National Journal of Advanced Research
ISSN: 2455-216X
Impact Factor: RJIF 5.12
www.allnationaljournal.com
Volume 4; Issue 1; January 2018; Page No. 94-100

Allelopathic effect of lambs quarter (*Chinopodium album*) concentrations on seed germination and early growth of wheat varieties

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Abstract
The present study was conducted to investigate the allelopathic effect of lamb's quarter (*chinopodium album*) concentrations on seed germination and early growth of different wheat varieties at Seed Testing Laboratory, Department of Agronomy, Sindh Agriculture University Tandojam during 2016. The lamb's quarter water extracts of weeds at 50 and 100% concentrations were applied to determine their effect of seed germination, shoot length (cm), shoot fresh weight (mg), root fresh weight (mg), shoot dry weight (mg), root dry weight (mg) of test under laboratory conditions. The water extract of lamb's quarter caused harmful effect on all growth parameters of wheat as compared to control treatments. The maximum seed germination (81.6%), shoot length (19.3 cm), root length (13.7 cm), shoot fresh weight (0.9440 mg), root fresh weight (0.9307 mg), shoot dry weight (0.9307 mg), root dry weight (0.3364 mg) was observed in control treatment whereas, the plant was treated with 100% allelopathic concentration was observed minimum seed germination (44.2%), shoot length (11.8 cm), root length (8.8 cm), shoot fresh weight (0.6293 mg), root fresh weight (0.2373 mg), shoot dry weight (0.2373 mg), root dry weight (0.1132 mg).The mean for varieties showed significant response to allelopathic concentrations. The maximum seed germination (70.8%), shoot length (16.0 cm), root length (13.1 cm), shoot fresh weight (0.9178 mg), root fresh weight (1.3744 mg), shoot dry weight (1.3744 mg), root dry weight (0.5007 mg) was recorded in Mehran-89 and minimum seed germination (58.8%), shoot length (11.0 cm), root length (9.7 cm), shoot fresh weight (0.6333 mg), root fresh weight (0.1967 mg), shoot dry weight (0.1967 mg), root dry weight (0.1167 mg) was noted in wheat variety Moomal. In respect of the above finding it can be concluded that 100% lambs quarter water extract has more negative effects on the germination and related traits of all wheat varieties.

Keywords: allelopathic concentrations, seed germination, early growth, wheat varieties

1. Introduction

Wheat is a major grain crop in Pakistan and staple food for billions of people of the world (Shewry, 2009) [1].

Wheat is necessary grain and primary food for more than one third of the world population, thus is a most important cereal considered as prime crop of Pakistan. Technological development in soil fortification, utilization of crop rotation, seed placement, fertilizers to improve plant sustenance and upgrading of harvesting practices have all shared to support wheat as a supplementary crop. Wheat is among the cheapest source of food that provides calories of 72% and protein in the normal human eating routine. In addition to this, 9.4 to 14.0 g protein, 326-335 calories, 11.57 to 14.0 g water, 69.1 to 75.4 g total carbohydrate, 1.8 to 2.5 g fat, 1.8 to 2.3 fiber, 36 to 46 mg calcium, 1.7 g ash, 3.0 to 4.3 mg iron, 370 to 435 mg potassium, 354 to 400 mg phosphorus, 0.11 to 0.12 mg riboflavin and 4.3 to 5.3 mg niacin 0.43 to 0.66 mg thiamine are content of 100 g grain wheat (Ken, 2004) [2].

Wheat is the leading food grain of Pakistan occupying the largest area under single crop. Wheat contributes 10.0 percent to the value added in agriculture and 2.1 percent to GDP. Area under wheat has decreased to 9180 thousand hectares in 2014-15 from last year's area of 9199 thousand hectares which shows a decrease of 0.2 percent. The production of wheat stood at 25.478 million tons during 2014-15, showing a decrease of 1.9 percent over the last year's production of 25.979 million tons (GOP, 2015) [3].

There are many problems of low yield in Pakistan, weeds play main role to decrease the yield of crop production. 45 kinds of weeds found in different wheat field in dissimilar wheat growing area of the country (Qureshi and Bhatti, 2001) [4].

Biochemical herbicides are key implements for the weed management to maintain quality and yield of crop. 20-30 % of wheat yield are decrease through the weeds in Pakistan (Abbas, 2006) [5].

