Original Research Article

Effect of different inorganic fertilizers and bio-fertilizers on growth, yield and quality of sponge gourd *(Luffa cylindrica L.)*

ABSTRACT

The study titled **Effect of different inorganic fertilizers and bio-fertilizers on growth, yield, and quality of Sponge gourd (*Luffa cylindrica* L.)** was conducted at the Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj, during the *zaid* season of 2022. The experiment was designed in a randomized block design with fifteen treatment combinations replicated three times. The treatments were made out of N, P, K, Azospirillum, Azotobacter, and PSB. The results showed that the application of T_8 (75% NP + 100% K + Azotobacter + Azospirillum + PSB) was the most effective for growth, yield and quality of sponge gourd giving maximum average vine length of (278.34cm) at harvest, maximum number of nodes per plant (15.98) at 40 DAS, minimum number of days to appearance of first male and female flower at (34.83) and (40.77) DAS respectively, minimum number of days to first appearance of male and female flowers in 50% plants at (38.78) and (44.72) DAS respectively, minimum number of days to first fruit picking at (46.72) DAS, highest average number of (16.17) fruits per plant, maximum fruit length and diameter of (24.33cm) and (5.05 cm) respectively, highest average fruit weight of (137.17g), maximum average fruit yield per plant of (2.22kg), maximum yield per hectare of (30.8 tonnes), maximum total soluble solids of 5.81 (^{0}Brix), and maximum ascorbic acid content of (20.29 mg/100g).

Keywords : *Sponge gourd, bio-fertilizers, Growth, Yield, PSB, Azospirillum, Azotobacter.*

1. Introduction

Cucurbits are undoubtedly among the most intriguing crops cultivated for seed. They provide a broad variety of fruit in terms of its sizes, colours, and shapes, and there doesn't seem to be any end to the new innovations that periodically surface**.** The crop Luffa is a cross-pollinated species with 26 chromosomes (2n = 26). The luffa, also known as sponge gourd, loofah, vegetable sponge, bath sponge, or dish cloth gourd (*Luffa cylindrica* (L.) Roem syn *L. aegyptiaca* Mill), is a member of the cucurbitaceous family. India is where the luffa species first appeared. *L. acutangula* still exists in wild forms in northwest India. Sometimes it is claimed that *L. cylindrica* descended from *L. acutangula*, although this does not seem possible given how drastically different the two species are from one another in terms of appearance and flowering period. Additionally, *L. cylindrica* is more common than *L. acutangula* and has a tendency to overgrow in many areas of the Tropics. The best types for fibre (sponges), which have undergone several changes, may currently be found in Japan.

Global land shortages make agricultural production limited, necessitating higher yields and better plant nutrition using fertilisers to boost output and improve soil fertility. Excessive application of inorganic fertilizers without integration of biofertilizers deteriorates the physical, chemical, and biological aspects of soil. It has a very diminishing effect on the health of plants and living organisms including the soil microbes, which has caused a severe decrease in humus content and increase in soil, air, and water pollution. Whereas application of biofertilizers in combination with inorganic fertilizers enhances the soil nutrient content more sustainably than alone use of inorganic fertilizers.

The biofertilizers or bioinoculants comprises of microorganisms which tends to multiply swiftly when applied in the soil or as seed treatment or as seedling root dip, creating a dense population in the rhizosphere. Azotobacter are aerobic, nitrogen-fixing bacteria in soil, synthesizing cellular proteins using air nitrogen, providing essential nitrogen for crop plants. Azotobacter can successfully replace at least some of the mineral nitrogen fertilisers used in agricultural production by fixing roughly 20 kg of nitrogen per hectare annually. **(Kizilkaya, 2009).** According to one investigation, applying a mixed culture of Azotobacter starains could cut the demand for nitrogen fertilisers by up to 50% **(Romero-Perdomo, *et al.*, 2017).** A bacterial genus known as Azospirillum is gram-negative, microaerophilic, non-fermentative, and

nitrogen-fixing. It has the capacity to create various phytohormones, such as auxins, cytokinins, and gibberellins, as well as fix atmospheric nitrogen **(Dobereiner *et al.*, 1976)**. It also produce several phytohormones, including auxins, cytokinins, and gibberellins **(Reynders, 1979).** PS bacteria and plants interact to preserve soil fertility, increase crop output, and make previously unavailable P sources accessible to metabolically healthy plants. They boost plant growth by promoting biological nitrogen fixation efficiency, increasing trace element availability, and synthesizing phytohormones. **(Ponmurugan & Gopi, 2006)(Wani *et al.*, 2007)(Zaidi *et al.*, 2009).**

