INNSPUB

International Journal of Agronomy and Agricultural Research (IJAAR)

ISSN: 2223-7054 (Print) 2225-3610 (Online)

http://www.innspub.net

Vol. 11, No. 1, p. 8-16, 2017

RESEARCH PAPER

OPEN ACCESS

Effect of seed priming durations on growth and yield of wheat varieties

Muhammad Asif Panhwar*[1], Ghulam Mustafa Laghari[1], Maqsood Ahmed Chandio[2], Fida Hussain Magsi[2], Sanaullah Mangi[2], Muhammad Azeem Malik[1], Naveed Ali Channa[2], Shafi Muhammad Jariko[3], Masroor Hassan Solangi[1], Abdul Rasheed[4]

[1]*Department of Agronomy, Sindh Agriculture University, Tandojam, Sindh, Pakistan*

[2]*Department of Entomology, Sindh Agriculture University, Tandojam, Sindh, Pakistan*

[3]*Department of Plant Breeding and Genetics, Sindh Agriculture University, Sindh, Tandojam, Pakistan*

[4]*Department of Plant Breeding and Genetics, University of Agriculture, Faisalabad, Pakistan*

Article published on July 25, 2017

Key words: Seed priming durations, Growth, Yield parameters, Wheat, Varieties

Abstract

The results revealed that the crop treated 1.5 hour seed priming proved to be more effective than the treatments with 87.33% seed germination, 88.00 cm plant height, 3.5367 m^2 number of tillers, 11.611 cm spike length, 49.667 spikelet's spike^{-1}, 46.667 grain spike^{-1}, 1.3011 g grain weight spike^{-1}, 46.367 g seed index, 17174 kg ha^{-1} biological yield, 4322.4 kg ha^{-1} grain yield and 38.478% harvest index. Wheat crop given 1 hour seed priming ranked second 82.556% seed germination, 85.00 cm plant height, 350.11 m^2 number of tillers, 11.37 cm spike length, 47.11 spikelet's spike^{-1}, 45.33 grain spike^{-1}, 1.2789 g grain weight spike^{-1}, 45.91 g seed index, 11196 kg ha^{-1}biological yield, 4128.9 kg ha^{-1} grain yield and 37.98% harvest index. While, minimum all parameters recorded at control (no priming) such as reduced 69.22% seed germination, 78.11 cm plant height, 285.89 m^2 number of tillers, 9.413 cm spike length, 36.11 spikelet's spike^{-1}, 35.00 grain spike^{-1}, 0.8089 g grain weight per spike, 39.567 g seed index, 9718 kg ha^{-1} biological yield, 3141.1 kg ha^{-1} grain yield and 32.786% harvest index. In varieties, the maximum 82.167% seed germination, 101.25 cm plant height, 347.00 m^2 number of tillers, 11.834 cm spike length, 44.917 spikelet's spike^{-1}, 46.750 grain spike^{-1}, 1.4867 g grain weight spike^{-1}, 46.900 g seed index, 16335 kg ha^{-1} biological yield, 4238.4 kg ha^{-1} grain yield, 39.906% harvest index and 1showed by TJ-83. Secondly 80.66% seed germination, 83.75 cm plant height, 325.25 m^2 number of tiller, 10.543 cm spike length, 43.900 spikelet's spike^{-1}, 37.833 grain spike^{-1}, 1.4500 g grain weight spike^{-1}, 44.542 g seed index, 10.676 kg ha^{-1} biological yield, 38.67.1 kg ha^{-1} grain yield, 39.668%harvest index and showed by Kiran-95. While from interaction point of view, the maximum 91.33% seed germination, 106.00 cm plant height, 365.00 m^2 numbers of tillers, 12.800 cm spike length, 54.00 spikelet's spike^{-1}, 52.00 grain spike^{-1}, 1.4867g grain weight spike^{-1}, 51.900 g seed index, 34227 kg ha^{-1} biological yield, 4903.3 kg ha^{-1} grain yield, 43.370% harvest index and showed by 1.5 hour priming x Kiran-95.