Weeds cannot be reduced only crop yield but they compete with wheat plants for nutrients, humidity, light and extra growing requirements but also by freeing allelochemicals in the rhizosphere through their roots and extra plant portions (Reddy, 2000) [6].

Weed infestation is most of the important aspects for low yields (Cheema and Farooq, 2007) [7]. *Convolvulus arvensis* is considered as one of the most harmful weeds in the world which give 20-70% crop yield loss and creates problems in harvesting (Peterson *et al.*, 2002) [8].

All components of the weed plant life including leaf, stem, root and fruit had allelopathic capability (Tinnin *et al.,* 2006) [9].

Bind weed extracts comprises allelochemicals such as Aldehydes, Alkaloids, Apocarotenoids, Flavonoids, Steroids, Xyloids, Clerogenic acid and Saponyns (Anaya *et al.,* 2010) [10].

Weeds also exert allelopathic effects on crop seed germination and growth by releasing water-soluble mixtures in to the soil (Batish *et al.,* 2007) [11].

Wheat seed germination and yield significantly decreased 14 and 80%, respectively as influenced by bindweed (*Convolvulus arvensis* L.) residues extract (Esfandiar *et al.,* 2012) [12].

Among different extracted parts, P total of bindweed had the highest inhibitory effect on millet and basil germination and growth characters. Therefore, inhibitory effects of bindweed increased by increasing extract concentration. Radicle length and dry weight was more sensitive to bindweed allelochemical materials than plumule length and dry weight. Also, germination percent of basil was lower than millet as influenced by allelopathic effects. Radicle and plumule dry weight less affected than other studied characters to different extracts (Esfandiar *et al.,* 2012) [12].

The allelopathic effects on growth and development of crop types are selective, depending upon the concentrations and residue type, either inhibitory or stimulatory to the growth of companion or subsequent crops or weeds (Cheema *et al.,* 2004) [13].

Allelochemicals may affect in crops damage and maxing with weeds and effects on the seeds development and early growth of crops (Wuweaver and Riley 2004) [14].

Allelopathy as the effect of one plant on other plants through the release of chemical compounds in the environment (Minorsky, 2002 and Mirshekari, 2003) [15, 16].

Allelochemicals were free in different methods such as leakage from plant matters by rain and precipitation and flow from plant origins (Peterson *et al.*, 2002) [8].

Allelopathy is a new method to keep the environmental clean and to change the workable agriculture (Yongqing, 2005) [17].

Allelopathy is two Greek language words '*Allelon*' means each other and '*Pathos*' means to suffer i.e. harmful of individual upon another which mentions to all biochemical communications stimulatory and inhibitory. It signifies the plant to plant side of the border field of chemical ecology. Many researchers have used the term in an extra incomplete sense to define individual dangerous impact of one higher plant upon another. Allelopathy is a complex phenomenon between phenolic compounds and concentration of allelochemicals. It has together inhibitory and stimulatory effects, which may be decided by concentration of allelochemicals current in removal. Allelochemicals which repressed the development of species at progressive applications may motivate the growth of related or unrelated species at minor applications (Patil, 2007) [18].

Allelopathy plays a main role in agroecosystems for the important extensive range on the effects and relations in biotic groups. Such influences and relations are mostly a result of allelochemicals discharge from the donor plants that commonly have harmful effects on the receiver plants but a selective benefit to the contributor plant. In current years, improved logical approaches have shown the allelopathy phenomenon in numerous species, indicating it is operative in plant ecosystems growth of competing species (Nardi *et al.,* 2000) [19].

Chenopodium album L. is presented as one of the damage-full parameters, which is caused by allelopathic effects of different plant parts (Nahar *et al.,* 2005) [20].

Chenopodium album L. is consider a common weed of wheat which may release allelochemicals into the soil which may exhibit inhibitory or stimulatory effects on development and growth of extra near plants (Abdul *et al.,* 2012) [21].

Allelopathic activity of *Amaranthusretro flexus* is proven but there is a lack of relevant information (Raskin *et al.,* 1989) [22].

Allelopathic impact of common lamb's quarter wheat with decreased the germination percentage and reduced the shoot and root length (Daizy *et al*., 2006) [23].

Aqueous leaf extracts of *Chenopodium album* L. exhibits strong detrimental effects on plant growing then grain yield of wheat hence the presence of this weed in wheat-grown fields may adversely affect growth of wheat corresponding to lower yield (Abdul *et al.,* 2012) [21].

