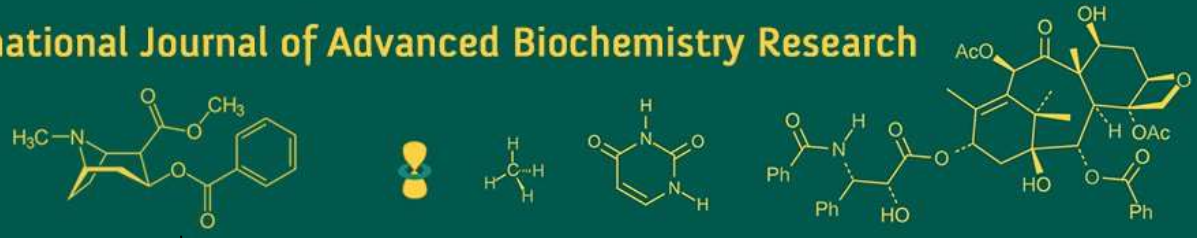
International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; SP-8(7): 75-79
www.biochemjournal.com
Received: 01-04-2024
Accepted: 03-05-2024

Pradeep
M.Sc. Scholar, Department of Horticulture, Sam Higginbottom University of Agricultural Sciences and Technology, NAI, Prayagraj, Uttar Pradesh, India

Vijay Bahadur
Associate Professor, Department of Horticulture, Sam Higginbottom University of Agricultural Sciences and Technology, NAI, Prayagraj, Uttar Pradesh, India

Saket Mishra
Assistant Professor, Department of Horticulture, Sam Higginbottom University of Agricultural Sciences and Technology, NAI, Prayagraj, Uttar Pradesh, India

Corresponding Author:
Pradeep
M.Sc. Scholar, Department of Horticulture, Sam Higginbottom University of Agricultural Sciences and Technology, NAI, Prayagraj, Uttar Pradesh, India

Effect of nitrogen and organic manurs on plant growth, yield and economic of cape gooseberry (*Physalis peruviana*)

Pradeep, Vijay Bahadur and Saket Mishra

DOI: https://doi.org/10.33545/26174693.2024.v8.i7Sb.1444

Abstract
A field experiment entitled" Effect of Nitrogen and Organic manures on plant growth, yield and quality attributes of Cape Gooseberry (*Physalis Peruviana*)" was carried out at Horticulture Research Field, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and sciences Prayagraj during the season (2023-2024). The design of the experiment was randomized block design (RBD) having 13 Treatment and each replication thrice. result obtained during the present investigation with different treatment of Nitrogen and Organic manures on plant growth, yield and quality attributes of Cape Gooseberry (*Physalis Peruviana*), it is concluded that the Treatment T_7 75% RD of nitrogen + 25% N through FYM + PSB + VAM was found to be the best treatment in respect to plant growth, fruit yield and fruit quality *viz*., plant height, number of branches per plant, number of leaves per plant, leaf area (cm^2),days to first flowering, days to first fruiting ,number of flower per plant, number of fruits per plant, fruit weight with and without husk (g), fruit yield (kg $plant^{-1}$) with and without husk, polar diameter (cm) with and without husk , radial diameter (cm) with and without husk, fruit yield (t ha^{-1}) with and without husk, acidity (%) , total soluble solids (T.S.S.) and ascorbic acid (100g of fresh fruit) of capegoose berry fruits under Allahabad agro-climatic conditions.

Keywords: Nitrogen, organic manurs, plant growth, yield, quality attributes and cape gooseberry

