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Effect of bio stimulants and bio fertilizers application on growth, yield and quality of tube rose (*Polianthes Tuberosa* L. cv. Prajwal)

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Abstract
The field experiment on tuberose was conducted to find out the bio stimulant to increase the growth, yield and quality of Tuberose (*Polianthes tuberosa*. L) cv. Prajwal at Horticultural College and Research Institute, Periyakulam during the year 2019-2021. The field was laid out in Randomised Block Design with nine treatments and three replications. The treatments consists of foliar spray of panchagavya (3 per cent and 4 per cent), humic acid (0.2 percent and 0.4 percent), seaweed extract (1 percent and 2 percent) and fulvic acid (2 percent and 3 percent) with all treatments are combined with soil application of Azotobacter @ 3 ml/m^2, Phosphate solubilizing bacteria @ 3 ml/m^2, Potassium solubilizing bacteria @ 3 ml /m^2 and Control (Without spray) + raising three rows of marigold. Finally it conclude that, 3 per cent panchagavya +Azotobacter @ 3 ml/m^2 + PSB @ 3 ml/m^2 + KSB @ 3 ml /m^2 (T_1) recorded highest plant height, no. of leaves, plant spread, spike length, lowest days taken for opening of first floret and highest no. of florets per spike, length of floret, length of spike and highest fresh weight of whole spike.

Keywords: Tuberose, panchagavya, florets per spike, fresh weight of whole spike

Introduction
Tuberose (*Polianthes tuberosa* L.) is one of the commercial flowering plant cultivated for the production of loose and cut flower. It is cultivated throughout the various states of India. The variety Arka Prajwal of Tuberose is an promising type with high yield and good quality loose flower and cut flower crop due to pleasant aroma, longer vase-life of spikes, higher net returns and adaptability to various soil and climate condition.
The present investigation was carried in Tuberose (*Polianthes tuberosa* L) cv. Prajwal through foliar application of bio-stimulants and soil application of bio-fertilizers with the following objectives.

- To increase the morphological parameters of Tuberose.
- To increase the yield of flowers in Tuberose.
- To improve the flower quality of Tuberose.

Materials and Methods
The field trial was conducted at Eastern Block (Field no.7) of Horticultural College and Research Institute, Periyakulam with an area of 0.035 ha. The initial soil analysis were taken. pH and Electrical conductivity of the soil was 8.07 and 0.22 ds/m respectively. The field was primarily ploughed and then ridges and furrow were taken. The bulbous species *Polianthes tuberosa* cv. Prajwal was utilized in this study. The mature bulbs were bought from mother block (Eastern Block) and planted at a spacing of 45x20 cm. Irrigation was given at weekly intervals and no weedicides were used for the experiment.
The experiment was laid out in Randomised Block Design with nine treatments and three replications. The treatments consists of foliar spray of panchagavya (3 per cent and 4 per cent), humic acid (0.2 percent and 0.4 percent), seaweed extract (1 percent and 2 percent) and fulvic acid (2 percent and 3 percent). All treatments are combined with soil application of Azotobacter @ 3 ml/m^2, Phosphate solubilizing bacteria @ 3 ml/m^2, Potassium solubilizing bacteria @ 3 ml/m^2.

Results and Discussion
The results of the field trial were statistically analyzed and the data are presented in appropriate Tables.

Table 1: Effect of Bio-stimulants on growth characters

Treatments	Plant height (cm)	No. of leaves/plant	Plant spread (E-W)	Plant spread (N-S)
T_1	33.84	13.20	39.00	37.94
T_2	31.40	11.47	37.60	35.54
T_3	30.13	11.34	35.47	34.27
T_4	27.47	8.87	30.30	31.20
T_5	30.10	11.87	38.07	36.57
T_6	30.20	9.80	37.80	31.24
T_7	30.34	9.94	31.77	37.57
T_8	32.40	10.20	36.17	29.90
T_9	27.54	11.07	33.94	35.20
S.E.(d)	1.722	1.085	0.919	0.925
C.D.(0.05)	3.68	2.321	1.964	1.977