2. Materials and methods

The laboratory experiment was conducted at Seed Testing Laboratory, Department of Agronomy, Sindh Agriculture University Tandojam during 2016. To investigate the allelopathic effect of lamb's quarter (*Chinopodium album*) concentrations on seed germination and early growth of different wheat varieties the treatments were set in completely randomized design having three replications. The treatment details are as under:

2.1 Experimental design

Completely randomized design (CRD)

2.2 Replication

Three

2.3 Treatments

Two factors (A and B)

2.4 Factor-A

Varieties (V) = 5

V_1 = TD-1

V_2 = Mehran-89

V_3 = Kiran-95

V_4 = TJ-83

V_5 = Moomal

2.5 Factor-B

Allelopathic concentrations (C) = 3

C_1 = Control (no allelopathic concentration)

C_2 = Lambs quarter water 50% extract

C_3 = Lambs quarter water 100% extract

2.6 Observations recorded

Seed germination (%)

Shoot length (cm)

Root length (cm)

Shoot fresh weight (mg)

Root fresh weight (mg)
Shoot dry weight (mg)
Root dry weight (mg)

2.7 Statistical analysis

The data was subjected to statistical analysis using Statistix 8.1 Computer Software (Statistix, 2006). The significance of differences among means was compared by the LSD test, where necessary.

3. Results

The laboratory experiment was conducted at Seed Testing Laboratory, Department of Agronomy, Sindh Agriculture University Tandojam during 2016. To investigate the allelopathic effect of lamb's quarter (*Chinopodium album*) concentrations on seed germination and early growth of different wheat. The characters studied were seed germination (%), shoot length (cm), root length (cm), shoot fresh weight (mg), root fresh weight (mg), shoot dry weight (mg), root dry weight (mg). The results on the above characters are presented in Table 1-7.

3.1 Seed germination (%)

The results for seed germination % for wheat varieties as affected by different allelopathic water extract concentration is shown in Table-1.

The above results indicated that maximum seed germination 81.6% was recorded at control (no allelopathic concentration) followed by 65.8% seed germination% was observed at 50% allelopathic concentration and minimum seed germination (44.2%) was observed at 100% allelopathic concentration. The mean for varieties showed significant response to allelopathic concentrations, maximum (70.8%) seed germination was recorded in variety Mehran-89 and minimum (58.8%) seed germination was noted in variety Moomal. The interactive effect showed that maximum (91.0%) seed germination was recorded under the interaction of no allelopathic concentration x in variety mehran-89, whereas minimum (36.6) seed germination was noticed under the interaction lambs quarter water 100% extract x in variety Moomal.

3.2 Shoot length (cm)

The data on mean shoot length (cm) for wheat varieties as affected by different allelopathic water extract concentration is shown in Table-2.

The results showed that maximum shoot length 19.3cm was recorded at control (no allelopathic concentration) followed by 16.3cm shoot length was observed at 50% allelopathic concentration and minimum seed shoot length 11.3cm was observed at 100% allelopathic concentration. The mean for varieties showed significant response to allelopathic concentrations, maximum (16.0 cm) shoot length was recorded in variety Mehran-89 and minimum (11.0 cm) shoot length was noted in variety Moomal. The interactive effect showed that maximum (18.7cm) shoot length was recorded under the interaction of no allelopathic concentration x in variety mehran-89, whereas minimum (8.5 cm) shoot length was noticed under the interaction lambs quarter water 100% extract x in variety Moomal.

3.3 Root length (cm)

The data on mean root length (cm) for wheat varieties as affected by different allelopathic water extract concentration is shown in Table-3.

The results showed that maximum root length 13. 7 cm was recorded at control (no allelopathic concentration) followed by 13. 7 cm shoot length was observed at 50% allelopathic concentration and minimum root length 8.8 cm was observed at 100% allelopathic concentration. The mean for varieties showed significant response to allelopathic concentrations, maximum (cm) root length was recorded in variety Mehran-89 and minimum (11.0 cm) Root length was noted in variety Moomal. The interactive effect showed that maximum (18.7cm) shoot length was recorded under the interaction of no allelopathic concentration x in variety mehran-89, whereas minimum (8.5 cm) shoot length was noticed under the interaction lambs quarter water 100% extract x in variety Moomal.

3.4 Shoot fresh weight (mg)

The data on mean shoot fresh weight (mg) for wheat varieties as affected by different allelopathic water extract concentration is shown in Table-4.