* **Corresponding Author:** Muhammad Asif Panhwar ✉ asifpanhwarpithoro@gmail.com

Introduction

Wheat is a noteworthy world harvest in solid expanding; Saudi Arabia was more than independent in wheat creation and delivering more than 3 million tons in the period 1989-1990. In 1992 wheat generation was more than 4 million tons, however has since it declined to 2.63 million tons. Latest reviews have demonstrated expanding saltiness of groundwater because of the nearby hydro-topographical conditions and escalated water system rehearse, which limits agri-business change in Saudi Arabia. There are some constraining elements which avoid and hinder germination and development of solid wheat. Saltiness is one of the significant snags in delivering preeminent nature of wheat and different products all through the world. Wheat (*Triticum aestivum* L.) under saltiness conditions builds the convergence of praline and sugar bringing about a critical increment of electrolyte spillage at 10 and 15 dSm-1. It has been stated that expansion in saltiness focus realizes diminish in relative development rate, net osmosis rate, K+, Ca2+ fixation and grain yield of wheat, however causes an expansion in Na+ and Cl- levels, this may be because of increment in Na+/K+ proportion in grain and straw at tillering stage. Saltiness influences wheat seedling development by changing phytochormone levels. Assist, saltiness incites a diminishment in photosynthetic rate and stomatal conductance in wheat. (Subyani, 2005). Wheat (*Triticum aestivum* L.) has a place with Poaceae family and is the most sustenance product on the planet. In South Asia, prior report demonstrated that wheat creation secured around 42% of the aggregate trimmed zone and 32% of aggregate rice (*Oryza sativa* L.) region in rice-wheat editing frame works (Iqbal *et al*., 2002). Quick seed germination and stand foundation are basic variables for harvest generation under anxiety conditions, which incorporate into many yield species; seed germination and early seedling development are the most delicate stages to stresses. Seed preparing is known as the seed treatment which enhances seed execution under natural conditions. Gibberellins (GA3) and cytokine's (CKs) control diverse formative procedures in plants CKs act right on time amid shoot start and control meri-stem movement, while GA3 are in charge of development and cell division in shoot lengthening, blooming and seed germination. All phytohormones apply their administrative part in close connection with each other. Hormone flagging pathways shape complex connecting system, which empowers seeing of various inside and outside jolts and producing separate plant reactions. Also, exogenously connected development controllers can change the substance of endogenous phytohormones. The biosynthesis of GA3 is managed by both formative and ecological jolts. Seed zone water substance is the controlling component for wheat seedling rise; however soil temperature and profundity of soil covering the seed are likewise critical. The three early periods of germination are: (i) imbibition, (ii) slack stage and (iii) projection of the radical through the testa.

Seed preparing can be utilized to upgrade quick and uniform seed development and to accomplish high force and better yields in vegetables and gardening. Seed preparing is a system by which seeds are in part hydrated to a point where germination forms start yet radical rise does not happen. In preparing, seeds are absorbed diverse arrangements with high osmotic potential. This keeps the seeds from retaining in enough water for radical projection. Seed preparing has been regularly used to lessen the time between seed sowing and seedling rise and to synchronize rise. Seed preparing medicines have been utilized to quicken the germination and seedling development in the majority of the products under ordinary and stress conditions. Revealed that prepared harvests developed all the more energetically, bloomed prior and yielded higher. It has likewise been accounted for that seed preparing enhances development, stand foundation, tillering, allometry, grain, straw yields and collect list. Ordinary reactions to preparing are speedier and nearer spread of times to germination and rise over all seedbed situations and more extensive temperature scope of germination, prompting to better product stands and thus enhanced yield and collect quality, particularly under problematic and stress condition developing conditions in the field.

Regularly preparing is done either in low water potential arrangement (osmo preparing) or in faucet water (hydro-preparing), in any case, consolidation of plant development controllers amid preparing have enhanced seed germination, foundation and product execution.

This keeps the seeds from retaining enough water for radical bulge, along these lines suspending the seeds in the slack stage (Taylor *et al.*, 2003). The seed treatment with hormone and salt arrangement may have expanded the metabolic action of the plant in such a course as to result in expanded take-up of N, P, K+ and Ca2+. Osmotic arrangements are utilized to force water stretch reproducibly under in vitro conditions. In osmo molding seeds are held at low water potential arrangements while amid matric molding seed hydration is controlled by the physical and osmotic normal for a strong network transporter. (Guzman and Olive, 2006) detailed that seed preparing with nitrate arrangements enhanced germination rate, radical development and germination record. Considering the above focuses on the impacts of seed preparing to enhance seed germination and consequent plant development, there is still sparse writing on the impacts of seed putting away term after seed preparing on germination practices. The objective of the study was to investigate the effects of primed seed storage duration on germination and seedling growth characteristics.

