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Effect of Certain Spacings and Nutrient Levels on Growth and Bulb Yield of Onion Var. N-53

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ABSTRACT

A field experiment was conducted to study the effect of spacing and nutrient levels on growth and bulb yield of onion cultivar N-53 during *rabi* season of 2006-2007 at Agricultural college, Bapatla (A.P). The results revealed that the wider spacing of 30x30 cm with nutrient level, 200 kg N: 80 kg P_2O_5: 100 kg k_2O ha^{-1} produced maximum plant height, no.of leaves, foliage length pseudostem diameter, drymatter production and chlorophyll content. However, narrow spacing 30x15cm with same nutrient level, produced maximum bulb yield per hectare and found promising.

Key words : Bulb yield , Nutrient levels, Onion, Plant growth, Spacing.

Onion (*Allium cepa* L.) is an important commercial bulbous vegetable crop in India, known for its high yielding ability and better storability. It is mainly used for the culinary purpose both in raw (salad) and cooked form. The yield per unit area continues to be low in coastal A.P conditions which can be increased appreciably by proper cultural practices. Among the various cultural practices nutrient levels and spacing are the key factors which affect the growth and bulb yield of onion (Mehla and Mangat Ram, 1995). However, the information on the effect of plant population through spacings and nutrient levels of onion is scarce under agro-climatic conditions of Bapatla. Keeping these points in view, the present field trial was under taken.

MATERIAL AND METHODS:

A field experiment was conducted to study the effect of certain spacings and nutrient levels on growth and bulb yield of onion cultivar N-53 during *rabi* season of 2006-2007 at Agricultural college farm, Bapatla.

The experimental soil was sandy loam with 7.9 pH and 0.4 EC. Available nitrogen status of the soil was 232 kg ha^{-1}, available P_2O_5 was 28.72 kg ha^{-1} and available K_2O was 54.60 kg ha^{-1}.

The experiment was laid in Randomized Block Design with factorial concept and replicated thrice. The treatments consisted of combination of three spacings (S_1- 30x30cm, S_2- 30 x 20 cm and S_3- 30 x 15 cm) and four nutrition levels *viz.,* (L_1- 80 kg N + 40 kg K_2O ha^{-1}, L_2- 120 kg N + 60 kg K_2O ha^{-1}, L_3- 160 kg N + 80 kg K_2O ha^{-1} and L_4- 200 kg N + 100 kg K_2O ha^{-1}).

Single super phosphate @ 80 kg ha^{-1} was applied as a common basal dose. Half dose of N and K_2O were applied as basal dose before transplanting and remaining half on 30th and 60th day of transplanting. All the other recommended cultural practices were followed .The observations were recorded on plant height, leaf number, foliage length, pseudostem diameter, chlorophyll content, dry matter production and bulb yield per hectare. The data was subjected to statistical analysis as suggested by Panse and Sukhatme (1978).

RESULTS AND DISCUSSION

Effect of spacing on vegetative growth and bulb yield

The wider spacing S_1 (30x30cm) produced significantly maximum chlorophyll content and dry matter production (Table 1). Similar results were reported by Kharchenko (1970), Kumar *et al.* (1998) and Shrivastava *et al.* (1996). The favourable effect of wider spacing in promoting the above plant growth parameters could be due to better microclimatic conditions which would have enhanced more availability of moisture, nutrients and light for crop growth which was expressed as increased leaf and bulb biomass through higher photosynthetic efficiency.

The highest bulb yield was observed in closer spacing S_3 (30 x 15 cm) which was significantly superior to wider spacing of 30 cm x 20 cm and 30 cm x 30 cm. The highest plant population in closer planting might have increased the bulb yield per unit area despite the reduced size

Table 1. Effect of different spacings and nutrient levels on vegetative growth of onion at 90 days after transplanting.

