Thesis. Department of Botany, University of the Punjab, Lahore, Pakistan & Centre for Environmental Technology, Imperial College of Science, Technology & Medicine, London.

Whittaker, R.H. 1978. Classification of Plant Communities. Dr. N Junck Publishers, The Hague.