Introduction
The Cape gooseberry (*Physalis peruviana* L.) belongs to the family Solanaceae commonly known as rasbhari in India. It is tetraploid and hexaploid (2n=4×=48 and 2n=6×=72) in nature. The genus Physalis includes about 100 species characterized by fruits that bear an inflated calyx (Legge, 1974) [7]. Integrated nutrient management includes the use of inorganic, organic and microbial sources of nutrients which ensure balanced nutrient proportion by enhancing nutrient response efficiency and maximizing crop productivity of desired quality. It also helps in minimizing the existing gap between the nutrient removal through continuous use of chemical fertilizers and supply through slow release of fertilizers. It is well reported that the extensive use of chemical fertilizers adversely affect the soil health and results in decreased crop productivity and quality (Macit *et al.*, 2007) [8].
Generally, the fruit of *P. peruviana* L. is consumed fresh as well as vegetable salads. The whole fruit can be used in syrup and dried as it becomes a "very nice raisin". The fruit is also used in sauces and glazes for meats and seafood. It can also be used for making jams and jellies. The juice of the ripe fruit is high in pectinase, reducing costs in the preparation of jams and other similar preparations (Corporacion Colombia Internacional, 2001). Although cape gooseberry are generally commercialized as fresh products, the fruits are also used in sauces, syrups, and marmalades (Puente *et al.*, 2011) [12], or dehydrated (similarly to grape raisins) for use in bakeries, cocktails, snacks, and cereal breakfast.
The chemical fertilizers are mostly used for the cultivation because of quick release of essential elements to the crops, which have some deleterious effect on quality besides adverse effect on soil health, water and environment. Organic manures are the excellent and balanced source of nutrients as they improve the quality of produce, soil health, safety of environment as well as nutrient uptake but release the nutrient slowly.
Thus, fertilizer application plays an important role in harnessing optimum and good quality fruits in Cape gooseberry.

Although chemical fertilizers, particularly nitrogenous and phosphatic fertilizers, contribute a lot in fulling the nutrient requirement of plants but continuous use of these fertilizers affects the soil health adversely and deterio-rates physicochemical properties of soil. Hence, organic manures may increase soil fertility and thus, the crop pro-duction potential possibly by changes in soil physical and chemical.
nutrients besides suppression of insect pest & diseases.
The Cape gooseberry crop has the potential to enhance food security, especially for marginalized communities and small-scale farmers and therefore its cultivation should be investigated more widely. Some studies seem to suggest that Cape gooseberries can grow well under organic amendments and bio-stimulants when compared to chemical fertilisers (Gond *et al.*, 2018; Patidar *et al.*, 2018) [4, 10].

Materials and Methods
The present investigation was carried out out at Horticulture Research Field, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and sciences Prayagraj during the season (2023-2024). The design of the experiment was randomized block design (RBD) having 13 Treatment and each replication thrice. result obtained during the present investigation with different treatment of Nitrogen and Organic manures on plant growth, yield and Economic of Cape Gooseberry and different treatment combination given below this table 1

Table 1: Treatments combinations

T_0	RDN (100:60:60)
T_1	75% RD of nitrogen + 25% N through FYM
T_2	75% RD of nitrogen + 25% N through vermicompost
T_3	75% RD of nitrogen + 25% N through Goat manure
T_4	50% RD of nitrogen + 50% N through FYM
T_5	50% RD of nitrogen + 50% N through vermicompost
T_6	50% RD of nitrogen + 50% N through Goat manure
T_7	75% RD of nitrogen + 25% N through FYM + PSB + VAM
T_8	75% RD of nitrogen + 25% N through vermicompost + PSB + VAM
T_9	75% RD of nitrogen + 25% N through Goat manure + PSB + VAM
T_{10}	50% RD of nitrogen + 50% N through Goat manure + PSB + VAM
T_{11}	50% RD of nitrogen + 50% N through Vermicompost + PSB + VAM
T_{12}	50% RD of nitrogen + 50% N through Goat manure + PSB + VAM