The above results indicated that maximum shoot fresh weight (0.9440 mg) was recorded under no allelopathic concentration followed by (0.8040 mg) was observed at 50% allelopathic concentration and lowest shoot fresh weight 0.629 g was observed at 100% allelopathic concentration. The mean for varieties showed significant response to allelopathic concentrations, maximum shoot fresh weight (0.9178 mg) was recorded in variety Mehran-89 and minimum shoot fresh weight (0.6333 mg) was noted in variety Moomal. The interactive effect showed that maximum shoot weight (1.0933 mg) was recorded under the interaction of no allelopathic concentration x in variety Mehran-89, whereas minimum shoot fresh weight (0.500 mg) was noticed under the interaction lambs quarter water 100% extract x in variety Moomal.

3.5 Root fresh weight (g)

The data on mean shoot fresh weight (mg) for wheat varieties as affected by different allelopathic water extract concentration is shown in Table-5.

The above results indicated that showed that maximum root fresh weight (0.9307 mg) was recorded under no allelopathic concentration followed by (0.5960 mg) was observed at 50% allelopathic concentration and lowest root fresh weight (0.2373 mg) was observed at 100% allelopathic concentration. The mean for varieties showed significant response to allelopathic concentrations, maximum root fresh weight (1.3744 mg) was recorded in variety Mehran-89 and minimum root fresh weight (0.1967 mg) was noted in variety Moomal. The interactive effect showed that maximum root weight (2.3433 mg) was recorded under the interaction of no allelopathic concentration x in variety Mehran-89, whereas minimum root fresh weight (0.1967 mg) was noticed under the interaction lambs quarter water 100% extract x in variety Moomal.

3.6 Shoot dry weight (mg)
The data on mean shoot dry weight (mg) for wheat varieties as affected by different allelopathic water extract concentration is shown in Table-6.

The above results indicated that maximum shoot dry weight (0.9307 mg) was recorded under no allelopathic concentration followed by (0.5960 mg) was observed at 50% allelopathic concentration and lowest root fresh weight (0.2373 mg) was observed at 100% allelopathic concentration. The mean for varieties showed significant response to allelopathic concentrations, maximum shoot dry weight (1.3744 mg) was recorded in variety Mehran-89 and minimum shoot dry weight (0.1967 mg) was noted in variety Moomal. The interactive effect showed that maximum shoot dry weight (2.343 mg) was recorded under the interaction of no allelopathic concentration x in variety Mehran-89, whereas minimum shoot dry weight (0.1967 mg) was noticed under the interaction lambs quarter water 100% extract x in variety Moomal.

3.7 Root dry weight (mg)
The data on mean root dry weight (mg) for wheat varieties as affected by different allelopathic water extract concentration is shown in Table-7.

The above results showed that maximum root dry weight (0.3364 mg) was recorded under no allelopathic concentration followed by (0.2352 mg) was observed at 50% allelopathic concentration and lowest root dry weight (0.1132 mg) was observed at 100% allelopathic concentration. The mean for varieties showed significant response to allelopathic concentrations, maximum root dry weight (0.5007 mg) was recorded in variety Mehran-89 and minimum root dry weight (0.1167 mg) was noted in variety Moomal. The interactive effect showed that maximum root weight (0.8362 mg) was recorded under the interaction of no allelopathic concentration x in variety Mehran-89, whereas minimum root dry weight (0.0813 mg) was noticed under the interaction lambs quarter water 100% extract x in variety Moomal.

4. Discussion
Allelopathy is a new method to keep the environmental clean and to change the workable agriculture [17] (Yongqing, 2005).

Allelopathy is two Greek language words '*Allelon*' means each other and '*Pathos*' means to suffer i.e. harmful effect of individual upon another which mentions to all biochemical communications stimulatory and inhibitory. It signifies the plant to plant side of the border field of chemical ecology. Many researchers have used the term in an extra incomplete sense to define individual dangerous impact of one higher plant upon another. Allelopathy is a complex phenomenon between phenolic compounds and concentration of allelochemicals. It has together inhibitory and stimulatory effects, which may be decided by concentration of allelochemicals current in removal. Allelochemicals which repressed the development of types at progressive applications may motivate the growth of related or unrelated species at minor applications [18] (Patil, 2007).

