



EFFECT OF DIFFERENT OPTIMIZED TIME PATTERNS OF PRESOAKING FOR MAXIMUM GERMINATION IN WHEAT AND JOWAR

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Abstract: The experiment were carried out to study to determine optimum time of presoaking for maximum germination in wheat & jowar. Physiochemical process is affected by the conditions of the environment in which it occurs. There is always a minimum optimum and maximum for each factor in relation to germination. In this experiment seeds 1 gm each time, were presoaked in 5 ml water before and after air drying to determine the water uptake and the best soaking duration period. The seeds were presoaked before and after air drying for periods from 0 to 24 hours. The beneficial effects of growth through the presoaking technique have been observed. The data presented in this experiment clearly indicate that presoaking treatments enhance the plant vigor. However, the seeds need to be soaked for a definite period of time. Soaking for more hours than optimum determined, is detrimental as found in present experiments.

Key Words: Optimum Time; Presoaking; Germination; Wheat; Jowar

INTRODUCTION

Evenari (1961) identified germination as the sum of all the physiological processes occurring inside the seed, which start with the imbibition of water and end with the protrusion of the embryonic root. Germination, like any other physiochemical process, is affected by the conditions of the environment in which it occurs. There is always a minimum optimum and maximum for each factor in relation to germination. Presoaking of the seed is described as a treatment preliminary to sowing during which seeds are moistened and dried back (once or a number of times) to activate certain physiological and biochemical processes which will enhance the seedling growth and final productivity (Henckel, 1964; Heydecker, 1973; Saxena, 1985).

In India presoaking method was first tried by Chinoy (1947) in wheat, and Parija (1953) in the rice. The process involved a single soaking in water for about 24 h (30% moisture by weight) at 10 to 25°C and drying back to the original weight. Modifications were suggested in repeated cycles of: soaking and drying. In the present investigation, effects of presoaking of seeds of wheat and jowar, were studied for determining the optimum soaking period,

MATERIAL AND METHODS

Seeds of 2 crops, wheat (cv. 147), jowar (cv. M-35-1 MSSC) were studied in this investigation. In each experiment the seeds were divided into 2 lots: Lot [A] was soaked in water and Lot [B] was air dried for 24 hours at room temperature and then soaked in water.

In this experiment seeds 1 gm each time, were presoaked in 5 ml water before and after air drying to determine the water uptake and the best soaking duration period. The seeds were presoaked before and after air drying for periods from 0 to 24 hours. The seeds were then rolled in filter paper and % germination root length, shoot length, were measured after 5 days. The fresh weight of root, shoot and leaf were determined. The samples were then kept in an oven at 60°C for 24 hrs for the determination of dry weight.

RESULTS

Following is the observation of effects of presoaking of seeds of wheat, jowar, were studied for determining the optimum soaking period, In Table 1 (a) and (b) Effect of duration of presoaking of wheat and In Table 2 (a) and (b): Effect of duration of presoaking of jowar.

Table 1(a): Effect of duration of presoaking of wheat on % germination, root length, shoot length and leaf.

Duration of soaking (Hrs)	% Germination	ROOT			SHOOT			LEAF	
		LN	FW	DW	LN	FW	DW	FW	DW
0	43.33	5.87	114.0	20.33	3.03	115.0	13.67	104.0	12.33
1	53.33	5.17	115.7	22.00	3.17	122.3	14.67	107.7	13.67
2	56.67	5.23	118.3	24.00	3.30	127.3	17.67	103.0	16.33
3	63.33	5.47	120.7	26.00	3.53	132.3	21.00	124.0	18.33
4	63.33	5.53	121.7	29.00	4.13	138.3	26.33	128.0	22.33
5	83.33	5.73	126.7	31.00	4.73	142.3	38.67	132.3	26.00
6	93.33	7.83	122.7	35.33	3.10	146.7	41.00	142.3	32.33
7	46.67	5.33	121.0	31.00	3.00	126.7	36.33	136.7	33.33
8	63.33	3.53	118.0	30.67	2.77	126.7	34.67	134.7	31.33
9	26.67	3.13	115.7	28.67	2.77	125.3	31.33	132.0	30.33
10	20.33	2.23	112.3	27.67	2.67	124.0	31.67	131.3	24.00
24	13.33	2.07	104.3	26.00	2.47	106.0	27.33	130.7	23.00
S.E.	2.48	0.13	0.32	0.57	0.03	0.80	0.48	0.44	0.49
C.D.	5.14	0.26	0.66	1.18	0.06	1.65	0.99	0.91	1.01
(P=0.05)									