Results and Discussion
The data from the Table 2 and Fig. 1 reveals that the mean plant height (cm), at different stages of plant growth. Anova table shows that at all the successive stages, plant height (cm) was significantly affected by the various treatment of Nitrogen and Organic manures over control.
At 90 days after transplanting significantly maximum plant height (159.95) was observed in the treatment T_7 75% RD of nitrogen + 25% N through FYM + PSB + VAM. Where as the minimum plant height (122.26) was found in treatment T_0 RDN (100:60:60). There was significant difference between different treatment combinations. However, T_6 50% RD of nitrogen + 50% N through Goat manure, T_{11} 50% RD of nitrogen + 50% N through Vermicompost + PSB + VAM and T_9 75% RD of nitrogen + 25% N through Goat manure + PSB + VAM are found statistically at par to T_7 75% RD of nitrogen + 25% N through FYM + PSB + VAM. The probable reason for increased plant height was possibly due to the readily available nitrogen, which might have encouraged more vegetative growth and development Girapu and Kumar (2006) [3].
At 90 days after transplanting significantly maximum number of branches per plant (44.00) was observed in the treatment T_7 75% RD of nitrogen + 25% N through FYM + PSB + VAM. Followed by T_1 250% RD of nitrogen + 50% N through Goat manure + PSB + VAM, T_9 75% RD of nitrogen + 25% N through Goat manure + PSB + VAM and T_8 75% RD of nitrogen + 25% N through vermicompost + PSB + VAM. Where as the minimum number of branches per plant (20.53) was found in treatment T_0 RDN (100:60:60). There was significant difference between different treatment combinations. The possible reason for the increase in number of branches per plant is due to increased soil fertility which attributes to more availability of applied nutrients, specially the supply of nitrogen which tends to vigorous plant growth remitting profuse branching and leaf production. Similar finding was also reported by Girapu and Kumar (2006) [3]. Increased plant growth might be due to more efficient absorption of nutrient elements because of the better root system developed by bio fertilization. Increase in plant-growth can also be ascribed to N addition through biological nitrogen fixation by Azotobacter (Bhattacharya *et al*., 2002) [2] and Sandhu Savreet and Singh Bikramjit Gill (2011) [14].
The significantly maximum number of flower per plant (90.13) was observed in treatment T_7 75% RD of nitrogen + 25% N through FYM + PSB + VAM followed by T_8 75% RD of nitrogen + 25% N through vermicompost + PSB + VAM, T_3 75% RD of nitrogen + 25% N through Goat manure, T_2 75% RD of nitrogen + 25% N through vermicompost and T_1 75% RD of nitrogen + 25% N through FYM and the minimum number of flower per plant (76.33) was found in T_0 RDN (100:60:60). There was significant difference between different treatment combinations. The probable reason for this might be due to increased photosynthetic efficiency and rate of assimilation due to nitrogen and phosphorus application which reflects on vigorous growth of plant and ultimately remitting profuse flowering. Similar results were also found by Prasad *et al.*, (1985) [11] in cape gooseberry. It may possibly be due to the fact that vermicompost and biofertilizers application accelerated the development of inflorescence, leaf numbers in autumn, which are positively correlated with number of flowers as well as number of fruits. These results are also in close conformity with the finding of Singh *et al*., (2015) [6] with application of vermicompost + Azotobacter + PSB + AM, Mishra and Tripathi (2011) [9] with use of Azotobacter 6 kg/ha. + PSB 6 kg/ha. and Soni *et al*. (2018) [18] with the application of 50% Vermicompost + 50% FYM + Azotobacter in strawberry.

The data shown that soil application of nitrogen and organic manures (RDN, FYM, Vermicompost, Goat manures, PSB and VAM) have significant effect on number of fruits per plant and fruit set (%) of cape Gooseberry (*Physalis peruviana*) as compared to control (T_0). The data from the Table 2 and Fig. 1 revealed that the average number of fruits per plant and fruit set (%) was significantly affected by the various treatment of nitrogen and organic manures over control.