Treatment Details

T_1 Panchagavya 3%+ Azotobacter@3ml/m^2 + PSB@ 3ml/m2 +KSB @ 3ml /m2

T_2 Panchagavya 4% + Azotobacter @ 3 ml/m^2 + PSB @ 3 ml/m^2 + KSB @ 3 ml /m^2

T_3 Humic acid 0.2% + Azotobacter @ 3 ml/m^2 + PSB @ 3 ml/m^2 + KSB @ 3 ml /m^2

T_4 Humic acid 0.4%+ Azotobacter @ 3 ml/m^2 + PSB @ 3 ml/m^2 + KSB @ 3 ml /m^2

T_5 Seaweed extract 1% + Azotobacter @ 3 ml/m^2+PSB @ 3 ml/m^2 + KSB @ 3ml /m^2

T_6 Seaweed extract 2% + Azotobacter @ 3 ml/m^2+PSB @ 3 ml/m^2 + KSB @ 3 ml /m^2

T_7 Fulvic acid 2%+ Azotobacter @ 3 ml/m^2 + PSB @ 3 ml/m^2 +KSB @ 3 ml /m^2

T_8 Fulvic acid 3% + Azotobacter @ 3 ml/m^2 + PSB @ 3 ml/m^2 +KSB @ 3 ml /m^2

T_9 Control (without spray) + raising three rows of marigold

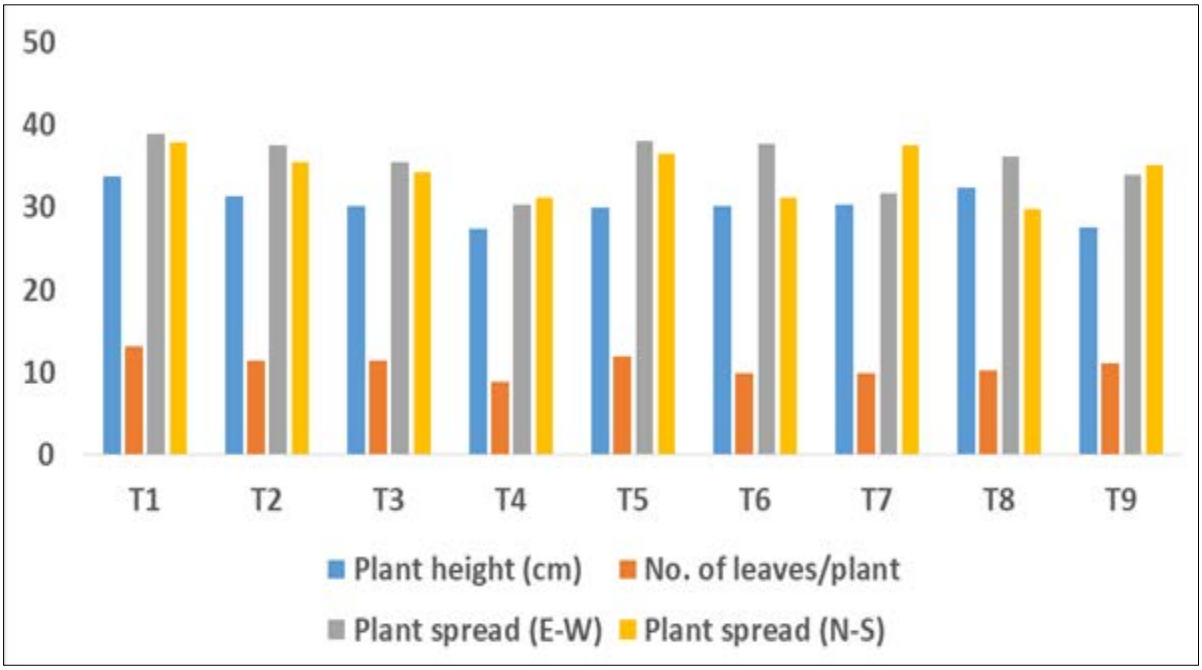

Fig 1: Effect of Bio-stimulants on growth characters

Among the different treatments the Treatment (T_1) recorded the highest plant height (33.84 cm), No. of leaves/plant (13.20), plant spread (E-W-39.00 & N-S-37.94) when compared to control. Panchagavya plays an important role to increase the vegetative growth and flowering parameters of tuberose and by the ability of the plant to receive more nutrients. Panchagavya carries considerable quantities of nitrogen, which would be further utilized for the protein synthesis and eventually resulted in stimulated crop growth. Moreover nitrogen is an important component of amino acids and coenzymes, which have considerable biological importance (Sivakumar, 2004) [14]. Another possible reason for the achievement of highest plant height might be due to the enzymes present in panchagavya, which favored rapid cell division and multiplication. This view was supported earlier by Ganesh (2004) [4] in paprika. Biostimulants sprayed on the foliage, resulted in the increased absorption of nutrients, as foliar application can reduce the long time between application and uptake by the plant, which could be important during a phase of rapid growth. These results are in conformity with the results, reported by Selvi *et al.*, (2002) [12] and Barad RG *et al.*, (2019) [1] in rose; Bhalla *et al.*, (2006) [2] in carnation; Mahawer *et al.*, (2010) [6] in tuberose and Suchitra Rakesh *et al.*, (2017) [16] in bhendi. Foliar application of panchagavya were produced larger leaves with denser canopy (Somasundaram *et al.*, 2007; Tharmaraj *et al.*, 2011) [15, 18]. According to Muthuvel (2002) [7] four sprays of panchagavya at 3% recorded higher plant height and number of branches per plant. The present study revealed that foliar spray of panchagavya at 3% significantly increased the yield attributes. This is in agreement with the finding of Birendra and Christopher (2007) [3] and Rajesh and Kaliyamoorthy (2013) [9]. The same findings were observed in black gram (Swaminathan *et al.*, 2007) [17] and *Coleus forskohili* (Kanimozhi, 2004) [5].

