

Investigation flora and Distribution of weed species of field peas (*Cicer arietinum* L.) in Khorramabad

A. R. Ahmadi^{1*}, S. K. Muosavi², M. Ghiasvand² and A. Hasanvand³

1. Faculty of agricultural college, Lorestan of University,
2. Agricultural and Natural Resource Research Center of Lorestan
3. Faculty of agricultural college, Payam Noor University of Lorestan

Corresponding author: A. R. Ahmadi

ABSTRACT: Lack of reliable information about distribution of weeds in agricultural fields in Khorramabad of Iran is one of the most important causes of low crop yield. Studies on floristic composition of weeds in an agricultural zone could lead to a better weed control management. The goal of this article was study the floristic composition of Chickpea weeds in Khorramabad, during 2007. Sampling was done on 9 point of each field according to W method. Per plate of all weed species were counted separately. Accordingly, species abundance, species density uniformity at the level of farm and each region was determined. Among the 70 species observed in the level of Chickpea fields, most Frequency are species *Gallium aparine* and *vicia vilosa* whit 93.8 percent. Weeds of *Vaccaria garndiflora*, and *Cerastium dichotomum* with frequency of 75 and 59.4% respectively were the two others prevalent species. Mean weed density of *Gallium aparine* 10.3 plants/m² was significant completely difference than the other weeds. Mean density of *Vaccaria grandiflora* and *Vicia villosa* were 4 and 3.4 plant/ m² , respectively.

Keywords: Flora, Weed, Disturbance, Sampling, Khorramabad

INTRODUCTION

Grains due to specific agricultural characteristics have special position in agriculture systems of developing countries (Saxena, 1993). This cultivation plant due to nitrogen stability and increasing soil fertility is of great importance in agricultural alternative and it is an important factor in the stability of grain production (Saxena, 1993). The average production of this grain in the world is 785 kg/hectare and in Iran 400 kg per hectare. Weeds are one of the most important factors of the reduction of the Yield of this plant (Saxena, 1993). Lorestan province with 132827 hectare cultivation area and average yield 552 kg/hectare had major share in production of chickpea. The cultivation improvement studies showed that region production potential was more than this value. By making the farmers aware of the cultivation frequency and avoiding single-cultivation of wheat in rain fed regions besides increasing chickpea cultivation stabilized the product stability of wheat strategic production and by acting in accordance with good cultivation attained production potential. Weeds are the main barriers of cultivation products competing on humidity, food, light and space with cultivation plants (Williams & West, 2000). The competition of weeds and their density in the fields are important factors of reduction of products and it shows the necessity of monitoring weeds (Storkey, 2006). Undoubtedly, by identification of the for a of weeds and determining the abundance condition and distribution of weed species, the important information is achieve to design management plans of weeds (Fround–williams, 1988; Derksen *et al.*, 2002). Due to the initial data about the condition of weeds of chickpea cultivation in Iran and namely Lorestan as the main source of chickpea production, the present study is aimed for exact identification of flora of weeds. Indeed, by identification of flora of weeds and determining abundance and distribution of weeds species, important data to design management plans of weeds are achieved. Exact identification of flora of weeds of chickpea fields, abundance, density and uniformity of the distribution of

weeds based on different species in chickpea fields, providing the list of problematic weeds of chickpea fields and the comparison of variety and diversity of weeds in various levels of Khoramabad are the aims of the present study.

MATERIALS AND METHODS

In the present study, the chickpea regions of Khoramabad town based on area cultivation of regions in each of them some fields were selected by stratified random sampling and by assigning the number of samples in accordance with each class. At first, by GPS, the geographical coordinate (longitude and latitude and sea level height) of the field was evaluated exactly. For each field, the form of farmer specification and other data of cultivation frequency were completed. The sampling in the field was as model W (Fig 1). After the selection of a corner of the field, 20 meters along one of the angles were moved. Then by forming a 90 degree angle, 20 meters were moved to inside the field, the sample starting point was from this place. Based on W-form model, 9 points were selected on it as the distance of two points was 20 meters and in each point a 0.25 Quadrates (0.5×0.5) was used. After throwing any 0.25 m² Quadrates, different kinds of weeds of each Quadrates were identified based on Genus and species (Muosavi et al. 2010).