The significantly maximum number of fruits per plant (83.87) was observed in treatment T775% RD of nitrogen + 25% N through FYM + PSB + VAM and the minimum number of flower per plant (40.47) was found in T_0 RDN (100:60:60).There was significant difference between different treatment combinations. However, 75% RD of nitrogen + 25% N through vermicompostare found statistically at par to T_7 75% RD of nitrogen + 25% N through FYM + PSB + VAM. The significantly maximum fruit set (95.64) was observed in treatment T_1 250% RD of nitrogen + 50% N through Goat manure + PSB + VAM and the minimum fruit set (44.27) was found in T_0 RDN (100:60:60).The probable reason for this might be due to increased photosynthetic efficiency and rate of assimilation due to nitrogen and phosphorus application which reflects on vigorous growth of plant and ultimately remitting profuse flowering. Similar results were also found by Prasad *et al.*, (1985) [11] in cape gooseberry. It may possibly be due to the fact that vermicompost and biofertilizers application accelerated the development of inflorescence, leaf numbers in autumn, which are positively correlated with number of flowers as well as number of fruits. These results are also in close conformity with the finding of Singh *et al.* (2015) [6] with application of vermicompost + Azotobacter + PSB + AM, Mishra and Tripathi (2011) [9] with use of Azotobacter 6 kg/ha. + PSB 6 kg/ha. and Soni *et al.* (2018) [18] with the application of 50% Vermicompost + 50% FYM + Azotobacter in strawberry.

The significantly maximum fruit yield (kg plant^{-1}) with and without husk (868.29 and 829.18) was observed in treatment T_7 75% RD of nitrogen + 25% N through FYM + PSB + VAM followed by 75% RD of nitrogen + 25% N through vermicompost + PSB + VAM and 75% RD of nitrogen + 25% N through Goat manure + PSB + VAM and the minimum fruit yield (kg plant^{-1}) with and without husk (310.60 and 266.55) was found in T_0 RDN (100:60:60). There was significant difference between different treatment combinations. It may possibly be due to fact that organic and inorganic fertilizer application accelerated the development of fruits which are positively correlated with the number of fruits in the following spring. Increased number of fruits might have also resulted because of increase in number of flowers per plant. Similar observations were also reported by Tripathi *et al.* (2010) [20] in strawberry. Although there is no report in the literature to support the results, yet it can be corroborated with the finding of Singh *et al.* (2009) [15] in ber, Baksh *et al.* (2008) [1] in guava and Rathi and Bist (2004) [13] in pear. These are similar finding reported by Patidar *et al.*, (2018) [10]. The treatments of FYM, vermicompost and pressmud individually showed significant also over control. When FYM, vermicompost and pressmud applied with PSB showed marked increase in fruit yield than individual applications. The vermicompost, Azotobacter and PSB improve the number of fruit and fruit size which ultimately increased the fruit yield. Similar result was recorded by Sanehu and Gill (2011) [21] recorded high fruit yield under integrated nutrient management in cape gooseberry, Soni *et al.* (2018) [18] in strawberry and Kumar *et al.* (2015) [6] in Potato.

The significantly maximum fruit yield (t ha^{-1}) with and without husk (20.84 and 19.90) was observed in treatment T_7 75% RD of nitrogen + 25% N through FYM + PSB + VAM and the minimum fruit yield (t ha^{-1}) with and without husk (7.45 & 6.40) was found in T_0RDN (100:60:60).However, 75% RD of nitrogen + 25% N through vermicompost + PSB + VAM and 50% RD of nitrogen + 50% N through Goat manure + PSB + VAM are found statistically at par to T_7 75% RD of nitrogen + 25% N through FYM + PSB + VAM. There was significant difference between different treatment combinations. It may possibly be due to fact that organic and inorganic fertilizer application accelerated the development of fruits which are positively correlated with the number of fruits in the following spring. Increased number of fruits might have also resulted because of increase in number of flowers per plant. Similar observations were also reported by Tripathi *et al.* (2010) [20] in strawberry. Although there is no report in the literature to support the results, yet it can be corroborated with the finding of Singh *et al.* (2009) [15] in ber, Baksh *et al.* (2008) [1] in guava and Rathi and Bist (2004) [13] in pear. These are similar finding reported by Patidar *et al.*, (2018) [10]. These findings are in line with the Subbiah (1994) in chilli, Wange *et al.* (1998) [19] in strawberry, Kadlag *et al.*, (2007) [5] in tomato and Tripathi *et al.* (2010) [20] in strawberry. The increase in yield might be due to increased fruit set per plant, fruit length and fruit width as well as fruit weight influenced by nitrogen fixers.

There was significant difference between different treatment combinations. It may possibly be due to fact that organic and inorganic fertilizer application accelerated the development of fruits which are positively correlated with the cost of cultivation T_{10} 3.48 benefit cost ratio and T_0 is lowest B;C ratio 0.96.