Table 2: Effect of bio-stimulants on floral characters

Treatments	No. of Flower spikes/plant	No. of days for opening of first floret	No. of florets/spike	Length of floret (cm)	Length of Spike (cm)	Fresh weight of whole spike (g)
T_1	23.58	88.53	36.12	7.53	86.75	131.26
T_2	11.71	90.12	34.54	6.10	85.02	130.11
T_3	16.50	91.72	32.35	5.72	85.58	127.14
T_4	14.40	92.89	31.82	5.28	84.92	126.38
T_5	11.97	93.82	30.11	5.56	84.10	129.13
T_6	15.00	92.12	30.52	5.27	84.04	128.53
T_7	17.57	90.25	33.22	5.12	82.25	125.13
T_8	10.80	91.52	32.82	5.03	81.63	124.34
T_9	11.10	97.32	29.25	4.08	71.92	99.28
SE.(d)	0.63	0.852	1.197	0.794	1.05	0.909
C.D. (0.05)	1.348	1.822	2.559	1.698	2.245	1.944

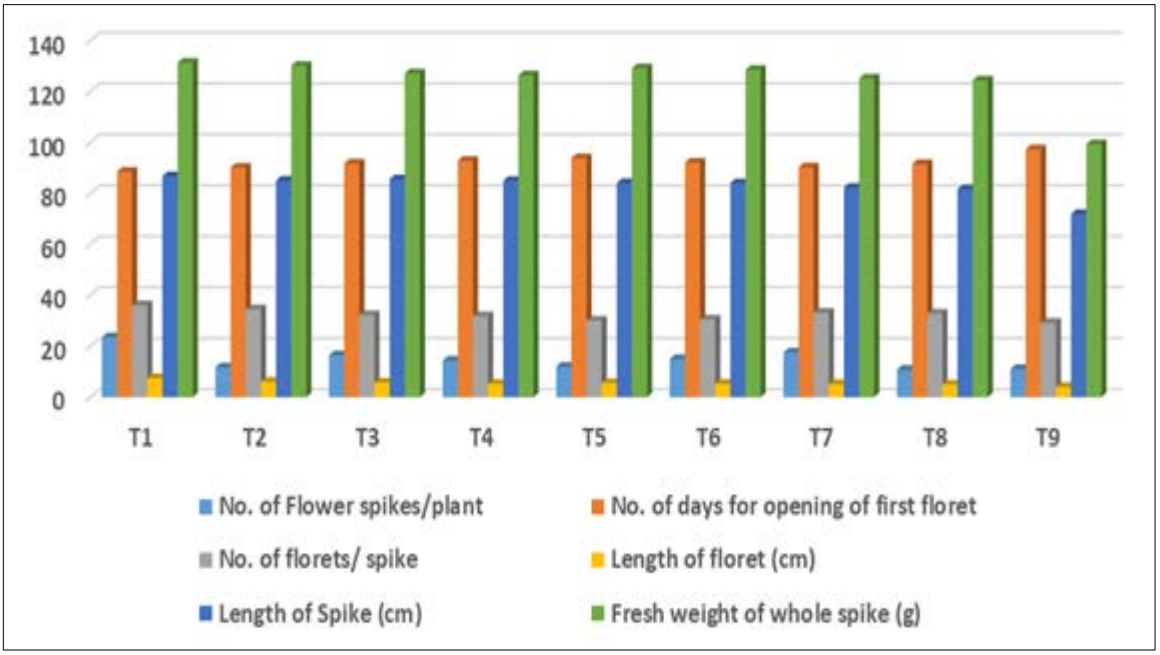

Fig 2: Effect of Bio-stimulants on floral characters

Regarding the yield parameters, the treatment (T_1) was recorded highest no. of flower spikes/plant (23.58), lowest no. of days for opening of first floret (88.53) and highest no. of florets/spike (36.12), length of floret (7.53 cm), length of spike (86.75cm) and fresh weight of whole spike (131.26g) when compared to control (T_9) and other treatments. This might be due to the ability of panchagavya to restore the yield level of all the crops during the transitory period (Natarajan, 2002) [8] and which was reported to be its special feature. The transitory period is well characterized by the fall in productivity during the conversion of inorganic supply of nutrients to organic (Sharma, 2002) [20]. Improvement in crop yield might have been due to the stimulation in root growth which further helped in better absorption of water and in turn improved vegetative and reproductive characters. The effect of panchagavya also improved on number of flowers and yield due to cell division and cell elongation process as reported by Thamaraiselvi (2001) [19] in rose.