Materials and methods

The experiment entitled "Effect of seed priming durations on the growth and yield of wheat varieties". The experiment will be conducted at student's Experimental Farm Department of Agronomy, Sindh Agriculture University Tandojam, during 2016. The experiment was laid out three replicated randomized completely block design (RCBD). The treatments included 12 with two factors and net plot size was used in the experiment 4m x 5m 20 m^2. The treatments details are as under:

Treatments = 12

$T_1=V^1P^1$, $T_2=V^1P^2$, $T_3=V^1P^3$, $T_4=V^1P^4$, $T_5=V^2P^1$, $T_6=V^2P^2$, $T_7=V^2P^3$, $T_8=V^2P^4$, $T_9=V^3P^1$, $T_{10}=V^3P^2$, $T_{11}=V^3P^3$, $T_{12}=V^3P^4$,

Land preparation

The land was prepared by two dry plowings followed by precision land leveling. After soaking doze, when soil reached proper moisture level, two plowings with cultivator plow were done to achieve the fine seedbed.

Observations recorded

1. Seed germination (%)
2. Plant height (cm)
3. Tillers (cm^2)
4. Spike length (cm)
5. Spikelet's spike^{-1}
6. Grains spike^{-1}
7. Grain Weight per spike (g)
8. Seed index (1000 grains weight g)
9. Biological yield (kg ha^{-1})
10. Grain yield (kg ha^{-1})
11. Harvest index (%)

Data analysis

The data thus collected will be subjected to ANOVA technique using MSTAT-C statistical package (Gomez and Gomez, 1984). The LSD test will be applied to compare treatment superiority, where necessary.

Results

The review was directed at Student's Experimental Farm, Sindh Agriculture University Tandojam, to analyze the impact of seed preparing spans on the development and yield of wheat assortments amid 2016. The test was laid out three repeated randomized totally square outline (RCBD). The medications included 12 with two components and net plot size was utilized as a part of the trial 4m x 5m 20 m^2. The treatment included untreated (control), $T_1= V^1P^1$, $T_2=V^1P^2$, $T_3=V^1P^3$ $T_4=V^1P^4$, $T_5=V^2P^1$, $T_6=V^2P^2$, $T_7=V^2P^3$, $T_8=V^2P^4$, $T_9=V^3P^1$, $T_{10}=V^3P^2$ $T_{11}=V^3P^3$ and $T_{12}=V^3P^4$. The perceptions were recorded on parameters of monetary significance, for example, plant stature (cm), tillers (cm^2), spike length (cm), spikelet's spike^{-1},grains spike^{-1}, grain weight per spike (g), seed list (1000 grains weight g), biological yield (kg ha^{-1}), grain yield (kg ha^{-1}) and harvest file (%). The outcomes on above parameters are appeared in Table 1-8. The outcomes are translated in this section.

Seed germination (%)

The seed germination % of wheat varieties as affected by various priming durations on are shown in Table-1. Results showed that maximum seed germination 87.333% recorded at 1.5 hour priming, followed by 82.556 seed germination % resulted in 1 hour priming and minimum 69.222 seed germination % observed for control treatment. While, in case of varieties, the maximum 82.167 seed germination % measured for Kiran-95 and TJ-83 ranked 2nd number and showed 80.667 seed germination%. In this way, interaction resulted highest 91.33 seed germination % in combination of 1.5 hour priming x TJ-83 and lowest 61.00 seed germination % observed in no priming x TD-1.

Table 1. Effect of seed priming durations on seed germination (%) of wheat.

Priming durations	Varieties			Mean
	TD-1	Kiran-95	TJ-83	
No priming (Control)	61.0 k	75.0 g	71.6 i	69.2 D
30 minutes priming	70.6 j	81.0 e	74.6 h	75.4 C
1 hour priming	77.6 f	85.0 c	85.0 c	82.5 B
1.5 hour priming	83.0 d	87.6 b	91.3 a	87.3 A
Mean	73.0 C	82.1 B	80.6 A	

	Varieties	Priming durations	Varieties x Priming durations
S.E ±	1.1008	1.2711	2.2015
L.S.D .05%	2.2829	2.6360	4.5657

Plant height (cm)

The plant height cm of wheat varieties as affected by various priming durations on are shown in Table-2.Results showed that maximum plant height 88.0 cm recorded at 1.5 hour priming, followed by 85.0 plant height cm resulted in 1 hour priming and minimum 78.1 plant height cm observed for control treatment. While, in case of varieties, the maximum 101.2 plant height cm measured for TJ-83 and Kiran-95 ranked 2nd number and showed 83.7 plant height cm. In this way, interaction resulted highest 106.0 plant height cm in combination of 1.5 hour priming x Kiran-95 and lowest 61.6 plant height cm observed in no priming x TD-1.