LN = Length, FW – Fresh Weight, DW – Dry Weight.

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Table 1(b): Effect of duration of presoaking of wheat after air drying on % germination, root length, shoot length and leaf.

Duration of soaking (Hrs)	% Germination	ROOT			SHOOT			LEAF	
		LN	FW	DW	LN	FW	DW	FW	DW
0	63.33	2.83	114.3	15.00	1.83	113.7	19.33	103.3	14.67
1	73.33	2.90	121.0	17.00	1.90	115.7	20.33	105.7	15.33
2	80.00	3.83	125.3	21.00	2.03	118.7	24.33	108.0	16.33
3	86.67	3.93	128.7	23.00	2.17	122.3	23.33	73.3	19.00
4	86.67	4.10	129.0	25.33	2.43	123.7	22.33	106.0	21.00
5	90.00	4.17	133.7	28.00	2.43	128.0	25.67	106.7	23.00
6	100.00	5.10	143.3	38.67	3.83	134.0	32.33	120.7	29.00
7	83.33	3.87	142.7	36.00	3.03	131.3	29.00	106.0	29.33
8	76.67	2.60	140.3	33.00	2.93	130.7	29.33	101.3	28.33
9	66.67	2.87	134.0	32.00	2.73	125.7	27.00	100.0	27.67
10	53.33	2.23	131.3	21.67	2.17	86.0	25.33	98.3	24.67
24	20.00	1.03	130.3	21.00	2.03	120.3	24.67	97.0	22.00
S.E.	2.86	0.04	0.48	14.31	0.05	0.67	0.38	0.37	0.27
C.D. (P=0.05)	5.93	0.08	0.99	29.67	0.10	1.38	0.78	0.76	0.55

LN - Length, FW - Fresh weight, DW - Dry weight.

Table 2(a): Effect of duration of presoaking of jowar on % germination, root length, shoot length and leaf.

Duration of soaking (Hrs)	% Germination	ROOT			SHOOT			LEAF	
		LN	FW	DW	LN	FW	DW	FW	DW
0	53.33	6.77	111.7	23.33	4.03	112.7	14.33	102.0	13.00
1	56.67	6.83	115.3	25.67	4.17	115.0	16.00	104.7	15.00
2	56.67	8.83	117.3	32.00	4.20	119.0	21.00	110.0	17.00
3	63.33	8.83	119.3	35.33	4.33	122.3	23.00	113.3	18.67
4	73.33	9.03	124.3	34.67	4.87	129.0	23.67	117.0	19.33
5	77.00	9.20	126.7	36.00	5.33	135.0	29.00	119.3	25.67
6	56.67	8.77	126.3	36.00	5.20	126.3	30.00	113.3	21.67
7	56.67	6.83	122.3	26.67	4.53	124.3	24.00	111.3	21.67
8	30.00	6.73	114.7	23.00	6.67	122.7	21.67	98.67	21.00
9	30.00	3.53	114.0	21.67	4.93	118.7	22.67	97.0	18.00
10	23.33	6.23	111.0	21.00	4.83	112.3	20.33	95.3	15.67
24	20.00	6.13	101.0	16.33	3.87	102.0	12.00	97.0	11.33
S.E.	2.33	0.04	0.51	0.52	0.12	0.80	0.40	0.37	0.50
C.D. (P=0.05)	4.83	0.08	1.05	1.19	0.24	1.65	0.82	0.76	1.03

LN - Length, FW - Fresh weight, DW - Dry weight.

