

Effect of NPK, bulb size and spacing on yield of pran (top onion) under temperate rainfed conditions

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The present investigation was carried out at the experimental field of the division of vegetable science, Sher-e-Kashmir university of agricultural sciences and technology of Kashmir, Shalimar during for ascertaining suitable spacing, bulb size and NPK combination for maximizing yield and quality of top onion (Pran). The experiment comprising of 27 treatment combinations was laid out as a randomized complete block design with each treatment combination replicated three times. Three bulb sizes (2.5-5.0,

5.1-7.5 and 7.6-10.0 g), three spacings (20 × 10, 20 × 15 and 20 × 20 cm) and three NPK fertilizer levels (80:60:40, 100:80:60 and 120:100:80 NPK kg^{ha}⁻¹) in various combinations were tried in the experiment. The findings reveal that among various treatment combinations, F3B3S3 combination (120:100:80 NPK kg^{ha}⁻¹, 7.6-10.0 g bulbs and 20 × 20 cm spacing) recorded highest values for number of bulbs (8.72), bulb length (6.73 cm), bulb diameter (2.79 cm), bulb weight (16.44 g), bulb weight per plant (141.75 g). However highest yield per hectare (37.72 tha⁻¹) was recorded for F₂B₂S₂ treatment combination (100:80:60 NPK kg^{ha}⁻¹, 5.1-7.5 g bulbs and 20 × 15 cm spacing).

Key Words: Pran; Top onion; Kashmir; NPK; Spacing; Bulb size

INTRODUCTION

Pran (*Allium x cornutum* Clementi ex Visiani) is a triploid viviparous species of genus *Allium*, extensively grown in Kashmir from times immemorial [1,2]. Pran is a cool season spice crop which grows well in mild climatic conditions. Being a long duration, rainfed and less labour intensive, this crop is cultivated on lofty hills where irrigation facilities seldom exist. It is more cold-hardy than onion and tolerates frost to a greater extent. Pran is traditionally cultivated in Kashmir and it is very popular as a spice and condiment due to its tasty bulbs and leaves. It is highly relished in Kashmiri kitchens in the preparation of soups, meat and salads. In the absence of scientific information with regard to appropriate nutrient dosage, spacing

and bulb size for propagation in pran, it is difficult to reckon and realize the objective of higher yield. The present investigation was carried out to find the appropriate nutrient dose, bulb size and spacing for yield maximization in pran.

MATERIALS AND METHODS

The experiment was conducted in two successive years and laid out in random block design with 27 treatments and 3 replications as detailed below. Three factors *viz.*, NPK, spacing and bulb size were taken for evaluation, each at three different levels in different forming 27 treatment combinations as given below (Tables 1 and 2).

TABLE 1

Experiment was conducted in two successive years and laid out in random block design with 27 treatments and 3 replications as detailed below

No. of levels	I	II	III
NPK	F1: 80:60:40 Kg ^{ha} ⁻¹	F2: 100:80:60 Kg ^{ha} ⁻¹	F3: 120:100:80 NPK Kg ^{ha} ⁻¹
Spacing	S1: 20 cm × 10 cm	S2: 20 cm × 15 cm	S3: 20 cm × 20 cm
Bulb size	B1: Small (2.5-5.0 g)	B2: Medium (5.1-7.5 g)	B3: Large (7.6-10 g)

TABLE 2

Spacing and bulb size were taken for evaluation, each at three different levels in different forming 27 treatment combinations

	F1			F2			F3		
	S1	S2	S3	S1	S2	S3	S1	S2	S3
B1	F1B1S1	F1B1S2	F1B1S3	F2B1S1	F2B1S2	F2B1S3	F3B1S1	F3B1S2	F3B1S3
B2	F1B2S1	F1B2S2	F1B2S3	F2B2S1	F2B2S2	F2B2S3	F3B2S1	F3B2S2	F3B2S3
B3	F1B3S1	F1B3S2	F1B3S3	F2B3S1	F2B3S2	F2B3S3	F3B3S1	F3B3S2	F3B3S3

Observations were recorded on various growth, yield and quality attributes of top onion. Ten competitive plants were selected at random from each

treatment and tagged for recording observations. Mean values for all the characters were worked out. The bulbs obtained from uprooting ten

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randomly selected plants were weighed expressed as bulb weight per plant in grams for all the treatment combinations in all the replications. The bulb yield per hectare was computed based on bulb yield per plot and expressed in tonnes per hectare.