Table 2: Effect of Nitrogen and Organic manures on plant growth, yield and Economic of Cape Gooseberry

Treatment No.	Treatments details	Plant height (cm) 90 DAT	Number of Branches per Plant 90 DAT	Number of flower per plant	Number of fruit per plant	Fruit yield per plant (g) Without husk	Fruit yield (t ha-1) Without husk	Benefit cost ratio
T_0	RDN (100:60:60)	122.16	20.53	76.33	40.47	266.55	6.40	0.96
T_1	75% RD of nitrogen + 25% N through FYM	127.41	25.80	87.47	79.13	638.05	15.31	1.05
T_2	75% RD of nitrogen + 25% N through vermicompost	129.19	26.27	87.20	76.40	618.85	14.85	1.56
T_3	75% RD of nitrogen + 25% N through Goat manure	132.33	29.60	88.67	78.20	639.92	15.36	2.46
T_4	50% RD of nitrogen + 50% N through FYM	134.78	26.87	85.00	72.93	639.58	15.35	1.54
T_5	50% RD of nitrogen + 50% N through vermicompost	139.57	32.00	87.87	82.40	703.75	16.89	2.55
T_6	50% RD of nitrogen + 50% N through Goat manure	147.46	30.87	85.00	71.60	636.10	15.27	2.77
T_7	75% RD of nitrogen + 25% N through FYM + PSB + VAM	159.95	44.00	90.13	83.87	829.18	19.90	1.60
T_8	75% RD of nitrogen + 25% N through vermicompost + PSB + VAM	139.34	33.20	84.73	80.33	786.76	18.88	2.20
T_9	75% RD of nitrogen + 25% N through Goat manure + PSB + VAM	144.39	34.67	88.13	83.60	789.64	18.95	3.31
T_{10}	50% RD of nitrogen + 50% N through Goat manure + PSB + VAM	141.60	32.93	83.93	79.27	728.61	17.49	3.48
T_{11}	50% RD of nitrogen + 50% N through Vermicompost + PSB + VAM	143.29	32.53	84.00	79.73	726.44	17.43	2.67
T_{12}	50% RD of nitrogen + 50% N through Goat manure + PSB + VAM	159.71	40.80	85.73	82.00	742.58	17.82	3.34
	F-Test	S	S	S	S	S	S	
	S.Ed.	6.05	2.67	2.70	2.97	26.95	0.64	
	C.D. at 0.5%	12.49	5.52	5.57	6.14	55.62	1.33	
	CV	5.29	10.39	3.86	4.78	4.89	4.89	