Nitrogen and Phosphorus serve as the most important nutrient in fertilization of Sponge Gourd and are also required in large quantities compared to other nutrients. Inorganic fertilizers along with Biofertilizers increases the production by direct nutrient supplement, nitrogen fixation, and phosphate solubilization which increases the amount of readily available nitrogen, phosphorus, and potassium for plant use without causing much harm to the environment. Thus, the aim of this investigation is to study and screen out the best effect of different treatment combinations of inorganic and biofertilizers on the growth, yield and quality of sponge gourd.

2. Materials and methods:

The present investigation was carried out to study the Effect of different inorganic fertilizers and bio-fertilizers on growth, yield and quality of sponge gourd (*Luffa cylindrica L.*).The experiment was carried out during *Zaid* season of 2022 at Horticulture Research farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P). Prayagraj is situated at an elevation of 78 meters above sea level at 25.87 ^{0} North latitude and 81.15^{0}E longitude. This region has a sub-tropical climate prevailing in the South-East part of U.P. with both the extremes in temperature, i.e., the winter and the summer. In cold winters, the temperature sometimes is as low as 32°F in December – January and very hot summer with temperature reaching up to 115°F in the months of May and June. During winter, frosts and during summer, hot scorching winds are also not uncommon. The experiment materials consist of hybrid TMSG-1609 which were planted with the spacing of 120×60 cm after seed inoculation with the bio-fertilizers according to the treatments. A total of fifteen treatments were tried in RBD and replicated thrice which consisted of different combinations of inorganic

fertilizers and bio-fertilizers, viz., T_1 : RDN (60:40:30) +FYM (20 tonnes), T_2 : 75 % N + 100 % PK + Azotobacter, T_3 : 75 % N + 100 % PK + Azospirillum, T_4 : 75 % P + 100 % NK + PSB, T_5 : 75 % N + 100 % PK + Azotobacter + Azospirillum, T_6 : 75 % NP + 100 % K + Azotobacter + PSB, T_7 : 75 % NP + 100 % K + Azospirillum + PSB, T_8 : 75 % NP + 100 % K + Azotobacter + Azospirillum +PSB, T_9 : 50 % N + 100 % PK + Azotobacter, T_{10} : 50 % N + 100 % PK + Azospirillum, T_{11} : 50 % P + 100 % NK + PSB, T_{12} : 50 % N + 100 % PK + Azotobacter + Azospirillum, T_{13} : 50 % NP + 100 % K + Azotobacter + PSB, T_{14} : 50 % NP + 100 % K + Azospirillum + PSB, T_{15} : 50 % NP + 100 % K + Azotobacter + Azospirillum +PSB. Five plants were randomly selected for recording observations on growth, yield and quality attributing parameters viz., vine length at harvest (cm), number of nodes per plant at 40 DAS, days to appearance of 1st male flower, days to appearance of 1st female flower, days to first appearance of male flowers in 50% plants of sponge gourd, days to first appearance of male flowers in 50% plants of sponge gourd, days to first fruit picking, number of fruits per plant, fruit weight (g) using physical balance, length of fruit (cm) using measuring scale, Diameter of Fruit (cm) using vernier calipers, average fruit yield per plant (kg), yield per hectare (tonnes/ hectare), TSS (^{0}Brix) using hand refractometer, ascorbic acid (mg/100g). The data collected during course of investigation were subjected to statistical analysis by adopting appropriate method of analysis of variance as described by Fisher (1950).

