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Short communication

Effect of biofertilizers on growth and yield of garlic

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Garlic is an important commercial spice crop of India. It is the second most important widely used and cultivated bulb crops after onion. Garlic bulb are rich source of carbohydrates, protein, phosphorus, vitamin C and also have several medicinal values. The productivity of garlic in India is low (4.07 t ha^{-1}) in comparison to other countries. Thus, there is an ample scope for increasing productivity and production thorough fertilizers in particular to biofertilizers in light textured soils. The present experiment was conducted to study the effect of biofertilizers on growth and yield of garlic.

The experiment was carried out during 2003-04 at SKN College of Agriculture, Rajasthan Agricultural University, Bikaner. The treatment comprising five levels of biofertilizers i.e. I_0 (Control), I_1 (*Azotobacter* seed treatment), I_2 (*Azotobacter* soil application), I_3 (*Azospirillum* seed treatment) and I_4 (*Azospirillum* soil application) in randomized block design with three replications. The garlic variety "G-1" was planted in 1 x 1 m^2 sized plots at 10 x 20 cm spacing. Garlic seeds (cloves) were treated with biofertilizers (*Azotobacter* and *Azospirillium*) by mixing the seeds in biofertilizers @ 2 kg *Azotobacter* and 2 kg *azospirillium* with jaggery solution per hectare seed quantity. For soil application 2 kg ha^{-1} of biofertilizers (*Azotobacter* and Azospirillium) each was mixed in 20 kg FYM. Keeping it moist and shady place for bacteria multiplication, than apply in experimental plots. Ten plants were tagged at random in each treatments for recording observations.

Data presented in table-1 clearly revealed that the maximum plant height and number of leaves per plant was recorded in *Azotobacter* seed treatment method. This treatment enhance plant height and number of leaves significantly as compared to remaining treatments i.e. soil application and control but it was at par with *Azospirillium* seed treatment. Efficient and healthy strain of *Azotobacter* in rhizosphere, which turn have resulted in greater fixation of atmospheric nitrogen and consequently for use by the plant resulting in vigorous growth of plant. Similar result have also been reported by Dibut *et al.* (1993) in onion. Likewise, *Azospirillum* have ability to fix nitrogen-produce plant growth promoting antifungal and antibacterial substances which influences plant growth. The bacterial effect of *Azospirillum* was also observed by Sankarnarayana *et al.* (1995). Application of biofertilizer by seed treatment significantly improved yield attributes *viz.* bulb diameter, fresh weight of bulb, number of cloves per bulb, bulb yield and harvest index as compared to soil application and control. Seed treatment method of biofertilizers proved most efficient inoculant to increase yield attributes and yield. These results are in close conformity with findings of Warade *et al.* (1996), Joi and Shende (1976) and Bhonde *et al.* (1997).

Application of biofertilizer (*Azotobacter* and *Azospirillum*) recorded maximum values on growth characteristics and yield attributes and yield. The highest bulb yield (112.79 q ha^{-1}) was recorded from the *Azotobacter* seed treatment as

Table 1. Effect of biofertilizers on growth, yield attributes and yield of garlic cv. "G-1"

Treatment	Height of plants (cm)	Number of leaves/ plant	Bulb diameter (cm)	Number of clove per bulb	Fruit weight (g)	Bulb yield (q ha^{-1})	Harvest index (%)
I_0	36.84	7.72	2.46	27.75	18.51	89.60	56.35
I_1	45.27	8.25	3.09	31.51	23.53	112.79	61.20
I_2	38.68	7.97	2.79	28.91	21.28	101.72	57.54
I_3	44.65	8.17	3.01	32.11	23.51	110.22	60.56
I_4	38.19	7.90	2.74	28.75	21.27	99.14	57.34
C D at 5%	2.59	0.41	0.13	1.80	1.17	4.78	3.06

I_0 (control); I_1 (*Azotobacter* seed treatment); I_2 (*Azotobacter* soil application); I_3 (*Azospirillum* seed treatment); I_4 (*Azospirillum* soil application);

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compare to other treatment such as soil application (101.72 q ha^{-1}) and control (89.60 q ha^{-1}), but it was at par with *Azospirillum* seed treatment (110.22 q ha^{-1}).

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