

Short Communication

Response of Onion (*Allium cepa* L.) Cultivars to Nitrogen and Potassium Fertilization under Semi-arid Conditions

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Onion (*Allium cepa* L.) is one of the most important vegetable crops commercially grown in the world. India has the largest area under onion cultivation in the world and it is the second largest producer of onion bulbs, but the yield per unit area, however, in the country is very low in comparison to that in other developed countries.

Onion is used as salad and cooked to prepare different kinds of delicacies. There is a great demand of this vegetable in the international market and it is one of the major sources of foreign exchange in case of vegetable export. Application of nitrogen and potassium has favorable impact on yield and quality of onion (Patel and Vachhani, 1994). The present investigation was, therefore, undertaken to study the effect of nitrogen and potassium on yield and quality of onion cultivars.

The investigations were conducted at Jobner during 1998-99 and 1999-2000. The experiment was laid out in split-plot design with four replications. There were 36 treatment combinations of four varieties (Puna Red - V₁, white Marblobe - V₂, Nasik Red - V₃ and Rasidpura Local - V₄) and three levels (50, 100 and 150 kg ha⁻¹) each of nitrogen and potassium.

The seedlings were transplanted on 16th December 1998 and 20th December 1999. The plant to plant spacing (10 cm) was uniform for all the treatments. The net plot size was 3.0 x 1.5 m. Nitrogen was applied in three splits: first half as basal dose before transplanting, and remaining half in two equal splits at 30 and 50 days after transplanting. Potassium was applied as basal dose through muriate of potash. The soil is typic Ustipsamment, loamy sand in texture, with pH 8.2, EC 1.76 dS m⁻¹, organic carbon 0.17%, available nitrogen 136 kg ha⁻¹, available P₂O₅ 17 kg ha⁻¹ and available K₂O 150 kg ha⁻¹. Observations were recorded on bulb yield, N, K and S contents and uptake in bulb. All the recommended cultural operations were followed to raise the healthy crop.

The pooled mean data presented in Table 1 revealed that the maximum yield (253.73 q ha⁻¹), N content (0.88%), K content (1.12%), S content (0.70%), N uptake (224.26 kg ha⁻¹), K uptake (96.89 kg ha⁻¹) and S uptake (178.73 kg ha⁻¹) were recorded in variety V₄ (Rasidpura Local). This might be due to genotypic potential and greater adaptability of this variety to soil and climatic conditions of Jobner. These results are in close conformity with the findings

Table 1. Effect of varieties, levels of nitrogen and potassium on bulb yield and uptake of nutrients by onion (pooled mean for the year 1998-1999 and 1999-2000)

Treatments	Bulb yield (q ha ⁻¹)	Content in bulb (%)			Uptake by bulb (kg ha ⁻¹)		
		N	K	S	N	K	S
Varieties							
V ₁	234.77	0.79	1.07	0.67	186.46	84.85	158.29
V ₂	245.86	0.87	1.09	0.66	215.43	92.70	163.21
V ₃	238.87	0.83	1.08	0.68	198.10	97.27	163.48
V ₄	253.73	0.88	1.12	0.70	224.26	96.89	178.73
SEm±	3.64	0.01	0.01	0.01	2.21	2.05	1.45
C.D. at 5%	10.80	0.03	0.03	0.02	6.55	6.07	4.30
Nitrogen (kg ha⁻¹)							
N ₅₀	235.06	0.73	1.06	0.68	172.53	84.67	159.08
N ₁₀₀	245.75	0.84	1.09	0.68	207.78	91.36	167.39
N ₁₅₀	249.12	0.96	1.12	0.69	237.88	95.25	171.39
SEm±	2.45	0.01	0.01	0.003	1.18	1.15	1.08
C.D. at 5%	6.75	0.02	0.03	0.01	3.25	3.16	2.97
Potassium (kg ha⁻¹)							
K ₅₀	236.14	0.76	0.94	0.68	180.07	75.66	169.92
K ₁₀₀	245.99	0.85	1.11	0.68	208.46	92.60	167.44
K ₁₅₀	247.79	0.92	1.22	0.69	277.66	103.02	170.58
SEm±	2.45	0.01	0.01	0.003	1.18	1.15	1.08
C.D. at 5%	6.75	0.02	0.03	0.01	3.25	3.16	2.97

of those by Singh and Dhankar (1989) and Jadhav *et al.* (1990).

Application of nitrogen significantly influenced the yield and quality of onion. Maximum yield (249.12 q ha⁻¹), N content (0.96%), K content (1.12%), S content (0.69%), N uptake (237.88 kg ha⁻¹), K uptake (95.25 kg ha⁻¹) and S uptake (171.39 kg ha⁻¹) in bulb were recorded with the highest levels of nitrogen (150 kg N ha⁻¹). The content and uptake of any nutrient in the plant is directly related to its availability in the rooting zone and the growth of plant. Thus, increase in dose

of nitrogen might have resulted in higher content and uptake of these nutrients in the onion. These responses were attributed to the low initial available N level (130 kg N ha⁻¹). The results of the present investigation are in close agreement with the findings of Jawahar Lal *et al.* (1988) and Vachhani and Patel (1993).

Potassium also significantly improved yield and quality of onion. Significantly higher yield (247.79 q ha⁻¹), N content (0.92%), K content (1.22%) and S content (0.69%) in bulb and N uptake (227.66 kg ha⁻¹), K uptake (103.02 kg ha⁻¹) and S

uptake ($170.58 \text{ kg ha}^{-1}$) in bulb were recorded with the highest levels of potassium ($150 \text{ kg K}_2\text{O ha}^{-1}$). It might be due to favorable effect of potassium, which induced tolerance against abiotic stresses. These results are in close agreement with the findings of Dugue *et al.* (1989) and Wuzhong *et al.* (1997).

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