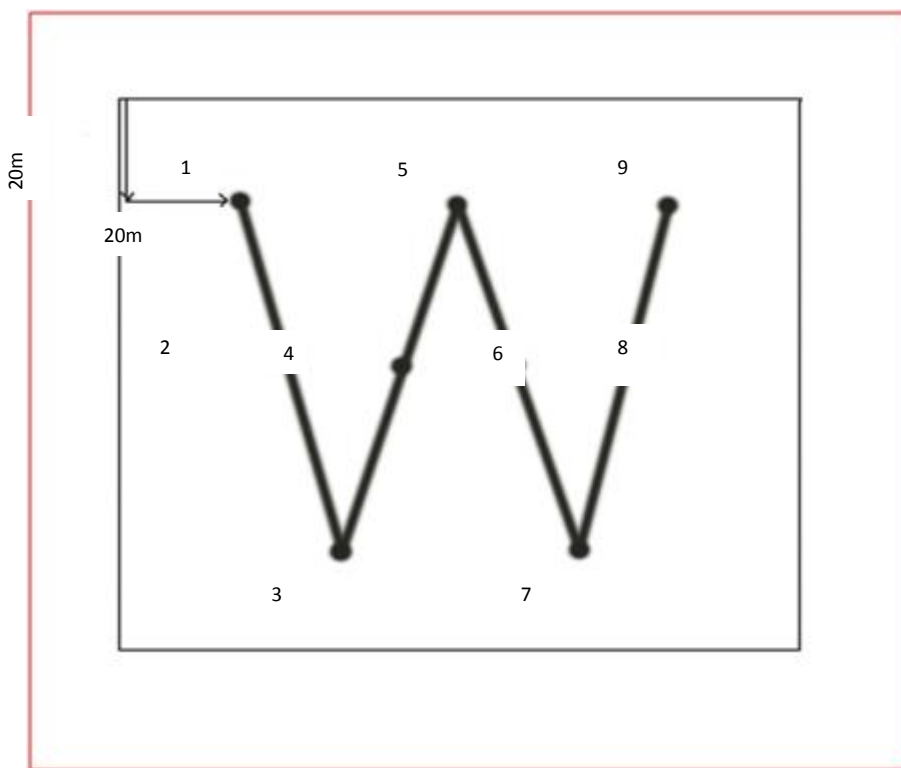


Figure 1. Sampling model

Data analysis methods

For data analysis of weed flora, three indices abundance, distribution uniformity and density mean were applied (Hassan *et al.* 2006; Thomas, 1985). Abundance showed the ratio of the fields in which the species were observed. The uniformity showed the Weed infestation area of the specified species. The density showed the number of plants in area. The grouping of weed species based on abundance, bush density mean in m² and distribution uniformity based on cluster analysis was done by Ward method in JMP software, version 7. The measurements and equations applied to determine the importance of weeds species in chickpea fields:

1-Species abundance

$$F_k = \frac{\sum Y_i}{n} \times 100$$

F. Species K abundance

Y_i : Presence (1) or lack of presence (0) of species K in field i

n :The number of visited fields

2-Distribution uniformity

$$U_k = \frac{\sum X_{ij}}{m \times n} \times 100$$

U_k : Field Uniformity of species K

X_{ij} : Presence (1) or lack of presence (0) of species K in box I in field J

n :The number of visited fields

m :The number of thrown boxes

3-Species density

$$D_{ki} = \frac{\sum Z_j}{m} \times 4$$

D_{ki} : Density (number of plants per m²) for species K in field i

Z_j =The number of plants per box (0.25 m²)