Allelopathy plays a main role in agroecosystems for the important extensive range on the effects and relations in biotic groups. Such influences and relations are mostly a result of allelochemicals discharge from the donor plants that commonly have harmful effects on the receiver plants but a selective benefit to the contributor plant. In current years, improved logical approaches have shown the allelopathy phenomenon in numerous species, indicating it is operative in plant ecosystems growth of competing species [19] (Nardi *et al.*, 2000).

The present study revealed that the water extract of lamb's quarter caused harmful effect on all growth parameters of wheat as compared to control treatments. The maximum seed germination (81.6%), shoot length (19.3 cm), root length (13.7 cm), shoot fresh weight (0.9440 mg), root fresh weight (0.9307 mg), shoot dry weight (0.9307 mg), root dry weight (0.3364 mg) was observed in control treatment whereas minimum seed germination (44.2%), shoot length (11.8 cm), root length (8.8 cm), shoot fresh weight (0.6293 mg), root fresh weight (0.2373 mg), shoot dry weight (0.2373 mg), root dry weight (0.1132 mg) was observed under the treatments of 100% allelopathic concentrations.

The mean for varieties showed significant response to allelopathic concentrations. The maximum seed germination (70.8%), shoot length (16.0 cm), root length (13.1 cm), shoot fresh weight (0.9178 mg), root fresh weight (1.3744 mg), shoot dry weight (1.3744 mg), root dry weight (0.5007 mg) was recorded in Mehran-89 and minimum seed germination (58.8%), shoot length (11.0 cm), root length (9.7 cm), shoot fresh weight (0.6333 mg), root fresh weight (0.1967 mg), shoot dry weight (0.1967 mg), root dry weight (0.1167 mg) was noted in wheat variety Moomal. Our results are similar with the findings of [23] (Daizy *et al*., 2006).

Allelopathic effects of *C. album* on wheat (*T. aestivum*) with reduced germination (%), decreased shoot and root length.

[24] Khan *et al.* (2003) estimated allelopathic effects of eucalyptus and its boiled extract reduced seed germination to 66% compared to 99% germination in the control [25]. Ali reza and Asaadi (2010) observed that seed germination, speed of germination, root and shoot length of weeds exhibited dissimilar point of inhibition giving to the concentration of the aqueous extract further results supported by (Siddiqui *et al*, 2009) [26] stated that allelochemicals inhibit the seed germination and decrease radicle length of wheat.

Abdul *et al*. (2012) [21] reported that the concentration of allelopathic extract had given harmful impact on plant height, no of tillers and spike length which approved to significantly minor grain yield. But the lowest twenty-five percentage concentration extract stimulated these characters. Data of this experiment that significantly suppressive effects of higher 50 and seventy-five percentage application extract on plant height of wheat consistent to lowest grain yield.

5. Tables

Table 1: Effect of allelopathic concentration on seed germination (%) of wheat varieties

Allelopathic Concentrations	Varieties					Mean
	TD-1	Mehran-89	Kiran-95	TJ-83	Moomal	
No allelopathic concentration	81.6	91.0	81.6	81.3	72.3	81.6 A
Lambs quarter water 50% extract	65.6	70.0	71.0	60.3	62.0	65.8 B
Lambs quarter water 100% extract	40.3	61.0	42.3	41.0	36.6	44.2 C
Mean	65.6 B	70.8 A	63.1C	60.8 D	58.8 E	

Means followed by different letters are significantly different at 5% probability level

	Concentrations	Varieties	C X V
SE	0.5391	0.6959	1.2054
LSD @5%	1.1042	1.4255	2.4691

Table 2: Effect of allelopathic concentration on shoot length (cm) of wheat varieties

Allelopathic concentrations	Varieties					Mean
	TD-1	Mehran-89	Kiran-95	TJ-83	Moomal	
No allelopathic concentration	16.1	18.7	16.4	19.5	15.6	19.3 A
Lambs quarter water 50% extract	13.8	16.1	13.7	16.7	10.9	16.3 B
Lambs quarter water 100% extract	13.5	13.0	12.7	11.3	8.5	11.8 C
Mean	14.5 A	16.0 A	14.3 A	15.9 A	11.0 B	-

Means followed by different letters are significantly different at 5% probability level

	Concentrations	Varieties	C X V
SE	0.7787	1.0053	1.7412
LSD @5%	1.5951	2.0592	3.5667

Table 3: Effect of allelopathic concentration on root length (cm) of wheat varieties