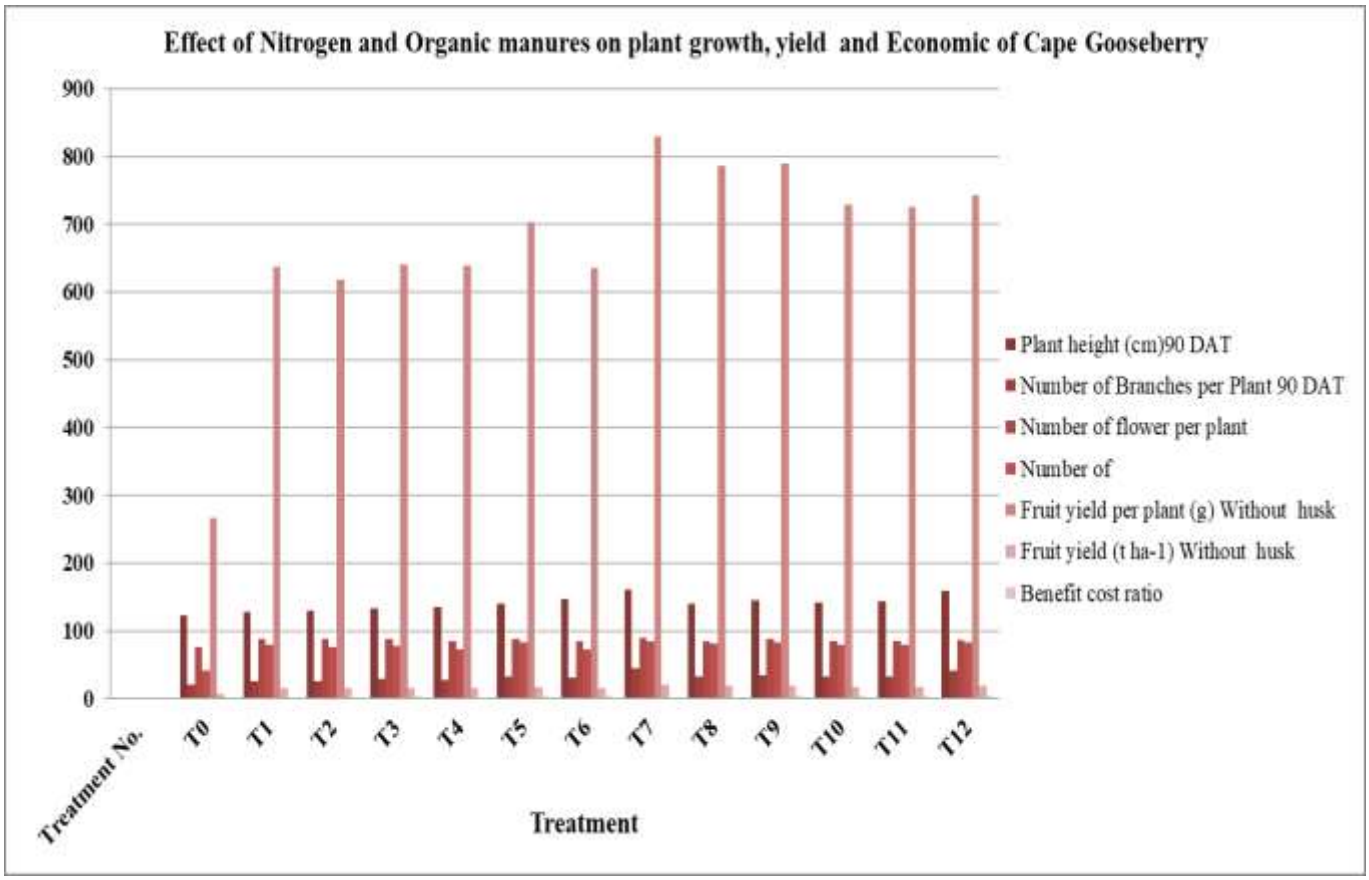


Fig 1: Effect of Nitrogen and Organic manures on plant growth, yield and Economic of Cape Gooseberry

Conclusion

From the result obtained during the present investigation with different treatment of Nitrogen and Organic manures on plant growth, yield and quality attributes of Cape Gooseberry (*Physalis Peruviana*), it is concluded that the Treatment T_7 75% RD of nitrogen + 25% N through FYM + PSB + VAM was found to be the best treatment in respect to plant growth, fruit yield and fruit quality *viz*., plant height, number of branches per plant, number of leaves per plant, leaf area (cm^2),days to first flowering, days to first fruiting ,number of flower per plant, number of fruits per plant, fruit set (%) fruit weight with and without husk (g), fruit yield (kg $plant^{-1}$) with and without husk, fruit diatemr polar and radial diameter (cm), fruit yield (t ha^{-1}) with and without husk, acidity (%) , total soluble solids (T.S.S.) and ascorbic acid (100g of fresh fruit) of cape goose berry fruits under Allahabad agro-climatic conditions.

Completing Interests

Author have declared that no competing interests Exists.