m =The number of thrown boxes

$$MD_{ki} = \frac{\sum D_{ki}}{n}$$

MD_{ki} =The mean density of species K

RESULTS AND DISCUSSION

Frequency percent of weed species

The frequency of common weeds species in chickpea fields of Khoramabad is shown in Table 1. Among 70 species of weeds observed in chickpea fields, the highest frequency as 93.8% was dedicated to *Gallium tricornutum*,. Annual weed of *Vaccaria grandi flora* with frequency 75% among weed species had second frequency rank. The abundance percent of these two species was obviously more than the frequency of other species of weeds. *Cerastium dichotomum* with frequency 59.4% had the third rank of frequency. The species of *Carthamus oxyacantha* and *Centaurea spp* of Asteraceae family with abundance of 56% had fourth and fifth ranks. *Conringia orientalis* weed of Brassicaseae family, *Vicia villosa* of Fabaceae family and *Sinapis arvensis* of Brassicaseae family of three species had frequency of more than 50%. Salonen et al., (2005) by the study of the flora of chickpea fields in Finland showed that *Chenopodium album stellaria media* and *violet sp.* were prevalent compared to other species of weeds. Thus, among weed species in chickpea fields, 30 species had frequency above 10%. Among 30 species, only three species were thin loaf, 86.7 species had frequency higher than 10% of broad loaf. of total 30 species with frequency above 10%, only four species were biennial or perennial. In other words, 83.3% of the species with frequency above 10% were annual. 41 species had abundance less than 10% in three separate groups.

Uniformity of the distribution of weed species

The uniformity condition of the distribution of weed species in chickpea fields of Khoramabad in cultivation year 2006-2007 are shown in Table(1a,b). The highest percent of uniformity was 54.2% and it was dedicated to *Gallium tricornutum* and *Vaccaria grandiflora* with uniformity 35.7% had the second rank and in terms of distribution uniformity in chickpea fields. The uniformity of the distribution of two species was different from other species. The distribution uniformity of other species of weeds was less than 10%. Based on the results in this study, it can be said that the difference in cultivation management method was the most important factor of the species composite of weeds and their diversity (Andersson and Milberg, 1998 and Karkanis et al., 2007).

Table 1a. Abundance, distribution uniformity and the average density of weed species in Khorramabad

Weed Species	Quantity (%)	Uniformity (%)	Density (1/m ²)
<i>Galium tricornutum</i>	93.756	54.150	10.275
<i>Vaccaria grandiflora</i>	74.988	35.738	4.330
<i>Cerastium dichotomum</i>	59.356	20.131	2.073
<i>Carthamus oxyacantha</i>	56.263	15.950	1.379
<i>Centaurea</i> spp.	56.238	18.050	1.722
<i>Conringia orientalis</i>	53.125	12.869	1.398
<i>Vicia villosa</i>	50.025	16.675	1.099
<i>Sinapis arvensis</i>	50.006	15.631	0.981
<i>Euphorbia helioscopia</i>	40.631	8.663	0.733
<i>Ranunculus arvensis</i>	40.625	7.281	0.341
<i>Neslia apiculata</i>	39.056	8.006	0.460
<i>Lactuca serriolla</i>	37.538	8.331	0.403
<i>Silene conoidea</i>	34.394	7.288	0.619
<i>Papaver dubium</i>	34.388	7.988	0.432
<i>Lathyrus aphaca</i>	34.375	16.669	3.353
<i>Anthemis cotula</i>	28.425	22.231	1.464
<i>Melilotus indicus</i>	25.013	6.600	0.454
<i>Scandix pecten-veneris</i>	25.006	9.025	1.382
<i>Convolvulus arvensis</i>	25.006	4.888	0.263
<i>Turgenia latifolia</i>	24.981	5.213	0.294
<i>Pimpinella</i> sp.	21.906	6.963	0.561
<i>Torilis</i> sp.	21.906	3.844	0.150
<i>Hordeum spontaneum</i>	21.875	8.006	0.779
<i>Bromus</i> spp.	18.738	4.875	0.385
<i>Aristolochia maurosum</i>	15.606	1.744	0.075
<i>Tragopogon graminifolius</i>	15.594	3.138	0.293
<i>Geranium</i> spp.	13.569	2.669	0.129
<i>Avena ludoviciana</i>	12.513	5.206	0.249
<i>Cardaria draba</i>	12.500	3.150	0.181
<i>Volunteer wheat</i>	12.500	1.769	0.143
<i>Picnoman acarna</i>	9.394	2.456	0.116
<i>Polygonum</i> spp.	9.369	1.738	0.147
<i>Alyssum</i> sp.	9.369	1.413	0.068
<i>Volunteer barley</i>	9.369	1.388	0.109
<i>Sideritis montana</i>	9.369	1.038	0.038
<i>Fumaria vailantii</i>	9.363	1.400	0.092
<i>Anchusa italica</i>	9.363	1.400	0.053
<i>Cichorium intybus</i>	9.350	2.769	0.109
<i>Cephalaria syriaca</i>	6.256	0.700	0.070
<i>Bongardia chrysogonum</i>	6.256	0.700	0.026

