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Influence of spacings and nutrient levels on bulb yield and quality of Onion var N-53

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ABSTRACT

Field studies conducted on the influence of certain spacings and nutrient levels on bulb characters and bulb yield of onion cv.N-53 indicated that the bulb characters increased with wider spacing (30 x 30cm). However, the highest bulb yield of 11.8 t ha^{-1} was observed under high plant population, *i.e*. , narrow spacing (30x15cm) per unit area. Among nutrient levels, L_4 (200 kg N: 80 kg P_2O_5: 100 kg K_2O/ha.) recorded the highest bulb yield of 10.0 t/ha and highest ascorbic acid content (17.02 mg/100 g bulb wt.). Among interactions effects 30 x15cm coupled with application of 200 kg N: 80 kg P_2O_5: 100 kg K_2o ha^{-1} recorded the highest bulb yield of 13.14 t/ha and the ascorbic acid content (16.9 mg/100 g bulb wt).

Key words : Bulb growth,Nutrient levels, Onion, 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 purposed both in raw (salad) and cooked form. The yield per unit area is 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 nutrients levels of onion is scarce under agro-climatic conditions of Bapatla on yeild. 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 out in a Randomized Block Design with factorial concept and replicated thrice. The treatments consisted of combination of three spacings (S_1-30x30cm, S_2-30x20cm and S_3-30x15cm) 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}).

In all the treatments single super phosphate @ 80 kg/ha was applied as a common basal dose. Half dose of N and K_2O was applied as basal dose before transplanting and remaining half in two equl splits 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, pseudo stem diameter, chlorophyll content, dry matter production and bulb yield per hectare. The data was subjected to statistical analysis as suggested by Panse and Sukhame (1978).

RESULTS AND DISCUSSION

Effect of spacings:

Spacing had exerted significant effect on bulb characters *viz*., bulb length, bulb diameter, bulb volume, bulb weight and yield. The bulb size and weight of bulb was highest with wider spacings of 30x30cm and 30x20cm but decreased significantly as the spacings become closer (30x15cm). This may be due to the fact that the wider spacings of plants helped the individual plant to utilize more nutrition, soil, water, air and light as compared to plants under lesser spacings in promoting these bulb characters. Similar findings were also reported by Dharmendra Kumar *et al* (2001).

On the other hand, bulb yield decreased significantly with widening of spacing and the highest yield (11.8 t ha^{-1}) was found with closer spacing of 30x15cm. This might be due to higher plant population which increased the bulb yield per unit area despite the reduced size and weight of bulb at

Table 1. Influence of different spacings and nutrient levels on bulb characters, bulb yield t ha^{-1} and quality of onion on harvesting.

Treatments	Bulb length (cm)	Blub diameter (g)	Blub weight (g)	Bulb volume (cm^3)	Bulb yield (t ha^{-1})	Ascorbic acid content (mg/100g)
Spacings						
S_1(30x30cm)	4.12	4.47	54.46	52.25	5.92	4.36
S_2(30x20cm)	3.77	4.05	53.89	51.06	8.99	13.97
S_3(30x15cm)	3.62	3.85	48.44	47.18	11.80	14.25
SEm±	0.12	0.12	1.18	1.42	0.163	0.36
CD at 5%	0.26*	0.25*	2.44*	2.95*	0.339*	NS
Nutrient levels						
L_1	3.49	3.57	43.32	43.91	6.75	11.25
L_2	3.64	3.90	50.36	49.40	8.80	13.11
L_3	4.00	4.20	57.10	52.81	9.96	15.39
L_4	4.22	4.63	58.29	54.53	10.10	17.02
SEm±	0.14	0.13	1.36	1.64	0.189	0.41
CD at 5%	0.30*	0.28*	2.82*	3.40*	0.391	0.86
Interactions						
$T_1(S_1L_1)$	3.87	3.70	49.72	45.84	3.49	11.16
$T_2(S_1L_2)$	3.92	4.20	54.49	52.52	6.21	13.26
$T_3(S_1L_3)$	4.20	4.90	61.23	55.82	6.93	15.75
$T_4(S_1L_4)$	4.50	5.10	62.42	56.94	7.07	17.26
$T_5(S_2L_1)$	3.40	3.60	47.84	43.72	7.53	11.00
$T_6(S_2L_2)$	3.60	3.90	51.02	50.94	8.37	13.11
$T_7(S_2L_3)$	4.00	4.20	57.76	53.27	9.96	15.01
$T_8(S_2L_4)$	4.10	4.50	58.95	54.18	10.10	16.90
$T_9(S_3L_1)$	3.20	3.40	42.39	42.17	9.23	11.60
$T_{10}(S_3L_2)$	3.40	3.60	45.56	44.74	11.83	12.98
$T_{11}(S_3L_3)$	3.80	4.10	52.31	49.34	12.99	15.40
$T_{12}(S_3L_4)$	4.07	4.30	53.50	52.46	13.14	16.90
SEm±	0.25	0.24	2.36	2.84	0.327	0.72
CD at 5%	NS	NS	4.89*	NS	0.678*	NS
CV%	8.07	7.14	5.53	6.94	4.59	6.25

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}.

closer spacings. These findings are in close conformity to that of Mehla and Mangat Ram (1995) and Shrivastava *et al*. (1996).Ascorbic acid content was not significantly influenced with wider and closer spacings.

Effect of nutrient levels:

Nutrient levels also had significant effect on bulb characters namely bulb length, bulb diameter, bulb volume , bulb weight and bulb yield. The aforesaid bulb characters and bulb yield registered a significant increase with each successive increase in N and K_2O levels from 80-200 kg ha^{-1} and 40-100 kg ha^{-1} respectively and maximum bulb size and bulb yield were, therefore, obtained with 200 kg N: 80 kg P_2O_5:100 kg K_2O ha^{-1} (L_4). This can be explained in the light of the fact that the increased nutrient levels improved vegetative growth and increased the chlorophyll content and accumulation of photosynthesis which in turn would increase the bulb weight and there by yield per unit area. These results are in accordance with those reported by Madan and Sandhu (1985) and Vachhani and Patel (1993).

Application of higher doses of nutrients increased the ascorbic acid content significantly. Highest ascorbic acid content (17.26 mg/100 g bulb wt.) was recorded under 200 kg N + 80 kg P_2O_5 + 100 kg K_2O ha^{-1} . The increasing trend of ascorbic acid content with the increased application of nutrients as observed here could be due to enhanced photosynthetic activity and greater assimilation of applied nutrients in plant metabolic activities. Similar

results were reported by Singh and Dhankar (1988). Interaction between spacings and nutrient levels was found significant in respect of bulb yield. Data in Table 1 revealed that the crop responded to higher doses of nutrients at closer spacing compared to that at wider spacing. The crop supplied with 200 kg N : 80 kg P_2O_5 : 100 kg K_2O/ha and planted at 30 x 15 cm spacings gave the highest bulb yield. The results are in conformity with Mehla *et al.* (1992) and Mehla and Mangat Ram (1995)

Hence the results of the present trial revealed that a spacing of 30 x 15 cm and application of 200 kg N: 80 kg P_2O_5: 100 kg K_20/ha would be optimum for realizing higher bulb yield and superior quality of bulbs in onion variety N-53 under the sandy loam conditions of Bapatla region.

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