References

1. Baksh H, Yadav R, Dwivedi R. Effect of INM on growth, yield attributing characters and quality of guava cv. Sardar. Progressive Agriculture. 2008;8(2):141-144.
2. Bhattacharya P, Jain RK, Paliwal MK. Biofertilizers for vegetables. Indian Horticulture. 2002;44:12-13.
3. Girapu RK, Kumar A. Influence of nitrogen and spacing on growth, yield and economics of cape-gooseberry (*Physalis peruviana* L.) production. Proceedings of the national symposium on production, utilization and export of underutilized fruits with commercial potentialities, Kalyani, Nadia, West Bengal, India; c2006.
4. Gond M, Dwivedi DH, Singh N. Performance of Cape Gooseberry (*Physalis peruviana* L.) under different spacing and organic manures. The Bioscan. 2017;12(1):377-380.
5. Kadlag AD, Jadhav AB, Bharti R. Yield and quality of tomato fruit as influenced by biofertilizers. Asian Journal of Soil Science. 2007;2(2):95-99.
6. Kumar A, Singh A, Hooda V, Singh RK, Singh M. Effect of organic manure, biofertilizers and mulching on growth and yield of potato (*Solanum tuberosum* L.). The Bioscan. 2015;10(1):403-406.
7. Legge AP. Notes on the history, cultivation and uses of *Physalis peruviana* L. Journal of the Royal Horticulture Society. 1974;99(7):310-314.
8. Macit I, Koc A, Guler S, Deligoz I. Yield, quality and nutritional status of organically and conventionally grown strawberry cultivars. Asian Journal of Plant Science. 2007;6(7):1131-1136.
9. Mishra AN, Tripathi VK. Effect of biofertilizers on vegetative growth, flowering, yield and quality of strawberry. Proceedings of the International Symposium on Minor Fruit and Medicinal Plants for Health and Ecological Security (ISMF&MP), West Bengal, India. 2011:211-215.
10. Patidar A, Bahadur V, Kumar RS. Effect of organic and inorganic fertilizers on growth, yield, and quality of cape gooseberry (*Physalis peruviana* L.). Journal of Pharmacognosy and Phytochemistry. 2018;7(4):3180-3184.
11. Prasad ID, Sengupta BN, Singh RK, Singh SP. Haryana Journal of Horticultural Sciences. 1985;44(3-4):151-155.
12. Puente LA, Pinto SA, Castro ES, Cortés M. *Physalis peruviana* L., the multiple properties of a highly functional fruit: a review. Food Research International. 2011;44:1733-1740.
13. Rathi DS, Bist LD. Inorganic fertilizers through the use of organic supplements in low chill pear cv. pant pear-18. International Journal of Horticulture. 2004;61(3):223-225.
14. Sandhu S, Singh BG. Effect of integrated nutrient management strategies on growth and yield of cape gooseberry (*Physalis peruviana* L.). Journal of Horticultural Sciences. 2011;6(1):29-32.
15. Singh A, Singh JN. Effect of biofertilizers and bioregulators on growth, yield and nutrient status of strawberry cv. Sweet Charlie. Indian Journal of Horticulture. 2009;66(2):220-224.
16. Singh A, Singh RP. Effect of bio- and chemical fertilizers on nutrient status of olive tree. Haryana Journal of Horticultural Sciences. 2004;33:27-29.
17. Soni S, Kanawjia A, Chaurasiya R, Chauhan PS, Kumar R, Dubey S. Effect of organic manure and biofertilizers on growth, yield and quality of strawberry (*Fragaria x ananassa* Duch) cv. Sweet Charlie. Journal of Pharmacognosy and Phytochemistry. 2018;2:128-132.
18. Subbiah K. Effect of nitrogen, phosphorous and biofertilizers on yield and nutrient uptake in chilli and bellary onion. Madras Agricultural Journal. 1994;81(5):277-279.
19. Wange SS, Kale RH. Effect of biofertilizers under on graded nitrogen levels of brinjal crop. Journal of Soils and Crops. 2004;14(1):9-11.
20. Saxena A, Tripathi RM, Singh RP. Biological synthesis of silver nanoparticles by using onion (*Allium cepa*) extract and their antibacterial activity. Dig J Nanomater Bios. 2010 Jun 1;5(2):427-432.
21. Sandhu S, Gill BS. Effect of integrated nutrient management strategies on growth and yield of Cape gooseberry (*Physalis peruviana* L.). Journal of Horticultural Sciences. 2011 Jun 30;6(1):29-32.