Table 2. Effect of seed priming durations on plant height (cm) of wheat.

Priming durations	Varieties			Mean
	TD-1	Kiran-95	TJ-83	
No priming (Control)	61.6 l	95.6 d	77.0 h	78.1 D
30 minutes priming	64.0 j	98.0 c	85.0 g	82.3 C
1 hour priming	63.6 k	105.3 b	86.0 f	85.0 B
1.5 hour priming	71.0 i	106.0 a	87.0 e	88.0 A
Mean	65.0 C	83.7 B	101.2 A	

	Varieties	Priming durations	Varieties x Priming durations
S.E ±	0.7510	0.8672	1.5020
L.S.D 0.05%	1.5574	1.7984	3.1149

Tillers (m²)

The tillers m² of wheat varieties as affected by various priming durations on are shown in Table-3.Results showed that maximum tillers 3.5367 m² recorded at 1.5 hour priming, followed by 350.11 tillers m² resulted in 1 hour priming and minimum 285.89 tillers m² observed for control treatment. While, in case of varieties, the maximum 347.00 tillers m² measured for TJ-83 and Kiran-95 ranked 2nd number and showed 325.25 tillers m². In this way, interaction resulted highest 365.00 m² tillers in combination of 1.5 hour priming x Kiran-95 and lowest 255.00 m² tillers observed in no priming x TD-1.

Table 3. Effect of seed priming durations on tillers (m²) of wheat.

Priming durations	Varieties			Mean
	TD-1	Kiran-95	TJ-83	
No priming (Control)	255.0 g	310.0 e	292.6 f	285.8 C
30 minutes priming	315.0 G	350.0 b	324.3 d	329.7 B
1 hour priming	346.3 c	363.0 a	341.0 c	350.1 A
1.5 hour priming	353.0 b	365.0 a	343.0 c	353.6 A
Mean	317.3 C	325.2 B	347.00 A	

	Varieties	Priming durations	Varieties x Priming durations
S.E ±	1.2626	1.4580	2.5253
L.S.D 0.05%	2.6186	3.0237	5.2371

Spike length (cm)

The Spike length cm of wheat varieties as affected by various priming durations on are shown in Table-4. Results showed that maximum spike length 11.611 cm recorded at 1.5 hour priming, followed by 11.378 spike length cm resulted in 1 hour priming and minimum 9.413 spike length cm observed for control treatment. While, in case of varieties, the maximum 11.834. Spike length cm measured for TJ-83 and Kiran-95 ranked 2nd number and showed 10.543 Spike length cm. In this way, interaction resulted highest 12.800 Spike length cm in combination of 1.5 hour priming x Kiran-95 and lowest 8.800 Spike length cm observed in no priming x Tj-83.

Table 4. Effect of seed priming durations on spike length (cm) of wheat.

Priming durations	Varieties			Mean
	TD-1	Kiran-95	TJ-83	
No priming (Control)	9.2 d	10.2 c	8.8 e	9.4 C
30 minutes priming	10.3 c	11.8 b	9.8 d	10.6 B
1 hour priming	11.1 b	12.5 a	10.5 c	11.3 A
1.5 hour priming	11.4b	12.8 a	10.5 c	11.6A
Mean	9.9 C	10.5 B	11.8 A	

	Varieties	Priming durations	Varieties x Priming durations
S.E ±	0.0871	0.1006	0.1742
L.S.D $_{0.05\%}$	0.1806	0.2085	0.3612

Spikelet's spike^{-1}

The spikelet's spike^{-1} of wheat varieties as affected by various priming durations on are shown in Table-5. Results showed that maximum spikelet's spike^{-1}49.667 1 recorded at 1.5 hour priming, followed by 47.111 spikelet's spike^{-1} resulted in 1 hour priming and minimum 36.111 spikelet's spike^{-1} observed for control treatment. While, in case of varieties, the maximum 44.917 spikelet's spike^{-1} measured for TJ-83 and Kiran-95 ranked 2nd number and showed 43.500 spikelet's spike^{-1}. In this way, interaction resulted highest 54.00 spikelet's spike^{-1} in combination of 1.5 hour priming x Kiran-95 and lowest 32.33 spike length $^{-1}$ observed in 30 minutes priming x Kiran-95.

Table 5. Effect of seed priming durations on spikelet's spike^{-1} of wheat.

