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IMPORTANT CHICKPEA WEEDS OF NEW DEVELOPMENTAL FARM, KHYBER PAKHTUNKHWA AGRICULTURAL UNIVERSITY PESHAWAR, PAKISTAN

Adres Khan[1], Ijaz Ahmad Khan[1], Rahamdad Khan[1], Imtiaz Khan[1], Zahid Hussain[1], Rozeena Humayun[2], Sadiq Ali[1] and M.A. Raza[2]

ABSTRACT

A field experiment was conducted to find out the important and most problematic weeds of chickpea crop using quadrate method at the New Developmental Farm, Khyber Pakhtunkhwa Agricultural University Peshawar, Pakistan, during winter season 2010-11. The computation of importance value is a good judgment for deciding the status of a given weed in a community. Based on spatial data it is concluded that Poa annua L., Anagallis arvensis L., Ammi visnaga (L.) Lam., Euphorbia helioscopia L., Coronopus didymus L., Fumaria indica L., Avena fatua L., Rumex crispus L., Melilotus parviflora L., Cirsium arvense (L.) Scop., Ranunculus sp., Lathyrus aphaca L., Sonchus sp. and Plantago lanceolata L., were the weeds of the New Developmental Farm. The relative weed densities (%) and relative frequencies (%) of all these weeds were calculated to quantify their importance values in descending order of their percentages as following: Poa annua L. (54.75%), Anagallis arvensis L. (49.23%), Euphorbia helioscopia L. (22.92%), Ammi visnaga (L.) Lam. (22.88%), Fumaria indica L. (12.86%), Coronopus didymus L. (11.4%), Avena fatua L. (10.11%), Rumex crispus L. (5.95%), Melilotus parviflora L. (5.50%), Cirsium arvense (L.) Scop. (2.43%), Plantago lanceolata L. (0.88%), Lathyrus aphaca L. (0.73%), Ranunculus sp. (0.73%), and Sonchus sp. (0.67%). The higher the importance value of a weed, the greater is its competitiveness.

Key words: Chickpea, density, frequency, importance value, infestation, Peshawar, weeds.

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is generally thought to be a healthy vegetarian food for human beings and the most important feed for domestic animals in South Asia. It is considered to be a cheap source of high quality protein in the human diets in developing countries, especially for those who cannot afford animal protein for balanced nutrition (Huisman and Van der Poel, 1994). It is the third most important pulse legume crop in the world after dry beans and peas (FAO, 2003). Chickpea in Pakistan has been categorised into two

[1]Department of Weed Science, [2]Department of Plant Breeding and Genetics, Khyber Pakhtunkhwa Agricultural University, Peshawar Pakistan.
*Corresponding author: weedscientist@gmail.com

main types on basis of their seed colour and seed size. One is Desi type and the other is Kabuli, Desi has small seed of darker colour and the Kabuli has creamed colour larger seed (Mansfeld's World Database, 2008).

In Pakistan, the area under chickpea cultivation was 1080.6 thousand ha with production of 740.5 thousand tons during 2008-09 and the average yield was 685 kg ha^{-1}. In Khyber Pakhtunkhwa, the area under chickpea cultivation was 42 thousand ha with a production of 20 thousand tons (MINFAL, 2009). The average yield of chickpea in Pakistan is lower as compared to other chickpea producing countries of the world due to many factors: that is low organic matter in soil, deficiency of macro and micro nutrients, soil erosion and weeds are a serious threat to chickpea production among all the other factors due to its competition with chickpea for available resources. The yield losses due to weeds competition vary and considerably depend on the level of weeds infestation and weed species prevailing (Bhan and Kukula, 1987). The common weeds that generally infest the chickpea crop are *Chenopodium album, Asphodelus tenuifolius, Argemone mexicana, Carthamus oxyacantha, Cenchrus ciliaris, Cyperus rotundus, Fumaria* sp.*, Polygonum* sp.*, Lathyrus* sp., *Vicia sativa, Cynodon dactylon* and *Cirsium arvense* (Mullen *et al*., 2000; Saxena and Yadav, 1976).

Keeping in view the losses caused by weeds in chickpea, the objective of the study were to investigate the problematic weeds and the intensity of their infestation in chickpea crop in the agro climatic condition of district Peshawar, to adopt the appropriate management strategies for controlling concern weeds problem in chickpea and to find out the suitable time in which the maximum weeds germination occurs which cause severe infestation.

MATERIALS AND METHODS

The weeds were randomly sampled from the experimental field of chickpea crop at the New Developmental Farm Khyber Pakhtunkhwa Agricultural University Peshawar using 33 x 33 cm^2 quadrate randomly at 84 different sites. The total area of the experimental plot 230 square meter. Relative weed density (RWD), relative frequency (RF) and importance value (IV) for each and every weed were calculated by using the following formulae:

$$RWD = \frac{\text{Number of weeds of a particular species in the quadrate x 100}}{\text{Total number of weeds in that quadrate}}$$

$$RF = \frac{\text{Number of quadrates in which the particlar species occured x 100}}{\text{Total number of quadrates thrown}}$$

$$IV = \frac{\text{Relative weed density (\%) + Relative frequency (\%)}}{2}$$

Based on the IVs, weeds were ranked in order of their importance.