Allelopathic concentrations	Varieties					Mean
	TD-1	Mehran-89	Kiran-95	TJ-83	Moomal	
No allelopathic concentration	14.3	16.3	12.3	14.4	11.3	13.7 A
Lambs quarter water 50% extract	11.3	12.6	11.2	13.0	9.4	11.4 B
Lambs quarter water 100% extract	9.1	10.4	8.7	7.5	8.6	8.8 C
Mean	11.6 B	13.1 A	10.6 C	11.6 B	9.7 D	

Means followed by different letters are significantly different at 5% probability level

	Concentrations	Varieties	C X V
SE	0.0825	0.1065	0.1844
LSD @5%	0.1689	0.2181	0.3777

Table 4: Effect of allelopathic concentration on shoot fresh weight (mg) of wheat varieties

Allelopathic concentrations	Varieties					Mean
	TD-1	Mehran-89	Kiran-95	TJ-83	Moomal	
No allelopathic concentration	1.110	1.0933	1.0733	0.7333	0.7100	0.9440 A
Lambs quarter water 50% extract	0.8400	0.9500	0.8900	0.6400	0.700	0.8040 B
Lambs quarter water 100% extract	0.6167	0.7300	0.7500	0.5500	0.500	0.6293 C
Mean	0.8556 B	0.9178 A	0.9111 A	0.6444 C	0.6333 C	

Means followed by different letters are significantly different at 5% probability level

	Concentrations	Varieties	C X V
SE	0.0111	0.014	0.0121
LSD @5%	0.0333	0.0245	0.0249

Table 5: Effect of allelopathic concentration on root fresh weight (mg) of wheat varieties

Allelopathic concentrations	Varieties					Mean
	TD-1	Mehran-89	Kiran-95	TJ-83	Moomal	
No allelopathic concentration	1.0700	2.3433	0.3800	0.4100	0.3200	0.9307 A
Lambs quarter water 50% extract	0.9700	1.3400	0.1700	0.3500	0.1500	0.5960 B
Lambs quarter water 100% extract	0.4467	0.3100	0.1400	0.1700	0.1200 l	0.2373 C
Mean	0.8289 B	1.3744 A	0.2300 D	0.3100 C	0.1967 E	

Means followed by different letters are significantly different at 5% probability level

	Concentrations	Varieties	C X V
SE	0.0888	0.4542	0.00735
LSD @5%	0.1162	0.7329	0.0111

Table 6: Effect of allelopathic concentration on shoot dry weight (mg) of wheat varieties

Allelopathic concentrations	Varieties					Mean
	TD-1	Mehran-89	Kiran-95	TJ-83	Moomal	
No allelopathic concentration	1.0700	2.3433	0.3800	0.4100	0.3200	0.9307 A
Lambs quarter water 50% extract	0.9700	1.3400	0.1700	0.3500	0.1500	0.5960 B
Lambs quarter water 100% extract	0.4467	0.3100	0.1400	0.1700	0.1200 l	0.2373 C
Mean	0.8289 B	1.3744 A	0.2300 D	0.3100 C	0.1967 E	

Means followed by different letters are significantly different at 5% probability level

	Concentrations	Varieties	C X V
SE	1.500	1.936	3.354
LSD @5%	3.073	3.967	6.870

Table 7: Effect of allelopathic concentration on root dry weight (mg) of wheat varieties

Allelopathic concentrations	Varieties					Mean
	TD-1	Mehran-89	Kiran-95	TJ-83	Moomal	
No allelopathic concentration	0.3044	0.8362	0.2385	0.1342	0.1714	0.3364 A
Lambs quarter water 50% extract	0.2234	0.5241	0.2109	0.1204	0.0973 l	0.2352 B
Lambs quarter water 100% extract	0.1135	0.1418	0.1094	0.1201	0.0813	0.1132 C
Mean	0.2138 B	0.5007 A	0.1854 C	0.1240 D	0.1167 E	

Means followed by different letters are significantly different at 5% probability level

	Concentrations	Varieties	C X V
SE	0.998	1.203	2.084
LSD @5%	1.909	2.464	4.268

6. Conclusion

In respect of the above finding it can be concluded that 100% Lambs quarter water extract has more negative effects on the germination and related traits of all wheat varieties.

7. Acknowledgment

We are thankful to friends who helped to make this research complete.

