INDIAN JOURNAL OF
ARID HORTICULTURE
2016, Vol. 11 (1-2):134-136

SHORT COMMUNICATION

Effect of different organic manures, fertilizers and sulphur on content in Onion (*Allium cepa* L.) under the Agro-climatic conditions of Bikaner

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(Received : 04.01.2016, Accepted : 12.08.2016)

Onion (*Allium cepa* L.) is one of the leading bulb vegetable crop of Alliaceae family worldwide grown for its culinary purposes and medicinal values. India ranks second in onion production which contribute 11.9 per cent of total vegetable production of the world. The productivity of onion is 16.10 q/ha. Continuous use of inorganic fertilizers resulted in deficiency of micronutrients, imbalance in soil physico-chemical properties and unsustainable crop production. Integrated nutrient management would be a viable strategy for advocating judicious and efficient use of chemical fertilizers with matching addition of organic manures. NPK and S content in bulb significantly higher in both organically and inorganically fertilized plants than their unfertilized counterparts. The role of nutrient is one of the paramount importance in boosting quality of onion. The information of balanced use of chemical fertilizers and organic manures and their combinations on bulb production of onion is very scanty. Therefore, there is an urgent need to determine the influence of chemical fertilizers and organic manures and their combinations on growth, yield and quality of onion in Bikaner condition. The present investigation was taken up to study effect of organic manures, fertilizer and sulphur on content in onion bulb.

A field experiment was conducted at at Niche area of excellence, SKRAU, Bikaner during the Rabi season of 2012-13 and 2013-14. The soil of experiment field was loamy sand with a pH of 8.75 and having 0.15 per cent organic carbon and 114.9, 20.58 and 238.5 kg ha^{-1} available N, P_2O_5 and K_20, respectively. The experiment comprising of 41 treatment combinations viz., different organic manures (control, FYM @ 22 t/ha, vermicompost 8 t/ha, Poultry manure @ 7 t/ha and sheep manure @ 10 t/ha) and four levels of recommended doses of NPK (control, 75, 100 and 125 per cent RD of NPK) and two levels of sulphur (25 and 50 kg S/ha) alongwith a overall control laid out in RBD with three replications. Estimation of nitrogen was done by colorimeteric method using Spectronic-20 after development of colour with Nesseler's reagent (Snell and Snell, 1939). Phosphorus was estimated by Vanadomolybdo phosphate yellow colour method (Jackson, 1973). Potassium content in bulb was determined by flame photometric method (Jackson, 1973). Sulphur content in bulb was estimated by turbidometric method (Tabatabi and Bremner, 1970). The F-test and critical difference (CD) calculated to test significance of difference among the treatments, whenever the results were significant.

Effect of organic manure on content parameters: The result of present investigation showed that different organic manures significantly increased the available nitrogen, phosphorus, potassium and sulphur content (Table 1). The significantly higher nitrogen, phosphorus, potassium and sulphur content was recorded with treatment *i.e.* poultry manure @ 7t/ha, whereas minimum was found in control. The treatment poultry manure @ 7t/ha was found significantly higher over control, FYM @ 22 t/ha, Vermicompost @ 8 t/ha and sheep manure @ 10 t/ha. This might be due to the improved nutritional environment in the rhizosphere as well as its utilization in plant system leading to enhanced translocation of nutrients, vitamins and proteins in plant and the reason might be increased activity of nitrate reductase which helped in synthesis of certain amino acids and protein as reported by Lopes *et al.* (1996) and Yadav and Vijaykumari (2004).

Effect of fertility levels on content parameters: Increasing of fertility level up to 100 per cent RD of NPK increased the NPK content of onion bulb (Table 1). The influence of nitrogen fertilization on NPK content of bulb appeared to be due to improved nutritional environment both in root zone and plant system. Thus, adequate supply of N, P and K early in the crop season increased the availability of nutrients to the root zone coupled with increased metabolic activity at cellular level might have increased the nutrient uptake and accumulation in the vegetative plant part. The higher nutrient content in bulb also seems to be due to higher functional activity of roots for longer duration under this treatment. The increase in N, P and K contents in bulb were also observed Sharma *et al.* (2003). Potash induces tolerance against abiotic stresses and helps plant to fight against the adverse condition. Secondly, the potassium concentration in the soil solution might have

gone down due to leaching losses, fixation and high initial uptake by plant. Therefore, high dose of potash increased NPK and S content in bulb.