Priming durations	Varieties			Mean
	TD-1	Kiran-95	TJ-83	
No priming (Control)	36.0 g	41.0 e	33.0 i	36.1 C
30 minutes priming	41.0 e	32.3 j	35.0 h	36.6 C
1 hour priming	47.0 d	52.3 b	42.0 f	47.1 B
1.5 hour priming	50.0 c	54.0 a	45.0 e	49.6 A
Mean	38.7 C	43.5 B	44.9 A	

	Varieties	Priming durations	Varieties x Priming durations
S.E ±	2.9656	3.4244	5.9313
L.S.D $_{0.05\%}$	6.1504	7.1018	12.301

Grains spike^{-1}

The grains spike^{-1}of wheat varieties as affected by various priming durations on are shown in Table-6. Results showed that maximum grains spike^{-1} 46.667 recorded at 1.5 hour priming, followed by 45.333 grains spike^{-1} resulted in 1 hour priming and minimum 35.000 grains spike^{-1} observed for control treatment. While, in case of varieties, the maximum 46.750 grains spike^{-1} measured for TJ-83 and Kiran-95 ranked 2nd number and showed 37.833 grains spike^{-1}. In this way, interaction resulted highest 52.00 grains spike^{-1} in combination of 1.5 hour priming x Kiran-95 and lowest 26.33 grains spike^{-1} length observed in 30 minutes priming x TD-1.

Table 6. Effect of seed priming durations on grains spike^{-1} of wheat.

Priming durations	Varieties			Mean
	TD-1	Kiran-95	TJ-83	
No priming (Control)	34.0 h	40.0 g	31.0 i	35.0 C
30 minutes priming	26.3 j	45.0 d	35.0 f	35.4 C
1 hour priming	45.0 d	50.0 b	41.0 f	45.3 B
1.5 hour priming	46.0 c	52.0 a	42.0 e	46.6 A
Mean	37.2B	37.8 B	46.7 A	

	Varieties	Priming durations	Varieties x Priming durations
S.E ±	2.4432	2.8212	4.8864
L.S.D $_{0.05\%}$	5.0669	5.8508	10.134

Grains weight per spike (g)

The grains weight g of wheat varieties as affected by various priming durations on are shown in Table-7. Results showed that maximum grains weight g 1.3011 recorded at 1.5 hour priming, followed by 1.2789 grains weight g resulted in 1 hour priming and minimum 0.8089 grains weight g observed for control treatment. While, in case of varieties, the maximum 1.4867 grains weight g measured for TJ-83 and Kiran-95 ranked 2nd number and showed (-1) 1.4500 grains weight g. In this way, interaction resulted highest 1.4867 grains weight g in combination of 1.5 hour priming x Kiran-95 and lowest 0.7067 grains weight g length observed in no priming x TJ-83.

Table 7. Effect of seed priming durations on grain weight per spike (g) of wheat.

Priming durations	Varieties			Mean
	TD-1	Kiran-95	TJ-83	
No priming (Control)	0.9 b	0.8 b	0.7 b	0.8 B
30 minutes priming	1.3 a	1.2 a	0.9 b	1.1 A
1 hour priming	1.4 a	1.3 a	1.0 a	1.2 A
1.5 hour priming	1.3 a	1.4 a	1.0 a	1.3 A
Mean	1.3 A	1.4 A	1.4 A	

	Varieties	Priming durations	Varieties x Priming durations
S.E ±	0.0937	0.1082	0.1875
L.S.D 0.05%	0.1944	0.2245	0.3888

Seed index (1000- grains weight g)

The seed index g of wheat varieties as affected by various priming durations on are shown in Table-8. Results showed that maximum seed index 46.367 g recorded at 1.5 hour priming, followed by 45.911 seed index g resulted in 1 hour priming and minimum 39.567 seed index g observed for control treatment. While, in case of varieties, the maximum 46.900 seed index g measured for TJ-83 and Kiran-95 ranked 2nd number and showed 44.542 seed index g. In this way, interaction resulted highest 51.900 seed index g in combination of 1.5 hour priming x TD-1 and lowest 35.900 seed index g length observed in no priming x TJ-83.

Table 8. Effect of seed priming durations on seed index1000 grain weight grains.

