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Effect of Sulphur and Vermicompost on Growth, Yield and Quality of Garlic (*Allium sativum* L.)

Manish Patidar, R P S Shaktawat and I S Naruka

College of Horticulture, Mandsaur, 458 001 (Madhya Pradesh)

ABSTRACT

A field experiment was conducted during the rabi season of 2013-14 to find out dose of sulphur and vermicompost to obtain better growth, yield and quality of garlic (*Allium sativum* L.). Sixteen treatment combinations of 4 levels of sulphur (0, 25, 50 and 75 kg S/ha) and 4 levels of vermicompost (0, 2, 4 and 6 t/ha) were tested. Application of 50 kg sulphur and 4.0t vermicompost / ha individually recorded significantly higher plant height, number of leaves per plant, neck thickness of bulb, polar diameter of bulb, equatorial diameter of bulb, number of cloves per bulb, fresh weight of 20 cloves, fresh weight of bulb, dry weight of bulb, bulb yield, TSS, volatile oil content and sulphur content of bulb. This combination significantly increased the bulb yield by 25.7 and 20.69 per cent over their respective control.

Key words: Bulb yield, Garlic, Sulphur, Quality and Vermicompost

INTRODUCTION

Garlic (*AIlium sativum* L.) is an important cash crop of Madhya Pradesh but its yield is very low i.e. 5t/ha. The main constraints of low productivity of garlic are imbalance use of fertilizers and decline soil productivity. Like other bulb crops, garlic also requires adequate sulphur fertilization. Sulphur (S) is essential for growth and development of plants and if soil is deficient in S then full potential of a crop cannot be realized. However, there is a need for integrated application of alternate sources of nutrients for sustaining the desired crop productivity. In integrated nutrient supply system, vermicompost is one of the important organic manure source which can be used to increase the soil fertility. Hence, the present investigation was undertaken to study the effect of vermicompost and sulphur on growth, yield and quality of garlic.

MATERIALS AND METHODS

The field experiment was carried out during the *rabi* season of 2013-14 at Research Farm, College of Horticulture, Mandsaur. The soil was light black, loamy in texture, normal in reaction (pH 7.2), low in nitrogen (243.2 kg/ha), medium in available phosphorus (19.8 kg/ha), high in available potassium (448.0 kg/ha) and sulphur (8.2 kg/ha). A total of 16 treatments were tested in randomized block design. The experiment comprised of 16 treatment combinations consisting of 4 levels of sulphur (0, 25, 50 and 75 kg S/ha) and 4 levels of vermi-compost (control, 2, 4 and 6 t/ha) with 3 replications. The G-282 variety of garlic was sown with full recommended dose of fertilizer i.e. 100 kg N + 50 kg P_2O_5 + 50 kg K_2O/ha. Garlic was sown in rows, 15 cm apart, on 19 November, 2013 and harvested on 23 April, 2014.

RESULTS AND DISCUSSION

Effect of Sulphur

The plant height, number of leaves per plant, neck thickness of bulb, polar diameter of bulb, equatorial diameter of bulb, number of cloves per bulb, fresh weight of 20 cloves, fresh weight of bulb, dry weight of bulb and bulb yield /ha of garlic were significantly affected with varying levels of S application (Table 1). This increase in yield attributes and yield were significant for each

Corresponding Author's Email: rpssbkn@yahoo.co.in

levels of S as compared to control. Application of 50 kg S/ha significantly increased the bulb yield by 25.7 per cent over control. Increased yield may be due to role of S in improving uptake of nutrient by root system, increased chlorophyll content, photosynthesis activity and protein content in crop plants. Similar results were also reported by Verma *et al* (2013) and Chaudhary *et al* (2014).

A perusal of data indicated that higher level of S was significantly superior over lower levels with respect to TSS, volatile oil content and S content of bulb. With the application of S a large amount of organic bound S containing amino acids i.e. cysteine and methionine are formed which are essential for synthesis of protein and improvement in quality of garlic. Banafar and Gupta (2005) reported that the application of 50 kg S/ha has improved nitrogen content, protein content, volatile oil, crude fiber percentage, ash percentage and TSS to a considerable extent.

Effect of Vermi-compost

It was evident (Table 1 and 2) that plant height, leaves per plant, neck thickness, cloves per bulb, fresh weight of 20 cloves, polar diameter of bulb, equatorial diameter of bulb, fresh weight of bulb, dry weight of bulb, bulb yield, volatile oil, TSS and S content increased significantly due to application of vermicompost. Application of 4 t vermicompost/ ha significantly increased the bulb yield by 20.7 per cent over control. The above finding clearly indicated that vermicompost played a significant role in enhancing the growth and yield of garlic. Due to application of vermicompost in soil improved nutrient availability and improvement in physical condition of soil which provides balanced nutritional environment both in soil rhizosphere and plant system. The increase in bulb yield with application of vermicompost were in conformity with the earlier findings of Suthar (2008), Shashidhar *et al* (2009), Rodriguez *et al* (2012) and Verma *et al* (2013).

Table 1. Effect of sulphur and vermi-compost on yield and quality of garlic.

