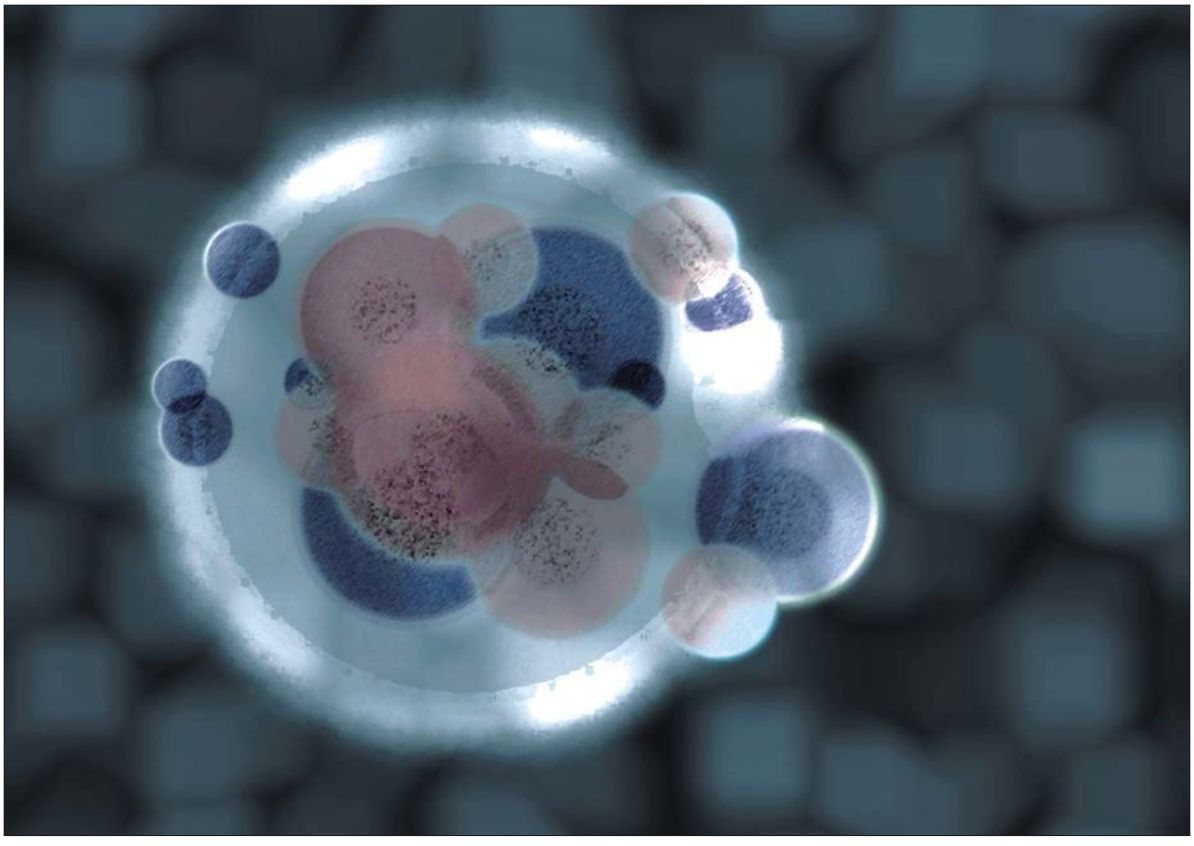

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Onion Shelf-life as Function of the Levels of Nitrogen and Potassium Application

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Abstract: Minimum sprouting and percent rotten bulbs were noted in trails received no inorganic fertilizer. Maximum weight loss was noted during 18.9.1996 to 3.10.1996 in NPK at 90-100-60 kg/ha (16.32%) and at 90-100-120 kg/ha (13.58%) while minimum weight loss was observed through out the storage period (2.7.1996-31.10.1996) in treatments FYM only and control. Data collected for bulb sizes showed significant differences between the two sizes. Small bulbs always showed higher percent weight loss and rotting while percent sprouting was maximum in larger bulbs.

Key words: Nitrogen, Potassium, Onion, Shelf-life

Introduction

Normally growers, who market the crop soon after harvest rather than storing the bulbs, can obtain larger onions by increasing nitrogen level. In comparison, if crop is going to be stored, growers may want to reduce nitrogen application because excess nitrogen tends to produce softer bulbs, and softer bulbs get rotted sooner. Jayabharathi (1989) reported that the percent loss in dry weight during post harvest storage was greater for top size bulbs (average weight 114.09 g for 25 bulbs prior to storage). Shukla *et al.* (1989) also reported that storage loss over 144 days was significantly lower in cv `Arka Niketan' compared with cv. `Arka Kalyan'. Singh and Dhankar (1991) concluded that bulb weight loss and incidence of rotting and sprouting were increased by increasing application of K_2O (100 kg/ha) and bulbs grown with 80 kg N/ha and 100 kg K_2O/ha had the best storage quality. Singh *et al.* (1994) concluded that storage quality of cv. `Pusa Red' held at room temperature decreased with increasing rates of N (upto 200 kg/ha).