Priming durations	Varieties			Mean
	TD-1	Kiran-95	TJ-83	
No priming (Control)	41.4 f	41.3 f	35.9 h	39.5 D
30 minutes priming	45.6 d	43.5 e	37.1 g	42.1C
1 hour priming	48.5 b	47.7 c	41.4 f	45.9B
1.5 hour priming	51.9 a	45.5 d	41.6 f	46.3 A
Mean	39.0 C	44.5 B	46.9 A	

	Varieties	Priming durations	Varieties x Priming durations
S.E ±	0.6120	0.7066	1.2239
L.S.D 0.05%	1.2691	1.4655	2.5383

Biological yield (Kg ha-1)

The biological yield kg ha of wheat varieties as affected by various priming durations on is shown in Table-9. Results showed that maximum biological yield kg ha 17174 recorded at 1.5 hour priming, followed by 11196 biological yield kg ha-1 resulted in 1 hour priming and minimum 9718 biological yield kg ha observed for control treatment. While, in case of varieties, the maximum 16335 biological yield kg ha measured for TJ-83 and Kiran-95 ranked 2nd number and showed 10676 biological yield kg ha. In this way, interaction resulted highest 34227 biological yield kg ha in combination of no priming x TJ-83 and lowest 7647 biological yield kg ha length observed in no priming x TD-1.

Table 9. Effect of seed priming durations on biological yield (kg ha) of wheat.

Priming durations	Varieties			Mean
	TD-1	Kiran-95	TJ-83	
No priming (Control)	7647d	9648c	34227e	9718B
30 minutes priming	9673c	10343b	9137c	10867A
1 hour priming	10527b	11253a	10820b	11196A
1.5 hour priming	10972b	11458a	11157a	17174A
Mean	9705C	10676B	16335A	

	Varieties	Priming durations	Varieties x Priming durations
S.E ±	5225.3	6033.7	10451
L.S.D 0.05%	10837	12513	21673

Grain yield (kg ha^{-1})

The grain yield kg ha of wheat varieties as affected by various priming durations able-10. Results showed that maximum grain yield kg ha 4322.4 recorded at 1.5 hour priming, followed by 4128.9 grain yield kg ha^{-1} resulted in 1 hour priming and minimum 3141.1 grain yield kg ha observed for control treatment. While, in case of varieties, the maximum 4238.4 grain yield kg ha measured for TJ-83 and Kiran-95 ranked 2nd number and showed 3867.1 grain yield kg ha. In this way, interaction resulted highest 4903.3 grain yield kg ha in combination of 1.5 hour priming x Kiran-95 and lowest 2775.0 grain yield kg ha length observed in no priming x TJ-83.

Table 10. Effect of seed priming durations on grain yield (kg ha) of wheat.

Priming durations	Varieties			Mean
	TD-1	Kiran-95	TJ-83	
No priming (Control)	3120.0 h	3528.3 g	2775.0 i	3141.1 D
30 minutes priming	3720.0 f	3905.3 e	3156.7 h	3594.0 C
1 hour priming	4230.0 d	4616.7b	3540.0 g	4128.9 B
1.5 hour priming	4398.3 c	4903.3 a	3665.7 F	4322.4 A
Mean	3284.3 C	3867.1 B	4238.4 A	

	Varieties	Priming durations	Varieties x Priming durations
S.E ±	29.822	34.435	59.644
L.S.D $_{0.05\%}$	61.847	71.415	123.69

Harvest index (%)

The harvest index % of wheat varieties as affected by various priming durations Table-11.Results showed that maximum harvest index % 38.478 recorded at 1.5 hour priming, followed by 37.984 harvest index % resulted in 1 hour priming and minimum 32.786 harvest index % observed for control treatment. While, in case of varieties, the maximum 39.906 harvest index % measured for TJ-83 and Kiran-95 ranked 2nd number and showed 39.668 harvest index %.In this way, interaction resulted highest 43.370 harvest index % in combination of 1.5 hour priming x Kiran-95 and lowest 22.177harvest index %length observed in 30 minutes priming x TJ-83.

Table 11. Effect of seed priming durations on harvest index (%) of wheat.

Priming durations	Varieties			Mean
	TD-1	Kiran-95	TJ-83	
No priming (Control)	40.8b	36.5 e	31.6 g	32.7 D
30 minutes priming	38.4c	37.7d	22.1 h	36.3 C
1 hour priming	40.2 b	40.9b	32.7 f	37.9 B
1.5 hour priming	40.1b	43.3a	31.9 CD	38.4A
Mean	29.6B	39.6 A	39.9A	

	Varieties	Priming durations	Varieties x Priming durations
S.E ±	2.0506	2.3678	4.1011
L.S.D $_{0.05\%}$	4.2526	4.9105	8.5052