Treatment	Cloves per bulb	Fresh weight of 20 cloves (g)	Fresh weight of bulb (g)	Dry weight of bulb (g)	Bulb yield (q/ha)	TSS content of bulb (%)	Volatile oil content of bulb (%)	Sulphur content of bulb (%)
Sulphur (kg S/ha)								
0	32.4	31.2	44.7	27.3	69.4	30.0	0.46	1.11
25	35.5	33.1	48.5	29.9	81.7	33.2	0.49	1.24
50	38.0	34.4	51.5	30.9	87.2	35.3	0.52	1.31
75	39.8	35.7	52.7	31.1	89.4	36.3	0.53	1.33
S. Em. +	0.75	0.45	0.55	0.35	0.8	0.36	0.006	0.01
CD 5%	2.17	1.30	1.60	1.03	2.32	1.05	0.017	0.03
Vermi-compost (t/ha)								
0	30.2	29.2	42.3	27.3	71.4	31.3	0.46	1.17
2	34.7	33.0	49.1	29.0	81.7	33.5	0.49	1.25
4	39.5	35.7	52.2	31.0	86.2	34.6	0.52	1.28
6	41.4	36.5	53.7	31.8	88.4	35.3	0.53	1.29
S. Em. +	0.75	0.45	0.55	0.35	0.8	0.36	0.006	0.01
CD 5%	2.17	1.30	1.60	1.03	2.32	1.05	0.017	0.03

Table 2. Effect of sulphur and vermi-compost on growth of garlic.

Treatment	Plant height			Leaves per plant			Neck thickness (mm)	Polar diameter of bulb (cm)	Equatorial diameter of bulb (cm)
	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS			
Sulphur (kg S/ha)									
0	32.6	41.8	71.9	5.8	6.4	7.5	10.3	3.79	4.58
25	33.8	45.1	74.7	6.1	6.9	7.9	10.8	4.05	4.92
50	35.4	47.1	77.2	6.4	7.2	8.4	11.3	4.31	5.09
75	36.6	48.7	78.2	6.6	7.4	8.7	11.7	4.45	5.18
S. Em. +	0.39	0.55	0.72	0.09	0.09	0.13	0.17	0.08	0.05
CD 5%	1.15	1.59	2.10	0.27	0.27	0.37	0.49	0.25	0.16
Vermi-compost (t/ha)									
0	32.3	42.5	68.6	5.6	6.2	7.3	9.6	3.61	4.52
2	34.2	45.0	74.5	5.9	6.9	8.0	10.9	3.95	4.91
4	35.5	46.9	78.6	6.5	7.3	8.5	11.6	4.40	5.08
6	36.5	48.3	80.3	6.7	7.5	8.9	12.1	4.62	5.23
S. Em. +	0.39	0.55	0.72	0.09	0.09	0.13	0.17	0.08	0.05
CD 5%	1.15	1.59	2.10	0.27	0.27	0.37	0.49	0.25	0.16

Application of vermi-compost significantly improved in higher volatile oil, TSS and S content in the garlic bulb. It also resulted in vigorous vegetative growth and greater accumulation of food material which ultimately increased the quality of bulb. The similar results have been reported by Gowda *et al* (2007) and Singh *et al* (2012) in garlic.

CONCLUSION

It may be concluded that application of 50 kg S and 4.0t vermicompost / ha recorded significantly higher plant height, number of leaves per plant, neck thickness of bulb, polar diameter of bulb, equatorial diameter of bulb, number of cloves per bulb, fresh weight of 20 cloves, fresh weight of bulb, dry weight of bulb, bulb yield, TSS, volatile oil content and sulphur content of bulb.

REFERENCES

Banafar R N S and Gupta N K (2005). Influence of soil and foliar application of sulphur on growth, yield and quality on onion. *Proc. National Seminar on Agro-technology, Quality, Processing and Export of Spices*, March 20-21, 2005. J.N.K.V.V. Jabalpur. pp. 67.

Chaudhary P, Jhajharia A and Kumar R (2014). Influence of sulphur and zinc fertilization on yield, yield components and quality traits of soybean (Glycine max L.) *The Bioscan* **9** (1):137-142.

Gowda M C, Vijayakumar M and Gowda A P M (2007). Influence of integrated nutrient management on growth, yield and quality of garlic (*Allium sativum* L.) cv. G-282. *Crop Res* **33**(1/3):144-147.

Rodriguez R A, Miglierina A M, Ayastuy M E, Lobartini J C, Dagna N, Greco N, Konijnenburg A and Fernandez J A (2012). The effect of different organic fertilization on garlic (*Allium sativum* L.) in Bahia Blanca Region, Argentina. *Acta Hort*. **933**:187-194.

Shashidhar T R, Mannikeri I M and Chavan M L (2009). Influence of different organic manures on growth and yield of garlic (*Allium sativum* L.). *J Ecob* **25**(3):235-239.

Singh P C, Saravanan R and Singh S R (2012). Effect of NPK with different doses of organic manures on growth and yield of garlic (*Allium sativum* L.) var Yamuna Safed-2 (G-50). *Env Ecol* **30**(2):329-331.

Suthar S (2008). Impact of vermicompost and composted farmyard manure on growth and yield of garlic (*Allium sativum* L.) field crop. *Int J Plant Prod* **3**(1):1735-6.

Verma S, Choudhary M R, Yadav B L and Jakhar M L (2013). Influence of vermicompost and sulphur on growth and yield of garlic (*Allium sativum* L.) under semi arid climate. *J Spices Arom Crops* **22**(1):20-23.

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