Materials and Methods

The trial was conducted at Agricultural Research Institute, Dera Ismail Khan during the year 1996. The experiment was laid out on the methodology of 2-factorial Complete Randomized Design having four replications.

The source of fertilizer for nitrogen, phosphorus and potash was urea, single super phosphate and potassium sulphate, respectively. Nitrogen fertilizer was applied in two split doses. First dose along with phosphorus and potash was applied at the time of transplantation while the remaining half was applied 30 days after transplantation.

All the required cultural practices such as irrigation, weeding, pest and disease control etc. were conducted uniformly in all plots whenever necessary. The bulbs were harvested on June 10, 1996 and before being transferred to the store, were graded into two standard sizes i.e., small (having diameter of 3 cm horizontally) and large (3-6 cm in diameter) by using Manual Hand Grader.

The cumulative loss in weight due to rotting, sprouting and drying represented total weight loss. Bulbs of each size weighed before being transferred to the store. Weight loss occurred between 2.7.96-18.7.96, 18.7.96-3.8.96, 3.8.96-18.8.96, 18.8.96-2.9.96, 2.9.96-18.9.96, 18.9.96-3.10.96, and 3.10.96-31.10.96 was calculated while rotting and sprouting percentage between 3.8.1996-2.9.1996 and 2.9.1996-31.10.1996 was also estimated.

To test the differences among means procedure of Duncun's Multiple Range Test was adopted (Steel and Torrie, 1980). The data was analysed using MSTATC computer software.

Results and Discussion

Percent Weight loss: Significant results were found while comparing two means of bulb sizes in case of D_2 (18-7-96 to 3-8-96). Small bulbs showed minimum weight loss (0.23%), while greater loss was noted in large bulbs i.e., 5.56%. Similarly, significant differences were found between the two means in case of D_7 (3-10-96 to 31-10-96), but here small bulb showed greater weight loss (11.21%) as compared to large ones i.e. (5.97%). Rest of the data regarding means of the two sizes showed non-significant results. Large bulbs showed greater weight loss during their early period of storage i.e., during D_1 and D_2 as compared to D_4, D_6 and D_7, where smaller bulbs showed slightly greater weight loss than large bulbs. As for interaction between the fertilizer levels and bulb sizes is concerned, non-significant results were found (Table 1).

Percent rotting: Significant differences were found between two bulb sizes in case D_2 (2-9-96 to 31-10-96). Minimum rotting occurred in large bulbs (3.15%) as compared to small bulbs where rotting is (6.92%). Non-significant results have been obtained, in case of interaction between the treatments and bulb sizes (Table 2).

Percent sprouting: Data collected for percent sprouting between different dates in Table 2 shows that in case of D_1 (3-8-96 to 2-9-96) no sprouting was observed in small bulbs, therefore, sprouting percentage only for large bulbs is given in the table. Differences were found non-significant among different fertilizer levels in both D_1 and D_2.

Significant differences were found between the two sizes in case of D_2 (2-9-96 to 31-10-96), where minimum sprouting (9.79%) occurred in small size bulbs compared to large size where sprouting was found 13.62%. So far the interaction between different treatments and bulb sizes is concerned non-significant results were obtained.

Table 1: Percentage weight loss occurred at different dates as affected by N and K