3. Results and Discussion

3.1 Growth parameters

3.1.1 Vine length

It is revealed from Table 1 that growth characters of sponge gourd were influenced significantly due to application of different combinations of inorganic fertilizers and bio-fertilizers. As shown in Table 1 among the different treatments T_8, which consisted of 75% NP + 100% K + Azotobacter + Azospirillum + PSB recorded significantly the longest vine length of 278.34cm, whereas T_1 { RDN (60:40:30) + FYM (20tonnes)}recorded the shortest vine length of 254.22cm at harvest due to the combined use of inorganic fertilizers and bio-fertilizers. The highest vine length in the best treatment might be due to ready availability of nutrients, their improved absorption and translocation by plants more quickly, which resulted in higher photosynthetic activity than other treatments. Azospirillum and Azotobacter improve plant N availability and content, affecting

growth characteristics. N is crucial for protein formation, protoplasm formation, cell division, and enlargement, ultimately enhancing plant growth **(Bakly, 1974).** Phosphobacteria convert unavailable phosphorus to available form during early crop growth, aiding in plant absorption of essential nutrients. They also enhance growth through biosynthesis of growth-promoting substances like vitamin B12 and Auxin. **(Prabhu *et al*., 2006).**

The results of present investigation are in agreement with the findings of **Prabhu *et al*.,(2006)** in cucumber, **Prasad *et al*.,(2009)**in bitter gourd, **Anmol and Singh (2018)** in cucumber and **Sonkamble et al., (2022)** in watermelon.

3.1.2 Number of nodes

Number of nodes varies significantly with the treatments. The maximum number of nodes 15.98 at 40 days after sowing was recorded in T_8 (75 % NP + 100 % K + Azotobacter + Azospirillum +PSB), whereas minimum number of nodes 10.89 was recorded in T_1 { RDN (60:40:30) + FYM (20tonnes)} shown in Table 1. The vine length is directly proportional to the number of nodes present in the plant and combined use of inorganic fertilizers and biofertilizers show a benificial effect on plant growth by increasing the available N, P and their uptake.

The results of present investigation are in agreement with the findings of **Prasad *et al*.,(2009)** in Bitter gourd.

3.2 Earliness Parameters

3.2.1 Days to appearance of first male flower

Days to appearance of 1st male flower varies significantly within the treatments. Sponge gourd required maximum number of days to appearance of first male flower i.e., 41.53 days in Table 1 when it was treated with T_1 { RDN (60:40:30) + FYM (20tonnes)}. On the other hand plants of the plots with treatment T_8 (75 % NP + 100 % K + Azotobacter + Azospirillum +PSB) took least number of days i.e., 34.83 days. Significant and early male flower initiation was due to combination of bio-fertilizers especially PSB which increased the availability of P which is crucial for promoting earliness **(Prabhu *et al*.,2006)**. The results of present investigation are in agreement with the findings of **Prabhu *et al*.,(2006)** in cucumber and **Prasad *et al*.,(2009)** in bitter gourd.

3.2.2 Days to appearance of first female flower

With a significant variation plants treated with T_8 (75 % NP + 100 % K + Azotobacter + Azospirillum +PSB) took

least number of days (40.77 days) to appearance of 1st female flower whereas T_1 { RDN (60:40:30) + FYM (20tonnes)} took the maximum of 50.02 days for the same. The earliness in appearance of female flower in Table 1 might be due to the enhanced production of growth substances like gibberellic acid, indole acetic acid, dihydrozeatin from bio-fertilizers which had positive influence on the physiological activity of plants which could assist the plants to induce female flowers **(Prasad *et al.*, 2009)**. The results of present investigation are in agreement with the findings of **Prabhu *et al.*,(2006)** in cucumber, **Prasad *et al.*,(2009)** in bitter gourd, **Sonkamble et al., (2022)** in watermelon and **Sahu *et al.*,(2022)** in cucumber.

3.2.3 Days to first appearance of male flowers in 50% plants of Sponge Gourd

Significant variation was found in the days to first appearance of male flowers in 50% plants of Sponge Gourd in Table 1. Maximum number of 45.62 days were taken by T_1 { RDN (60:40:30) + FYM (20tonnes)} to first appearance of male flowers in 50% plants while it took only 38.78 days by T_8 (75 % NP + 100 % K + Azotobacter + Azospirillum +PSB) for the same. This might be due early appearance of male flowers and better availability of nutrients by the combined use of inorganic and bio-fertilizers especially P which plays a crucial role in early induction of flowers on the plants **(Prabhu *et al.*,2006)**.