RESULTS AND DISCUSSION

The results of the experiment (Table 3) showed that maximum fresh bulb weight of 16.44 g was registered in treatment combination F3B3S3 (120:100:80 NPK kg^{ha}⁻¹+7.6-10.0 g bulb size and 20 × 20 cm spacing) after pooling the two-year data. This was followed by treatment combination F3B2S3 (120:100:80 NPK kg^{ha}⁻¹+5.1-7.5 g bulb size and 20 × 20 cm spacing) which registered the fresh bulb weight of 16.34 g in pooled analysis. Lowest fresh bulb weight of 8.04 g was registered in treatment combination F1B1S1. Maximum fresh yield of 37.72 tha⁻¹ was registered in treatment combination F2B2S2 after pooling the two-year data. This was followed by treatment combination F2B3S2 which registered the fresh yield of 37.70 tha⁻¹

in pooled analysis. Lowest fresh yield of 28.03 tha⁻¹ was registered in treatment combination F1B1S1 (Table 4).

Number of bulbs per plant, bulb length, bulb diameter, fresh bulb weight and fresh weight of bulbs per plant were significantly increased by using medium weight and large bulb weight in both seasons. This could be a result of the positive effect of available food reserves in large bulbs, which might have improved crop establishment and consequently increased growth characters and subsequently yield attributes like number of bulbs per plant, bulb length, bulb diameter, fresh bulb weight and fresh weight of bulbs per plant. Bulb size is related to planting density and smaller bulbs are formed at closer spacing. Close spacing of individual plants suffers much from competition and the crop may be improved in too wide spacing; however, the yield per hectares may be reduced because of reduction in plant number. The results are in accordance with findings of Faheema, et al. Hussain, et al. [3,4].

TABLE 3
Effect of NPK, bulb size and spacing on bulb weight (g) of Pran (Top onion)

Bulb size (g)	Bulb weight (g)												Overall mean
	F1 80:60:40Kgha ⁻¹ NPK				F2 100:80:60 NPK Kgha ⁻¹				F3 120:100:80 NPK Kgha ⁻¹				
	Spacing (cm)			Mean	Spacing (cm)			Mean	Spacing (cm)			Mean	
	20 × 10 (S1)	20 × 15 (S2)	20 × 20 (S3)		20 × 10 (S1)	20 × 15 (S2)	20 × 20 (S3)		20 × 10 (S1)	20 × 15 (S2)	20 × 20 (S3)		
2.5-5.0 (B1)	8.04	10.53	12.62	10.4	9.22	12.11	15.05	12.13	9.82	12.42	15.28	11.68	28.72
5.1-7.5 (B2)	8.51	10.97	12.89	10.79	10.42	13.08	16.21	13.24	10.09	13.57	16.34	12.45	33.43
7.6-10 (B3)	8.47	11.23	13.45	11.05	10.31	12.91	16.44	13.22	10.01	13.79	16.27	12.54	33.85
Mean	8.34	10.91	12.99	10.75	9.98	12.7	15.9	12.86	9.97	13.26	15.96	13.07	
CD (p< 0.05)													
NPK				0.28									
Bulb Size				0.28									
NPK X Bulb Size				0.50									
Spacing				0.28									
NPK x Spacing				0.50									
Bulb Size x Spacing				0.50									
NPK x Bulb Size x Spacing				0.86									

TABLE 4
Effect of NPK, bulb size and spacing on fresh yield (tha⁻¹) of Pran (Top onion) fresh

Bulb size (g)	Fresh yield (tha ⁻¹)												Overall mean
	F1 80:60:40Kgha ⁻¹ NPK				F2 100:80:60 NPK Kgha ⁻¹				F3 120:100:80 NPK Kgha ⁻¹				
	Spacing (cm)			Mean	Spacing (cm)			Mean	Spacing (cm)			Mean	
	20 × 10 (S1)	20 × 15 (S2)	20 × 20 (S3)		20 × 10 (S1)	20 × 15 (S2)	20 × 20 (S3)		20 × 10 (S1)	20 × 15 (S2)	20 × 20 (S3)		
2.5-5.0 (B1)	28.03	29.1	27.21	28.11	33.31	34.13	32.6	29.55	33.93	34.34	32.83	28.5	28.72
5.1-7.5 (B2)	29.66	30.88	28.7	29.75	36.12	36.72	35.08	35.69	35.69	36.65	35.05	34.85	33.43
7.6-10 (B3)	30.02	31.31	29.49	30.27	35.93	36.82	35.45	30.27	35.73	36.46	34.58	35.54	33.85
Mean	29.23	30.43	28.46	29.37	33.78	34.81	33.42	33.65	35	31.94	31.94	32.96	

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CD (p<0.05)	
NPK	0.28
Bulb size	0.28
NPK × Bulb size	0.50
Spacing	0.28
NPK × Spacing	0.50
Bulb size × Spacing	0.50
NPK × Bulb size × Spacing	0.86

CONCLUSION

It was observed that different combinations of NPK, bulb size and spacing exhibited a significant influence on all the parameters of top onion. Treatment F₂B₂S₂ (100:80:60 NPK kg ha⁻¹+5.1-7.5 g bulb size and 20 × 15 cm spacing) proved superior over rest of the treatments with respect to yield.

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