Table 1b. Abundance, distribution uniformity and the average density of weed species in Khorramabad

Weed Species	Quantity (%)	Uniformity (%)	Density (1/m ²)
<i>Salvia syriaca</i>	6.219	2.775	0.276
<i>Lolium rigidum</i>	6.238	2.456	0.453
<i>Ornithogalum</i> sp.	6.219	1.063	0.043
<i>Lithospermum arvense</i>	6.219	0.688	0.043
<i>Lolium rigidum</i>	6.238	2.456	0.453
<i>Aegilops cylindrica</i>	6.219	0.688	0.038
<i>Cirsium arvense</i>	6.219	0.688	0.038
<i>Malva neglecta</i>	6.219	0.688	0.038
<i>Falcaria scioides</i>	6.219	0.688	0.024
<i>Glycyrrhiza glabra</i>	6.219	0.688	0.024
<i>Chrozophora tinctoria</i>	3.131	0.694	0.028
<i>Adonis aestivalis</i>	3.131	0.356	0.019
<i>Linaria</i> sp.	3.131	0.356	0.019
<i>Roemeria hybrida</i>	3.131	0.356	0.019
<i>Taeniatherum crinitum</i>	3.113	1.050	0.165
<i>Garhadiolus angulosus</i>	3.113	0.338	0.041
<i>Althaea</i> sp.	3.113	0.338	0.030
<i>Orobanch</i> spp.	3.113	0.338	0.030
<i>Acroptilon repens</i>	3.113	0.338	0.011
<i>Goldbachia laevigata</i>	3.113	0.338	0.011
<i>Malabaila</i> sp.	3.113	0.338	0.011
<i>Hordeum murinum</i>	3.106	1.050	0.039
<i>Heliotropium</i> sp.	3.106	0.700	0.026
<i>Setaria</i> spp.	3.106	0.700	0.026
<i>Agropyrum repense</i>	3.106	0.350	0.026
<i>Trifolium</i> spp.	3.106	0.350	0.026
<i>Alhagi camelorum</i>	3.106	0.350	0.013
<i>Chenopodium album</i>	3.106	0.350	0.013
<i>Koelpinia tenuissima</i>	3.106	0.350	0.013
<i>Prangos</i> sp.	3.106	0.350	0.013
<i>Xanthium strumarium</i>	3.106	0.350	0.013
<i>Heliotropium</i> sp.	3.106	0.700	0.026

The mean density of weed species

The mean density of common weed species in chickpea fields of Khoramabad in cultivation year 2006-2007 is shown in Table (1a ,b). Among the common weed in chickpea fields, the highest density (10.3 plants per m²) was dedicated to annual *Gallium tricornutum*. The second and third ranks were dedicated to *Vaccaria grandiflora* and *Lathyrus aphaca* species. The mean density of *Vaccaria grandiflora* and *Lathyrus aphaca* species was 4.3 and 3.4 plants per m², respectively. Besides the three species, 8 species *Cerastium dichotomum*, *Centaurea* spp., *Anthemis cotula*, *podophyllum*, *Scandix 541ybrid-veneris*, *Carthamus oxyacantha*, *Vicia villosa* and *Sinapis arvensis* with density mean 2.1, 1.7, 1.5, 1.4, 1.4, 1.4, 1.1 and 1 plants per m², respectively. Among total species of weed in chickpea fields of Khoramabad town, 11 species had density mean more than 1 plants per m². The mean density of other species of weed was less than one plants per m², thus the density mean of 84% of the species was less than 1 plants per m².