Discussion

The results revealed that the effect of different seed priming durations application on different parameters were significant ($P<0.05$). The harvest treated 1.5 hour seed preparing turned out to be more compelling than rest of the medications with 87.33% seed germination, 88.00 cm plant stature, 3.5367 number of tillers m^2, 11.611 cm spike length, 49.667 spikelet's spike^{-1}, 46.667 grains spike^{-1}, 1.3011 g grain weight for every spike, 46.367 g seed list, 17174 kg ha^{-1} organic yield, 5695.67 kg ha^{-1}, 4322.4 kg ha^{-1} grain yield and. 38.478% gather record. The wheat trim given 1 hour seed preparing positioned second 82.556% seed germination, 85.00 cm plant stature, 350.11 m^2 number of tillers, 11.37cm spike length, 47.11 spikelet's spike^{-1}, 45.33 grain spike^{-1}, 1.2789 g grain weight for each spike, 45.91g seed record, 11196 kg ha^{-1} natural yield, 4128.9 kg ha^{-1} grain yield and 37.98% collect list. While, least all parameters recorded at control (no preparing, for example, diminished 69.22% seed germination, 78.11 cm plant tallness, 285.89 m^2 number of tillers, 9.413 cm spike length, 36.11 spikelet's spike^{-1}, 35.00 grain spike^{-1}, 0.8089 g grain weight for each spike, 39.567 g seed file, 9718 kg ha^{-1} natural yield, 3141.1 kg ha^{-1} grain yield and 32.786% reap file. On the off chance that there ought to be an event of verities, the most extraordinary 82.167% seed germination, 101.25 cm plant height, 347.00 m^2 number of tillers, 11.834 cm spike length, 44.917 spikelet's spike^{-1}, 46.750 grain spike^{-1}, 1.4867 g grain weight for every spike, 46.900 g seed list, 16335 kg ha^{-1} common yield, 4238.4 kg ha^{-1}

grain yield 39.906, % procure rundown and 1 showed up by TJ-83. Also 80.66% seed germination, 83.75 cm plant tallness, 325.25 m^2 number of tiller, 10.543 cm spike length, 43.900 spikelet's $spike^{-1}$, 37.833 grain $spike^{-1}$, 1.4500 g grain weight for every spike, 44.542 g seed file, 10.676 kg ha^{-1} natural yield, 38.67.1 kg ha^{-1} grain yield, 39.668% collect list and appeared by Kiran-95. While from collaboration perspective, the most extreme 91.33% seed germination, 106.00 cm plant stature, 365.00 m^2 number of tillers, 12.800 cm spike length, 54.00 spikelet's $spike^{-1}$, 52.00 grain $spike^{-1}$, 1.4867 g grain weight for every spike, 51.900 g seed file 34227 kg ha^{-1} organic yield kg ha^{-1}, 4903.3 grain yield, 43.370% gather record, appeared by 1.5 hour preparing x Kiran-95. Our outcomes are concurrence with various specialists who dealt with hydro preparing in connection to wheat and others crops. Seed germination was fundamentally higher with all the preparing medicines contrasted with that with the control. Wheat seed prepared with GA–20 brought about most extreme germination and was at standard with HP–12 took after by Gyp–10, Gyp–30, and GA–60. Tillers were like that with control for all the preparing medications aside from HP–12.

Plant stature was not measurably influenced by medicines. Fundamentally the most noteworthy shoot weight was recorded for HP–12 taken after by GA–20, GA–60, Gyp–10, Gyp–30 and control (22.59, 20.39, 19.89, 19.71, 19.38 and 16.50 g pot-1, individually). Saline-sodic water system antagonistically influences physical and synthetic properties of soils that, thus, unfavorably influence seed germination and seedling development (Rashid *et al*., 2006).Studied to find out the response of wheat (*Triticum aestivum* L.) cultivars (Lasani-2008, Auqab-2000) to foliar application of 1 % potassium at different growth stages (tillering, flower initiation and milking) was carried out under water limited environment, at the Nuclear Institute for Agriculture and Biology (NIAB), Faisalabad during 2008-09. Drought stress at all three critical growth stages adversely affected plant height, spike length, number of spikelet's per spike, number of grains per spike, 1000-grain weight and grain yield of wheat plant.