Treatments	Plant height (cm)	No.of leaves	Foliage length (cm)	Pseudostem diameter (mm)	Chlorophyll (mg/100g)	Dry matter content (g plant^{-1})
Spacings						
S_1(30x30cm)	51.23	11.75	48.30	10.15	0.50	5.10
S_2(30x20cm)	49.85	10.94	46.43	9.89	0.42	4.77
S_3(30x15cm)	49.07	10.46	45.07	9.74	0.36	4.45
SEm±	1.25	0.27	1.41	0.20	0.01	0.11
CD at 5%	NS	NS	NS	NS	0.027*	0.24*
Nutrient levels						
L_1	46.60	9.16	42.22	7.53	0.35	3.63
L_2	49.37	10.64	45.45	9.16	0.39	4.37
L_3	51.77	11.56	48.99	10.27	0.45	5.23
L_4	52.46	12.80	49.39	11.79	0.52	5.94
SEm±	1.45	0.31	1.63	0.23	0.015	0.133
CD at 5%	3.01*	0.66*	3.38*	0.48*	0.032*	0.27*
Interactions						
$T_1(S_1L_1)$	47.34	10.00	43.88	8.50	0.40	3.78
$T_2(S_1L_2)$	50.87	11.00	46.88	9.45	0.46	4.60
$T_3(S_1L_3)$	52.87	12.00	51.07	10.34	0.54	5.72
$T_4(S_1L_4)$	53.86	14.00	51.37	12.34	0.63	6.53
$T_5(S_2L_1)$	46.58	9.00	41.89	8.20	0.36	3.57
$T_6(S_2L_2)$	49.13	10.57	45.09	9.02	0.40	4.36
$T_7(S_2L_3)$	51.62	11.70	48.88	10.42	0.45	5.28
$T_8(S_2L_4)$	52.07	12.50	49.87	11.79	0.49	5.89
$T_9(S_3L_1)$	45.88	8.51	40.90	8.15	0.29	3.54
$T_{10}(S_3L_2)$	45.13	10.35	44.39	9.01	0.32	4.16
$T_{11}(S_3L_3)$	50.83	11.00	47.04	10.06	0.38	4.70
$T_{12}(S_3L_4)$	51.46	12.00	47.84	11.34	0.46	5.40
SEm±	2.517	0.55	2.80	0.40	0.02	0.231
CD at 5%	NS	NS	NS	0.83*	NS	NS
CV%	6.24	6.11	7.41	5.09	7.68	5.91

L_1-80kg N + 40kg k_2O ha^{-1}, L_2-120kg N + 60kg k_2O ha^{-1}, L_3-160kg N + 80kg k_2O ha^{-1}, L_4-200kg N + 100kg k_2O ha^{-1}.

Table 2. Effect of different spacings and nutrient levels on Bulb yield (t ha^{-1})of onion at harvesting

N and K_2O levels	Spacings			
	S_1	S_2	S_3	Mean
L_1	3.49	7.53	9.23	6.75
L_2	6.21	8.37	11.83	8.80
L_3	6.93	9.96	12.99	9.96
L_4	7.07	10.10	13.14	10.10
Mean	5.92	8.99	11.80	
	SEm±	CD at 5%	F-test	CV%
S	0.163	0.339*	S	4.59
L	0.189	0.391*	S	
S x L	0.327	0.678*	S	

L_1-80kg N+40kg k_2O ha^{-1}, L_2-120kg N+60kg k_2O ha^{-1}, L_3-160kg N+80kg k_2O ha^{-1}, L_4-200kg N+100kg k_2O ha^{-1}.

and weight of bulb. These results are in agreement with the findings of Sirohi *et al*. (1992) and Srivastava *et al*. (1996).

The plant height, number of leaves, foliage length, and pseudostem diameter, chlorophyll content and dry matter production were significantly higher at highest dose of nutrient level, L_4 (200 kg N + 80 kg P_2O_5 + 100 kg K_2O ha^{-1}). The favourable effect of higher dose of nutrient level in promoting the vegetative growth might be due to the fact that the net assimilation rate was accelerated by the increased chlorophyll content at their higher doses. These findings are in conformity with Neeraja *et al.* (1999) and Dharmendra Kumar *et al*. (2001).

Significantly highest bulb yield per hectare was recorded with higher dose of nutrient level, i.e. L_4 (200 kg N + 80 kg P_2O_5 + 100 kg K_2O ha^{-1}). The increased yield per hectare due to higher assimilation rate due to availability of sufficient nutrients which promoted higher vegetative growth and accumulation of photosynthates which inturn would have increased the bulb weight and there by yield per plot. These results are in accordance with those reported by Madan and Sandhu (1985).

The interaction of certain spacings and nutrient levels had significant effect on bulb yield (Table 2). The narrow spacing (30 x 15 cm) with higher dose of nutrients (200 kg N **:** 80 kg P_2O_5 **:** 100 kg K_2O ha^{-1}) recorded maximum bulb yield per plot. These results are in conformity with Mehla *et al*. (1992) and Mehla and Mangat Ram (1995).

The results of the present investigation clearly suggested that spacing of 30 x 15 cm and application of 200 kg N **:** 80 kg P_2O_5 **:** 100 kg K_2O ha^{-1} would be optimum for realizing better growth and bulb yield in onion cv.N-53 under the coastal sandy loam conditions of Bapatla region.

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