3.2.4 Days to first appearance of female flowers in 50% plants of Sponge Gourd

Minimum number of 44.72 days were taken by T_8 (75 % NP + 100 % K + Azotobacter + Azospirillum +PSB) to first appearance of female flowers in 50% plants while it took maximum number of 54.11 days by T_1 { RDN (60:40:30) + FYM (20tonnes)} for the same. This significant variation and earliness observed in Table 1 was favoured by the early appearance of female flowers and enhanced production of growth substances like gibberellic acid, indole acetic acid, dihydrozeatin from bio-fertilizers which had positive influence on the physiological activity of plants which could assist the plants to induce female flowers (**Prasad *et al.*, 2009)**.

3.2.5 Days to first fruit picking in Sponge gourd

Days to first fruit picking varies significantly in Table 1 due to application of different combinations of inorganic fertilizers and bio-fertilizers. Plants treated with T_8 (75 % NP + 100 % K + Azotobacter + Azospirillum +PSB) took least number of 46.72 days to first harvest whereas maximum number of 57.85 days were taken by T_1 { RDN (60:40:30) + FYM (20tonnes)}for the same. Combined

use of biofertilizers might have created balanced nutrition which accelerated the synthesis of chlorophyll and amino acids, there by photosynthates were translocated from leaves to fruits **(Eifediyi and Remison 2010) (Moharana *et al*., 2017).** The results of present investigation are in agreement with the findings of **Prasad *et al*.,(2009)**in bitter gourd, **Sonkamble et al., (2022)** in watermelon and **Sahu *et al*.,(2022)** in cucumber.

3.3 Yield Parameters

3.3.1 Number of fruits per plant

Number of fruits per plant varies significantly among the treatments. The maximum number of fruits per plant 16.17 was recorded in T_8 (75 % NP + 100 % K + Azotobacter + Azospirillum +PSB) whereas minimum number of fruits per plant 9.79 was found in T_1 { RDN (60:40:30) + FYM (20tonnes)}in Table 1. This might be due to the increased nutrient availability from the organic phosphorus through phosphobacteria and IAA from Azospirillum could have increased the various endogenous hormonal levels in the plant tissue, thereby enhancing pollen germination and tube growth, which ultimately increased the number of fruits per plant. It may also be due to higher percentage of productive flowers in these treatments **(Rajagopal and Rao 1974).** The results of present investigation are in agreement with the findings of **Prabhu *et al*., (2006)** in cucumber**, Prasad *et al*.,(2009)**in bitter gourd, **Anmol and Singh (2018), Sonkamble et al., (2022)** in watermelon and **Sahu *et al*.,(2022)** in cucumber.

3.3.2 Fruit weight

Fruit weight varies significantly among the treatments. Heavier fruits of 137.17 g were harvested from plants treated with T_8 (75 % NP + 100 % K + Azotobacter + Azospirillum +PSB) whereas lighter fruits of 121.20 g were harvested from T_1 { RDN (60:40:30) + FYM (20tonnes)}in Table 1. This significant increase in weight might be attributed to the balanced nutrition due to integration of bio-fertilizers which accelerated the synthesis of chlorophyll and amino acids, there by translocation of photosynthates from leaves to fruits causing increase in fruit weight **(Eifediyi and Remison 2010) (Moharana *et al*., 2017).** The results of present investigation are in agreement with the findings of **Prabhu *et al*., (2006) in cucumber, Prasad *et al*.,(2009)**in bitter gourd, **Anmol and Singh (2018), Sonkamble et al., (2022)** in watermelon and **Sahu *et al*.,*(*2022)** in cucumber.

3.3.3 Fruit length

Fruit length varies significantly among the treatments. Maximum fruit length of 24.33

cm were harvested from plants treated with T_8 (75 % NP + 100 % K + Azotobacter + Azospirillum +PSB) whereas fruits with minimum fruit length of 17.74 cm were harvested from T_1 { RDN (60:40:30) + FYM (20tonnes)}in Table 1. This might be due to the application of inorganic sources of nitrogen in combination with bio-fertilizers (Azotobacter and PSB) which led the plant growth favourably with the production of more carbohydrates which perhaps accelerated flow of assimilates to sink and might be the reason of higher fruit length **(Prasad *et al.,* 2009)**. The results of present investigation are in agreement with the findings of **Prabhu *et al.,* (2006)** in cucumber**, Prasad *et al.*,(2009)**in bitter gourd, **Anmol and Singh (2018)** and **Sahu *et al.*,(2022)** in cucumber.