8. References

1. Shewry PR. Wheat Research. Wheat Journal of Experimental Botany. 2009; 60:1537-1553.
2. Ken P. Forms of micronutrient fertilizer. Sask. Agriculture & Food, Rigas Karamanos (Westco), Agriculture and Agri-Food Canada, 2004, 1-10.
3. GOP. Economic Survey of Pakistan, 2014-2015. Government of Pakistan, Ministry of Food, Agriculture and Livestock, Agriculture & Livestock Division (Economic Wing), Islamabad. 2015.
4. Qureshi R, Bhatti GR. Determination of weed communities in wheat field of District Sukhur. Pak. J Bot. 2001; 33:109-115.
5. Abbas AM. General agriculture field crop production and management 4th Publishers Emporium, Ahata Shah Darian, Urdu Bazar, Lahore, Pakistan. 2006, 174.
6. Reddy SR. Principles of crop production. Kalyani Publishers, New Delhi, India, 2000, 446-44.
7. Cheema AZ, Farooq M. Agriculture in Pakistan. Agriculture in Pakistan, 2007.
8. Peterson C, Betts AH, Baldwin IT. Methyl Jasmonate an allelopathic agent: Sagerbrush inhibits germination of a neighboring tobacco. Nicotianaattenata chemical ecology. 2002; 28(11):187-201.
9. Tinnin R, Muller CH. The allelopathic influence of *Avena Fatua*. The allelopathic mechanism. Bulletin of the Torrey Botanical Club. 2006; 99:287-292.
10. Anaya L, Ramos L, Cruz RH, Fernandez JG, Nava V. Perspectives on allelopathy in Mexican traditional

agroecosystems: A Case Study in Taxcala. Journal of Chemical Ecology. 2010; 13:2083.
11. Batish D, Lavanya K, Singh H, Kohli R. Root mediated allelopathic interference of nettle leaved goosefoot (Chenopodium murale) on wheat (Triticum aestivum). J Agro and Crop Sci. 2007; 193:37-44.
12. Esfandiar F, Seyedeh S, Farzad G. Evaluation the allelopathic effect of bindweed (*Convolvulus arvensis* L.) on germination and seedling growth of millet and basil. Adv. in Environmental Biol. 2012; 6(3):940-950.
13. Cheema ZA, Khaliq A, Saeed S. Weed control in maize (*Zea mays* L.) through sorghum allelopathy. Journal of Sustainable Agriculture. 2004; 23:73-86.
14. Wuweaver S, Riley WR. Field bindweed. OMAFRA Factsheet order. 2004; 83:002.
15. Minorsky V. Allelopathy and grain crop production. Plant Physiology. 2002; 130:1745-1746.
16. Mirshekari B. Weeds and their control. Islamic Azad University, Tabriz Branch, Iran and C. Jonathan (eds.). International Maize and Wheat Improvement Centre. Mexico, 2003, 1-95.
17. Patil CK. Allelopathic effect of botanicals on major weeds of onion (*Alium cepa* L.). M.Sc. Thesis submitted to the University of Agricultural Sciences, Dharwad, India, 2007.
18. Nahar L, Sarker SD. Chenoalbuside: an antioxidant phenolic glycoside from the seeds of *Chenopodium album L*. (*Chenopodiaceae*). Rev. Bras. Farmacogn. 2005; 15:279-282.
19. Abdul M, Zubeda C, Zahir M. Allelopathic assessment of fresh aqueous extracts of chenopodium album L. for growth and yield of wheat (*Triticum aestivum* L.). Pak. J Bot. 2012; 44(1):165-167.
20. Daizy R, Harminder PS, Nipunika R, Ravinder KK. Assessment of allelopathic interference of *Chenopodium album* through its leachates, debris extracts, 2006.
21. Alireza D, Asaadi AM. Allelopathic effects of Eucalyptus camaldulensis on seed germination and growth seedlings of *Acroptilonrepens*, *Plantagolanceolata* and *Portulacaoleracea*, Res. J Biol. Sci. 2010; 5(6):430-434.
22. Siddiqui S, Bhardwaj S, Khan SS, Meghvanshi MK. Allelopathic Effect of Different Concentration of Water Extract of Prosopsis Juliflora Leaf on Seed Germination and Radicle Length of Wheat (*Triticum aestivum* Var-Lok-1). American-Eurasian Journal of Scientific Research. 2009; 4(2):81-84.