	Treatment									
	T1	T2	T3	T4	T5	T6	T7	T8	T9	Mean
D_1 = (2-7-96 to18-7-96)										
S	3.34	4.43	5.70	2.04	3.75	4.19	3.15	2.99	4.11	3.74b
L	10.45	10.12	3.08	5.15	8.96	9.25	6.43	7.45	14.24	8.35a
Means	6.88	7.27	4.39	3.59	6.35	6.72	4.79	5.22	9.18	
D_2 = (18-7-96 to 3-8-96)										
S	1.44	0.06	0.08	0.10	0.04	0.10	0.08	0.08	0.08	0.23b
L	15.45	13.59	1.89	5.48	1.09	4.81	1.52	9.40	6.86	5.56a
Means	8.43	1.83	6.98	2.77	0.56	2.45	0.80	4.75	3.47	
D_3 = (3-8-96 to 18-8-96)										
S	1.09	0.76	2.10	5.26	6.36	3.27	5.96	2.25	3.20	3.36
L	1.14	6.00	11.45	3.59	2.27	3.58	4.88	3.33	8.89	4.35
Means	1.11	0.39	6.77	4.42	4.32	3.43	5.42	2.79	6.05	
D_4 = (18-8-96 to 2-9-96)										
S	6.75	5.94	7.70	8.17	7.53	6.37	9.03	8.06	9.35	7.65
L	3.57	5.87	8.99	3.71	10.56	4.40	4.81	4.36	2.87	5.46
Means	5.16	5.90	8.35	5.94	9.04	5.38	6.92	6.21	6.11	
D_5 = (2-9-96 to 18-9-96)										
S	3.94	11.04	5.83	10.42	5.76	8.56	17.32	10.45	14.71	9.73
L	11.81	3.95	11.49	7.67	8.66	8.36	4.77	4.71	9.79	7.91
Means	7.67	7.49	8.68	9.05	7.21	8.46	11.04	7.58	12.25	
D_6 = (18-9-96 to 3-10-96)										
S	11.88	8.10	12.19	11.83	9.85	2.71	13.82	10.57	17.62	10.06
L	6.67	4.21	6.03	10.08	6.67	4.63	18.78	6.64	9.50	8.13
Mns	9.27	9.16	9.11	10.96	8.26	3.67	16.32	8.60	13.58	
D_7 = (3-10-96 to 3-10-96)										
S	12.38	8.13	10.79	11.81	9.74	7.64	11.48	14.38	14.54	11.21a
L	10.45	10.12	3.08	5.15	8.96	9.25	6.43	7.45	14.24	5.97b
Mns	6.88	7.27	4.39	3.59	6.35	6.72	4.79	5.22	9.18	

Means followed by different letters are significantly different at 5% probability using DMRT

S = small size L = large size Mns = Means

D_1 = 2.7.96 to 18.7.96; D_2 = 18.7.96 to 3.8.96; D_3 = 3.8.96 to 18.8.96; D_4 = 18.8.96 to 2.9.96; D_5 = 2.9.96 to 18.9.96; D_6 = 18.9.96 to 3.10.96; D_7 3.10.96 to 3.10.96

Table 2: Percent bulb rotting and sprouting occurred between different dates as affected by N and K

Treatment	D_1			D_2			D_1		D_2		
	S	L	Mns	S	L	Mns	S	L	S	L	Mns
T_1 Control	2.72	0.00	1.36	7.65	0.00	3.83	0.00	0.00	7.87	5.55	6.71
T_2 FYM Only	2.69	13.73	8.21	2.31	3.57	2.94	0.00	0.44	7.49	5.63	6.56
T_3 00-100-90	4.68	4.69	4.68	6.76	0.06	3.41	0.00	0.00	14.06	14.30	14.18
T_4 60-100-90	8.93	6.18	7.55	9.27	1.30	5.29	0.00	0.95	12.54	11.40	11.97
T_5 90-100-90	4.20	11.08	7.64	8.05	0.00	4.03	0.00	0.89	7.03	23.58	15.30
T_6 120-100-90	5.60	1.79	3.68	4.89	7.13	6.01	0.00	1.35	9.28	17.76	13.52
T_7 90-100-60	10.67	7.65	9.16	6.39	4.60	5.49	0.00	0.54	14.40	18.33	16.36
T_8 90-100-60	32.48	6.18	19.33	9.24	4.80	7.02	0.00	0.83	9.99	14.33	12.16
T_9 90-100-120	10.68	2.88	6.78	7.70	6.87	7.28	0.00	0.45	5.43	11.75	8.69
Means	9.18	6.02		6.92a	3.15b					9.79b	13.62a

Means followed by different letters are significantly different at 5% probability using DMRT

S = small size L = large size Mns = Means

D1 = (3-8-96 to 2-9-96) D2 = (2-9-96 to 31-10-96)

The main objective of this study was to see if application of potassium may improve the shelf-life of onion and nitrogen result in low quality storage. But no encouraging results were observed. The variety Swat-1 did not response to the application of nitrogen and potassium. No work seems to have been done on shelf-life of onion variety Swat-1 so the results cannot be compared. The result recorded in this study agree with that of Shukla *et al. (*1989) who found no significant

differences between nitrogen treatments for keeping quality but contrary to the results of Singh *et al.* (1994).

Bulbs were stored just after harvesting and after necessary field curing. Data were collected on percent weight loss, percent rotten bulbs and percent sprouting fortnightly. No significant differences were found among the fertilizer levels. However, it was observed that minimum bulbs sprouting and percent rotten bulbs were noted in bulbs receiving no inorganic fertilizer. Similar results were found for weight loss.

Data collected for bulb sizes showed significant differences between the two sizes. Small bulbs always showed higher percent weight loss and percent rotten bulbs, while percent sprouting was maximum in larger bulbs at the end of storage period.

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