The classification based on cluster analysis for common weed species in chickpea fields of Khoramabad in cultivation year 2006-2007 is shown in Figure 4.

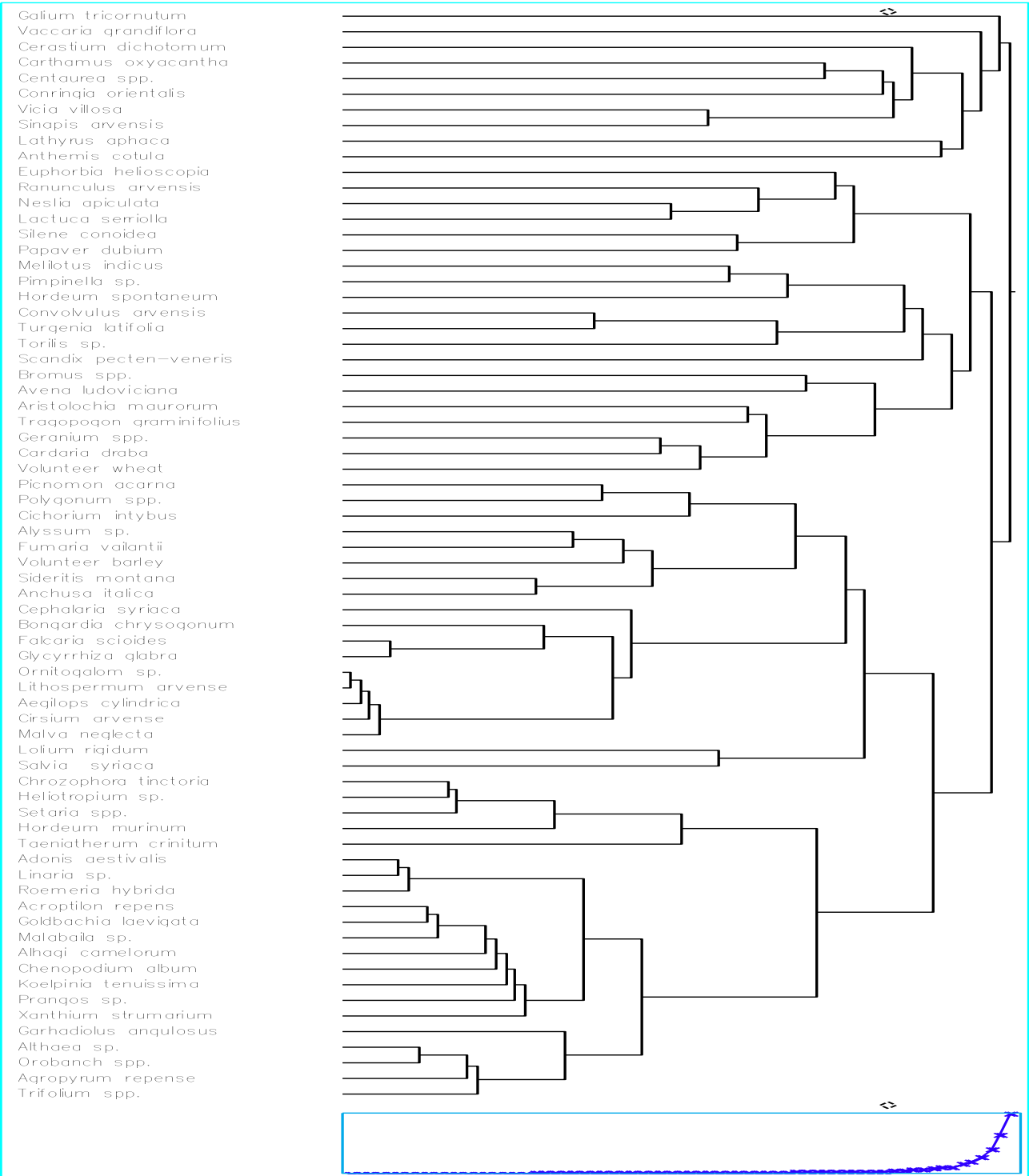


Figure 4. Cluster analysis for weed species pea fields using abundance, uniformity distribution and weed densities (plants per m²) data

CONCLUSION

Among 70 species of weed in chickpea fields, the highest abundance was dedicated to *Galium tricornutum* and *Vaccaria grandiflora*. Weeds of *Cerastium dichotomum*, *Carthamus oxyacantha* and *Centaurea spp* species

had next ranks. Plant families of caryophyllaceae, compositae, and brassicaceae any with two species, and rubiaceae, and fabaceae families with one species included the 8 species with abundance more than 50%. Thus, among weed species in chickpea fields, 30 species had abundance above 10%. Among 30 species, only three species were thin loaf, 86.7 species had abundance higher than 10% of broad loaf. Of total 30 species with abundance above 10%, only four species were biennial or perennial. In other words, 83.3% of the species with abundance above 10% were annual. Among common weed species in chickpea fields the highest density was dedicated to *Gallium tricornutum*, *Vaccaria grandiflora* and *Lathyrus aphaca*. The 8 species of *Cerastium dichotomum*, *Centaurea spp.*, *Anthemis cotula*, *podophyllum*, *Scandix sp*, *Carthamus oxyacantha*, *Vicia villosa* and *Sinapis arvensis* had density higher than 1 plants per m². Among the total weed species in chickpea fields in Khorramabad, 11 species had density mean more than 1 plant per m². The mean density of 84% of the species was less than 1 plant per m².

REFERENCES