3.3.4 Fruit diameter

Fruit diameter varies significantly among the treatments. Fruits with maximum diameter of 5.05 cm were harvested from plants treated with T_8 (75 % NP + 100 % K + Azotobacter + Azospirillum +PSB) whereas fruits with minimum fruit diameter of 3.01 cm were harvested from T_1 { RDN (60:40:30) + FYM (20tonnes)}in Table 1. The application of inorganic sources of nitrogen in combination with bio-fertilizers (Azotobacter and PSB) lead the plant growth favourably with the production of more carbohydrates which perhaps accelerated flow of assimilates to sink and might be the reason of higher fruit diameter **(Prasad *et al.,* 2009)**. The results of present investigation are in agreement with the findings of **Prabhu *et al.,* (2006)** in cucumber**, Prasad *et al.*,(2009)**in bitter gourd, **Anmol and Singh (2018)** and **Sahu *et al.*,(2022)** in cucumber.

3.3.5 Average fruit yield per plant

Average fruit yield per plant varies significantly among the treatments. Maximum fruit yield per plant of 2.22 kg was obtained from T_8 (75 % NP + 100 % K + Azotobacter + Azospirillum +PSB) whereas a minimum of 1.19 kg was recorded in T_1 { RDN (60:40:30) + FYM (20tonnes)}for the same in Table 1. The quick availability of plant nutrient from inorganic source, balanced C/N ratio, synthesis of auxin, growth substances, anti fungal due to inoculation of Azotobacter and conversion of insoluble phosphate to soluble form by PSB perhaps helped to increase fruit yield**(Prasad *et al.*,2009)**. The results of present investigation are in agreement with the findings of **Prabhu et *al.,* (2006)** in cucumber,**Prasad *et al.*,(2009)**in bitter gourd, **Anmol and Singh (2018)** in cucumber and **Sonkamble et al., (2022)** in watermelon.

3.3.6 Fruit yield per hectare

Fruit yield per hectare varies significantly among the treatments. Maximum fruit yield per hectare of 30.8 tonnes was obtained from T_8 (75 % NP + 100 % K + Azotobacter + Azospirillum +PSB) whereas a minimum of 16.49 tonnes was recorded in T_1 { RDN (60:40:30) + FYM (20tonnes)}for the same in Table 1. This might be due to soil inoculation of biofertilizers which adds nitrogen from the atmosphere by fixing and solubilizing insoluble phosphates, promoting plant growth and potentially enhancing fruit yield. The results of present investigation are in agreement with the findings of **Prabhu *et al.*, (2006)** in cucumber, **Prasad *et al*.,(2009)**in bitter gourd, **Anmol and Singh (2018), Sonkamble et al., (2022)** in watermelon and **Sahu *et al.,(*2022)** in cucumber.

3.4 Quality Parameters

3.4.1 TSS

TSS varies significantly among the treatments. Maximum TSS value of 5.81 ^{0} Brix was obtained from T_8 (75 % NP + 100 % K + Azotobacter + Azospirillum +PSB) whereas a minimum TSS value of 3.74 ^{0} Brix was recorded in T_1 { RDN (60:40:30) + FYM (20tonnes)}in Table 1. This may be brought on by the speedy metabolic conversion of pectin and starch into soluble molecules, as well as the swift movement of sugars from leaves to growing fruits due to integration of inorganic fertilizers with bio-fertilizers. The results of present investigation are in agreement with the findings of **Sayed *et al.*, (2015)** in cucumber, **Das *et al*.,(2009)**in bottle gourd, **Anmol and Singh (2018)** in cucumber.

3.4.2 Ascorbic acid

Ascorbic acid varies significantly among the treatments. Maximum vitamin –C content 20.29 mg per 100g was obtained from T_8 (75 % NP + 100 % K + Azotobacter + Azospirillum +PSB) whereas a minimum 15.35mg per 100g was recorded in T_1 { RDN (60:40:30) + FYM (20tonnes)}for the same in Table 1. This might be due the integration of inorganic fertilizers with bio-fertilizers which led to the speedy metabolic conversion of starch into ascorbic acid. The results of present investigation are in agreement with the findings of **Sayed *et al.*, (2015)** in cucumber, **Das *et al*.,(2009)**in bottle gourd, **Anmol and Singh (2018)** in cucumber.