Foliar application of K at all three critical growth stages improved the drought tolerance of plants and improved the growth and yield components, however, grain filling stage was found more responsive (Aown *et al.,* 2012). Study was conducted to ascertain a suitable planting time and seed treatment for wheat. Different planting times included November15, November 30 and December 15. The seed treatments were comprised of unsoaked, water soaked and 1% $NaHCO_3$ soaked seed. The water soaked and 1% $NaHCO_3$ seed treatments produced higher yield of 4.618 t ha-1 and maximum average grain yield of 5.09 t ha-1 was produced by sowing of wheat on November 15. Water soaked seeds sowing at November 15 was superior in all respect (Shahzad *et al.,* 2007). Different seed priming techniques on germination and morphological characters of wheat an experiment was conducted in 2010 in a factorial experiment based on the complete randomized block design with 2 factors in iran. Seeds were primed for 15, 30 and 45 hours in seven priming media (PEG 5%, PEG 10%, KNO_3 1%, KNO_3 2%, KCl 4%, KCl2% and distilled water as control). Maximum seed germination percentage was observed when seed primed by PEG 10% for 45 h. The most stem and radical length were obtained for seeds with KCl 2% and KCl 4% for 45 h. Rate of germination was improved when the seed soaked water and PEG 10%. There was interaction between seed priming media × priming duration showed the beneficial effects on germination percentage, stem length (Lemrasky and Hosseini, 2012).Experiments were conducted during rabi season of 2012 and 2013 to study the effect of seed priming on germination, growth, biochemical changes and yield of tolerant KRL 210and susceptible HD 2733 varieties under sodic soil at the research farm of Department of Genetics and Plant Breeding, Narendra Deva University of Agriculture & Technology, Kumarganj, Faizabad (U.P.). Seed priming was done by soaking the seeds for 12 hours in distilled water, KNO_3 (3%), KCl (1%), GA_3 (150 ppm) and cycocel 500 ppm. Application of primers brought a considerable increase in germination and growth parameters like plant height, tiller numbers and plant dry weight.

The biochemical parameters viz., total chlorophyll content and starch content showed a significant increase due to seed priming. Seed priming also significantly enhanced the ear bearing tiller plant-1, number of grain ear-1 and grain yield plant-1. Among different treatments, KNO3 (3%) was found superior among all the priming treatments and significantly higher than rest of the treatments (Kalpana *et al.,* 2015).

Conclusion

Based on the results, it is concluded that 1. 5 hours seed priming has positive effect on growth and yield traits of wheat varieties. However in case response of varieties to different priming durations for growth and yield, the TJ-83 produced better results and secondly Kiran-95. While from interaction point of view, all maximum wheat characteristics, such as maximum seed germination, plant height, number of tillers, spike length, spikelet's spike^{-1}, grain spike^{-1}, grain weight per spike, seed index, biological yield kg ha^{-1}, grain yield kg ha^{-1} and harvest index resulted at 1.5 hour priming x Kiran-95.

Acknowledgment

Thankful to friends who helped to make this research complete.

References

Aown M, Raza S, Saleem MF, Anjum SA, Khaliq T, Wahid MA. 2012. Foliar application of potassium under water deficit conditions improved the growth and yield of wheat (*Triticum aestivum* L.). The Journal of Animal and Plant Sciences **22(2)**, 431-437.

Guzman F, Olave S. 2006. Seed priming winter wheat for germination, emergence and yield. Crop Science Society America **43,** 2135-2141.

Iqbal M, Khan MA, Anwar MZ. 2002. Zero-tillage technology and farm profits: a case study of wheat growers in the rice zone of Punjab. Pakistan Development Review **41,** 665-682.

Kalpana, Khan AH, Singh AK, Maurya KN, Mubeen, Yadava RK, Singh U, Gautam AR. 2015. Effect of different seed priming treatments on germination, growth, biochemical changes and yield of wheat varieties under sodic soil. International Journal of Science and Research **4(7)**, 306-310.

Lemrasky MG, Hosseini SZ. 2012. Effect of seed priming on the germination behavior of wheat. International Journal of Agriculture and Crop Sciences **4(9)**, 564-567.

Rashid A, Hollington PA, Harris D, Khan P. 2006. On-farm seed priming for barley on normal, saline and saline-sodic soils in North West Frontier Province, Pakistan. European Journal of Agronomy **24,** 276–281.

Shahzad MA, Wasi-ud-Din, Sahi ST, Khan MM, Ehsanullah, Ahmad M. 2007. Effect of sowing dates and seed treatment on grain yield and quality of wheat. Pakistan Journal of Agriculture Science **44(4)**, 581-583.

Subyani A. 2005. Hydrochemical identification and salinity problem of ground-water in Wadi Yalamlam basin, western Saudi Arabia. Journal of Arid Environments **60,** 53-66.

Taylor AG, Allen PS, Bennett MA, Bradford KJ, Burrisand JS, Misra MK. 2003. Seed enhancements. Seed Science Research 245- 256.