Table 2 (b): Effect of duration of presoaking of jowar after air drying on % germination, root length, shoot length and leaf.

Duration of soaking (Hrs)	% Germination	ROOT			SHOOT			LEAF	
		LN	FW	DW	LN	FW	DW	FW	DW
0	46.67	0.83	140.3	10.00	2.13	113.7	14.33	123.7	11.67
1	50.00	6.47	191.0	10.00	2.23	114.7	15.00	122.0	12.00
2	60.00	6.50	201.3	12.67	3.23	119.3	21.00	122.7	13.00
3	66.67	7.83	202.0	17.00	3.33	121.7	21.67	125.3	13.67
4	73.33	9.10	300.0	18.33	4.33	124.7	22.67	127.7	15.33
5	90.00	9.53	352.0	18.67	5.53	125.3	26.00	131.0	17.00
6	63.33	8.53	301.3	13.00	7.20	123.7	28.67	130.3	16.67
7	63.33	11.83	231.7	12.00	6.27	118.7	20.33	126.0	14.67
8	50.00	10.57	202.7	10.67	5.37	114.0	21.33	128.0	13.67
9	43.33	6.23	201.3	9.00	5.33	106.7	21.67	126.3	12.67
10	40.00	6.03	192.0	8.00	4.73	101.0	21.67	121.7	11.33
24	33.33	5.20	181.7	8.00	4.17	100.3	18.00	120.0	10.33
S.E.	2.84	0.06	0.52	0.61	0.12	6.83	7.15	7.67	0.38
C.D. (P=0.05)	5.89	0.02	1.07	1.26	0.24	14.16	14.82	15.90	0.78

LN - Length, FW - Fresh weight, DW - Dry weight.

RESULTS AND DISCUSSION

The results in Tables 1(a) and 1(b) show that from 93 to 100% germination of wheat seeds was possible when the seeds were soaked in distilled water without or after air drying for a period of 6 hrs. The growth of root, shoot and leaf was also best at this soaking period. The percentage germination dropped between 13 and 20% when seeds were soaked in water beyond 6 hrs to 24 hours.

In general, the dry weight was maximum in shoots when seeds were presoaked before air drying. The dry weight was usually maximum in roots in seeds kept for germination after air drying, the root length ranged from 5.17 to 7.83cms and from 2.90 to 5.10 cm in seeds from lot (A) and lot (B) respectively. In 1 to 6 hrs soaking time the shoot length for the same period ranged from 3.10 to 4.73 and from 1.90 to 3.83 respectively. The dry weight (in mg) of the root, shoot and leaf in presoaked seeds kept for germination without air drying ranged from 22.0 to 35.3, 14.67 to 41.0 and 13.67 to 32.33 respectively.

Table 2 gives findings on jowar seeds. The best results in case of jowar were obtained at 5 hrs soaking period. At this period the % germination ranged from 77 to 90%. There was a steady decline in the % germination in both the lots (A) and (B) when the soaking period was increased From 5 to 24 hrs. At 24 hrs, the % germination was as low as 20 and 33 in lots (A) and (B) respectively.

The length of the root and shoot ranged between 6.83 and 9.20, and 4.17 to 5.33 in roots and shoots in presoaked seeds (Table 2a). During the same period the root length and shoot length in seeds soaked in water after air drying (lot B) ranged from 6.47 to 9.53 and from 2.23 to 5.53 respectively. The dry weight of root, shoot and leaf was at its maximum at 5hrs soaking time 36mg in root, 29mg in shoot, 25.7mg in leaf in presoaked seeds kept for germination without air drying and 18.7 mg, 27.0, 17.0mg respectively in seeds kept for germination after air drying.

CONCLUSION

The present study and the available literature reviewed in the paper lead to the conclusion that, the effects of growth through the presoaking technique is beneficial. The data presented in this experiment clearly indicate that presoaking treatments enhance the plant vigor. However, the seeds need to be soaked for a definite period of time. Soaking for more hours than optimum determined, is detrimental as found in present experiments.

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