RESULTS AND DISCUSSION

Relative weed density (%)

The data on relative weed density of weed species is shown in Table-1. The analysis of the data revealed that the field was mostly dominated by *Poa annua* L., *Anagallis arvensis* L., *Ammi visnaga* (L.) Lam. and *Euphorbia helioscopia* L. The infestation by other weeds like *Fumaria indica* L., *Coronopus didymus* L., *Avena fatua* L., *Rumex crispus* L., *Melilotus parviflora* L., *Cirsium arvense* (L.) Scop., *Rananculus* sp., *Sonchus* sp., *Plantago lanceolata* L. and *Lathyrus aphaca* L. were also occurred. It was observed during the stdudy that the chickpea field was mostly dominated by broad leaf weeds (85%), while only 15% of the weeds were grasses.

The highest relative weeds density (39.87%) was observed for *Poa annua* L. followed by *Anagallis arvensis* L. (33.81%), while the lowest RWD observed for *Plantago lanceolata* L. (0.05%). The reason for the high value of *Poa annua* might be due to the moist loving nature of that weed and that's why it gave the maximum value because of frequent rainfall during the study months which provided an ideal condition for the infestation of *Poa annua* L.

Table-1. Relative weed density (%) of the weed species of chickpea at New Developmental Farm, Agricultural University Peshawar.

Weed Species	Family	Relative weed density (%)
Poa annua L.	Poaceae	39.87
Anagallis arvensis L.	Primulaceae	33.81
Euphorbia helioscopia L.	Euphorbiaceae	7.24
Ammi visnaga (L.) Lam.	Apiaceae	7.99
Fumaria indica L.	Fumariaceae	2.82
Coronopus didymus L.	Brassicaceae	3.03
Avena fatua L.	Poaceae	1.75
Rumex crispus L.	Polygonaceae	1.18
Melilotus parviflora L.	Palaeophonidae	1.33
Cirsium arvense (L.) Scop.	Asteraceae	0.56
Lathyrus aphaca L.	Fabaceae	0.11
Rananculus sp.	Ranunculaceae	0.11
Sonchus sp.	Asteraceae	0.05
Plantago lenceolata L.	Plantaginaceae	0.05

Relative Frequency (%)

The relative frequency of weeds is a good gauge showing the occurrence of weed species in the study area. Among all weed species noted in the study area, the highest relative frequency (15.62%) was observed for *Euphorbia helioscopia* L. followed by *Anagallis arvensis* L. (15%) while the lowest relative frequency (0.62%) was observed for *Sonchus arvense* L. Whish *et al.* (2002) narrated that losses in chickpea yield and yield components increased with increasing density of weeds and weed density increased with increased row spacing.

Table-2. Relative frequency (%) of the weed species of chickpea at New Developmental Farm, Agricultural University Peshawar.

Weed Species	Family	Relative frequency %
Poa annua L.	Poaceae	14.37
Anagallis arvensis L.	Primulaceae	15
Euphorbia helioscopia L.	Euphorbiaceae	15.62
Ammi visnaga (L.) Lam.	Apiaceae	14.79
Fumaria indica L.	Fumariaceae	10.00
Coronopus didymus L.	Brassicaceae	8.33
Avena fatua L.	Poaceae	8.33
Rumex crispus L.	Polygonaceae	4.79
Melilotus parviflora L.	Palaeophonidae	4.16
Cirsium arvense (L.) Scop.	Asteraceae	1.87
Lathyrus aphaca L.	Plantaginaceae	0.83
Rananculus sp.	Fabaceae	0.62
Sonchus sp.	Ranunculaceae	0.62
Plantago lenceolata L.	Asteraceae	0.62

Importance value of weeds

The importance value analysis is considered to be a good indicator for the weed flora impeding the associated crop growth. The results showed that the highest importance value (54.75%) was calculated for *Poa annua* followed by *Anagallis arvensis* (49.23%) and minimum importance value of the weeds was for *Plantago lenceolata* (0.67%) followed by *Rananculus* sp. and *Lathyrus aphaca* both scored 0.73% each (Table-3). The remaining weed species carried a relatively lower Importance value except *Ammi visnaga* and *Euphorbia helioscopia* possessing moderately higher value of 22.92 and 22.88%, respectively (Table-3). These results are in great analogy with the work of Sultan and Nasir (2003) who observed different communities of weeds in gram fields of district Chakwal at 8 different locations. The

phyto-sociology in the gram fields they reported partially agrees with the current findings.

Table-3. Importance values wise ranking of the weeds of chickpea at New Developmental Farm, Agricultural University Peshawar.

Weed Species	Family	Importance value %	Ranking
Poa annua L.	Poaceae	54.75	1
Anagallis arvensis L.	Primulaceae	49.23	2
Euphorbia helioscopia L.	Euphorbiaceae	22.92	3
Ammi visnaga (L.) Lam.	Apiaceae	22.88	4
Fumaria indica L.	Fumariaceae	12.86	5
Coronopus didymus L.	Brassicaceae	11.40	6
Avena fatua L.	Poaceae	10.11	7
Rumex crispus L.	Polygonaceae	5.95	8
Melilotus parviflora L.	Palaeophonidae	5.50	9
Cirsium arvense (L.) Scop.	Asteraceae	2.43	10
Lathyrus aphaca L.	Plantaginaceae	0.88	11
Rananculus sp.	Fabaceae	0.73	12
Sonchus sp.	Ranunculaceae	0.73	13
Plantago lenceolata L.	Asteraceae	0.67	14

The highest weeds germination occurred in mid February due to rainfalls and adequate moisture contents in the air. The weeds i.e. *Poa annua* L., *Anagallis arvensis* L., *Ammi visnaga* (L.) Lam. and *Euphorbia helioscopia* L. were present in the fields with high densities that in future may cause a serious problem to production of chickpea at New Developmental Farm, Agricultural University Peshawar.

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