4. Conclusion

From the present investigation, it is concluded that the influence of different inorganic fertilizers and bio-fertilizers with different treatment combinations rendered their significant effect on, growth, yield and quality of sponge gourd. Treatment T_8 (75 % NP + 100 % K + Azotobacter + Azospirillum +PSB) recorded best in vine length at harvest (cm), number of nodes per plant at 40 DAS, days to appearance of 1st male flower, days to appearance of 1st female flower, days to first appearance of male flowers in 50% plants of sponge gourd, days to first appearance of male flowers in 50% plants of sponge gourd, Days to first fruit picking, number of fruits per plant, fruit weight (g), length of fruit (cm), diameter of fruit (cm), average fruit yield per plant (kg), yield per hectare (tonnes/ hectare), TSS (^{0}Brix), ascorbic acid (mg/100g fruit wt.).

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Notation	Vine length at harvest	Number of nodes at 40 DAS	Days to appearance of first male flower	Days to appearance of first female flower	Number of days to first appearance of male flowers in 50% plants	Number of days to first appearance of female flowers in 50% plants	Days to first fruit picking	Number of fruits per plant	Fruit Weight	Fruit Length	Fruit Diameter	Fruit Yield per plant	Yield per hectare	TSS	Ascorbic acid content
T_1	254.22	10.89	41.53	50.02	45.62	54.11	57.85	9.79	121.20	17.74	3.01	1.19	16.49	3.74	15.35
T_2	260.89	12.11	39.00	45.3	43.04	49.34	52.28	12.07	122.87	20.01	3.64	1.48	20.6	4.36	18.27
T_3	262.22	12.35	38.63	44.97	42.66	49	51.79	12.32	123.83	20.17	3.72	1.53	21.19	4.51	18.43
T_4	258.98	11.09	40.07	47.03	44.15	51.11	55.28	11.10	122.17	18.40	3.14	1.36	18.83	3.98	17.67
T_5	264.89	13.11	38.46	44.63	42.47	48.64	51.36	13.21	125.73	20.47	4.11	1.66	23.07	4.74	18.89
T_6	267.11	14.46	37.99	43.2	41.96	47.17	49.89	14.64	129.43	21.07	4.61	1.90	26.32	5.41	19.66
T_7	266.89	14.24	38.20	43.63	42.18	47.61	50.49	14.32	128.77	20.97	4.56	1.84	25.61	5.22	19.47
T_8	278.34	15.98	34.83	40.77	38.78	44.72	46.72	16.17	137.17	24.33	5.05	2.22	30.8	5.81	20.29
T_9	260.33	11.96	39.40	45.4	43.45	49.45	52.35	11.78	122.67	19.98	3.53	1.45	20.07	4.22	18.07
T_{10}	259.89	11.71	39.73	45.83	43.79	49.89	53.16	11.54	122.60	19.97	3.36	1.41	19.65	4.13	17.94
T_{11}	259.78	11.35	39.77	46.54	43.84	50.61	54.09	11.32	122.50	18.89	3.23	1.39	19.26	4.06	17.83
T_{12}	263.22	12.78	38.55	44.86	42.57	48.88	51.59	12.88	125.33	20.41	3.84	1.61	22.42	4.65	18.64
T_{13}	266.44	13.90	38.26	43.97	42.25	47.96	50.95	13.97	127.13	20.70	4.34	1.78	24.67	5.01	19.21
T_{14}	265.02	13.54	38.38	44.37	42.38	48.37	51.20	13.76	126.77	20.65	4.20	1.74	24.23	4.96	19.00
T_{15}	268.42	15.14	37.76	42.86	41.72	46.82	49.49	14.87	133.87	22.54	4.78	1.99	27.65	5.52	19.71
F- test	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
SE.d (±)	4.33	0.24	0.75	0.65	0.75	0.65	0.5	0.32	1.45	0.71	0.08	0.04	0.61	0.06	0.09
$CD_{0.05}$	8.88	0.49	1.54	1.33	1.54	1.33	1.03	0.66	2.97	1.46	0.17	0.09	1.25	0.13	0.19
C.V	2.01	2.25	2.38	1.77	2.16	1.62	1.19	3.05	1.41	4.26	2.53	3.29	3.29	1.61	0.6

Table 1 : Effect of different inorganic fertilizers and bio-fertilizers on growth, yield and quality of Sponge gourd.