Effect of sulphur levels on content parameters: The results of present study (Table 1) clearly indicated that N, P, K and S content in bulb increased significantly due to application of sulphur 50 kg/ha. Application of sulphur might have improved the nutritional environment in the rhizosphere as well as in plant system and consequently increased the availability of nutrients in the root zone coupled with increased metabolic activity at cellular level probably enhanced the nutrient uptake by plants and their translocation specially N, P, K and S to reproductive structures which ultimately increased the concentration of these nutrients in different plant parts. Similar result have also been reported in sunflower by Sagare *et al.* (1990). Similarly, S content content in bulb increased with increasing level of sulphur. The increased sulphur in bulb might be due to increased concentration of S in soil solution with increasing level of sulphur fertilization. Similar results were also reported by Mishu *et al.* (2013) in onion.

Table 1 Effect of different organic manures, fertility levels and sulphur on N, P, K and S content (%) in bulb

Treatments	N content			P content			K content			S content		
	2012-13	2013-14	Pooled	2012-13	2013-14	Pooled	2012-13	2013-14	Pooled	2012-13	2013-14	Pooled
Control	0.695	0.593	0.644	0.498	0.505	0.502	1.101	1.115	1.108	0.589	0.601	0.595
Rest of the treatment	0.831	0.843	0.837	0.547	0.549	0.548	1.119	1.122	1.121	0.614	0.625	0.620
SEm±	0.0036	0.0046	0.0029	0.0021	0.0022	0.0015	0.0057	0.0061	0.0042	0.0035	0.0029	0.0023
CD (P=0.05)	0.0102	0.0132	0.0082	0.0060	0.0062	0.0042	0.0162	0.0173	0.0117	0.0101	0.0082	0.0065
A. Organic manures												
M_0 (Control)	0.672	0.680	0.676	0.504	0.513	0.508	1.078	1.081	1.080	0.533	0.543	0.538
M_1 FYM @ 22 t/ha	0.841	0.850	0.846	0.538	0.540	0.539	1.117	1.119	1.118	0.589	0.599	0.594
M_2 Vermicompost @ 8 t/ha	0.848	0.867	0.858	0.552	0.555	0.554	1.125	1.128	1.127	0.631	0.641	0.636
M_3 Poultry manure @ 7 t/ha	0.907	0.916	0.911	0.571	0.571	0.571	1.141	1.145	1.143	0.656	0.669	0.663
M_4 Sheep manure @ 10 t/ha	0.888	0.898	0.893	0.566	0.566	0.566	1.134	1.137	1.136	0.660	0.673	0.666
SEm±	0.008	0.010	0.007	0.005	0.005	0.003	0.013	0.014	0.009	0.008	0.007	0.005
CD (P=0.05)	0.023	0.029	0.018	0.014	0.013	0.009	0.036	0.039	0.026	0.023	0.018	0.014
B. Fertility levels												
F_0 (Control)	0.778	0.795	0.786	0.525	0.531	0.528	1.090	1.093	1.092	0.541	0.548	0.544
F_1 75% RD of NPK	0.832	0.844	0.838	0.542	0.544	0.543	1.121	1.123	1.122	0.636	0.648	0.642
F_2 100% RD of NPK	0.851	0.857	0.854	0.559	0.560	0.559	1.130	1.133	1.131	0.639	0.651	0.645
F_3 125% RD of NPK	0.864	0.873	0.869	0.560	0.561	0.560	1.136	1.139	1.137	0.640	0.653	0.647
SEm±	0.007	0.009	0.006	0.004	0.004	0.003	0.012	0.012	0.008	0.007	0.006	0.005
CD (P=0.05)	0.020	0.026	0.016	0.012	0.012	0.008	0.032	0.035	0.023	0.020	0.016	0.013
C. Sulphur levels (kg ha^{-1})												
S_1 Sulphur @ 25kg/ha	0.821	0.832	0.827	0.541	0.543	0.542	1.106	1.109	1.108	0.605	0.615	0.610
S_2 Sulphur @ 50kg/ha	0.841	0.853	0.847	0.552	0.555	0.554	1.132	1.135	1.134	0.623	0.635	0.629
SEm±	0.005	0.007	0.004	0.003	0.003	0.002	0.008	0.009	0.006	0.005	0.004	0.003
CD (P=0.05)	0.014	0.019	0.012	0.009	0.009	0.006	0.023	0.024	0.017	0.014	0.012	0.009
CV (%)	4.778	6.121	5.467	4.309	4.275	4.283	5.63	5.99	5.81	6.398	5.127	5.781

NS= non significant

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