- Andersson, T. N. and P. Milberg. 1998. Weed flora and the relative importance of site, crop, crop rotation and nitrogen. *Weed Science*. 46: 30-38.
- Derksen, D.A., Anderson, R.L., Blackshaw, R.E. and Maxwell, B. 2002. Weed dynamics and management strategies for cropping systems in the northern Great Plains. *Agronomy Journal* 94, 174-85.
- Fround-williams, R. J. 1988. Changes in weed flora with different tillage and agronomic managmentn in systems. Pages: 213-236.
- Hassan, G., I. Khan, and I. Ahmad Khan. 2006. Studies on Floristic Compositio of Chickpea Weeds in District Karak, Pakistan. *Iranian journal of Weed Science*, vol: 2, Num 1: 69-81.
- Karkanis, A., D. Bilalis and A. Efthimiadou. 2007. Tobacco (*Nicotiana tabacum*) infection by branched broomrape (*Orobanche ramosa*) as influenced by irrigation system and fertilization, Under East Mediterranean conditions. *Agron. J.* 6: 37-402.
- Mousavi, S. K., N. Souiri., E. Zeidali., N. Azadbakht and M. GHiasvand. 2010. Comparison of weed floristic Composition in fruit Gardens in Khorramabad. *Iranian Journal of Field Crops Research*, 8(2): 252-269.
- Salonen, J., T. Hyvonen and H. Jalli. 2005. Weed Flora and weed management of field peas in Finland. *Agric. Food Science*. 14:189-201.
- Saxena, M. C 1993. The challenge of developing biotic and abiotic stress resistance in cool seson food legumes. In: *Breeding for Stress Tolerance in Cool-Season Legumes*. Eds. K. B.
- Thomas, A.G. 1985. Weed survey system used in saskatchevan for cereal and oilseed crops. *Weed Science*, 33: 34-43.
- Williams, A. C. J. West. 2000. Environmental weeds in Australia and New Zealand: issues and approaches to management. *Austral Ecol.*, 25:425-444.