Panchagavya is a potential organic product, to promoting the growth and providing immunity to plant system. It contains major nutrients, essential micro nutrients, more vitamins and important amino acids. Flowering and yield of tuberose increased may be due to the increased availability and uptake of nutrients, water and also the enhanced activity of GA, IAA and cytokinins in Panchgavya. The results of present study are in close conformity with findings of Raushan (2008) [11] in gladiolus; Singh *et al.*, (2007) [13] in tuberose, Renukaradya *et al.*, (2011) [21] in carnation, Barad RG *et al.*, (2019) [1] in rose and Sachitra Rakesh *et al.*, (2017) [16] in bhendi. Foliar application of Panchagavya increased the growth and vigour of the crop by inducing resistance to pests and diseases and keeping quality of vegetables and fruits were improved (Natarajan, 2002) [8]. Foliar spray of Panchagavya as a potential organic product for all the crops than the recommended nutrients in terms of higher growth and productivity.

Best Treatment (T_1)

Control (T_9)

Conclusion

Then present study of Tuberose cv. Prajwal revealed that Panchagavya 3 per cent as a foliar application and Azotobacter @ 3 ml/m^2, Phosphate Solubilizing Bacteria @ 3ml/m^2 and Potassium Solubilizing Bacteria @ 3 ml /m^2 as a soil application (T_1) recorded significant results viz. highest plant height, no. of leaves, plant spread, spike length, lowest days taken for opening of first floret and highest no. of florets per spike, length of floret, length of spike and highest fresh weight of whole spike.

References

1. Barad RG, Karetha KM, Subhrajyoti Mishra, Maheta PV, Rathva KN. Effect of biostimulants and micronutrients grade on growth and flowering of rose cv. top Secret under protected condition, International Journal of Chemical Studies. 2019;7(5):234-236.
2. Bhalla R, Dharma S, Dhiman SR, Jain R. Effect of biofertilizers and biostimulants on growth and flowering in standard Carnation (*Dianthus caryophyllus* Linn.). J Orna. Hort. 2006;9(4):282-285.
3. Birendra KY, Christopher LA. Use of panchagavya as a growth stimulant and biopesticide in agriculture. In: Agriculture and Environment. Ed. Arvind Kumar, APH Publishing Corporation, New Delhi; c2007. p. 65-70.
4. Ganesh R. Effect of biostimulants on maximising the yield of paprika (*Capsicum annum* var. *Longum*) var.kt pl-19. M.Sc., (Ag.) Thesis, submitted to Tamilnadu Agrl. Univ., Coimbatore; c2004.
5. Kanimozhi S. Standardization of organic production package of Coleus forskohlii. M.Sc. Thesis, Horticultural College and Research Institute, Tamil Nadu Agriculture University, Coimbatore, T.N. (India); c2004.
6. Mahawer LN, Bairwa HL, Shukla A. Response of biostimulants as pre harvest management of tuberose cut spike (*Polianthes tuberosa* L.) cv. Phule Rajani. Progre. Hort. 2010;42(1):54-57.
7. Muthuvel I. Effect of organics on growth and yield of bhendi var. Varsha Uphar. Proc. Nation. Conf. on glory of gomatha: panchagavya as potentiator of plant cells: effects on crop plants and the physiology that validates the effects. S.V. Veterinary Univ., Tirupati, A.P; c2002 Dec 1-3. p. 143-148.
8. Natarajan K. Panchagavya - A Manual. Other Indian Press, Mapusa, Goa, India; c2002. p. 333.
9. Rajesh M, Kaliyamoorthy, J Changes in morphological,

biochemical and yield parameters of *Abelmoschus Esculentus* (L.) Moench due to panchagavya spray. International Journal of Modern Plant & Animal Sciences. 2013;1(2):82-95.
10. Ranukaradya S, Pradeepkumar CM, Santoshkumar HM, Dronachari M, Sashikumar RS. Effect of integrated system of plant management on growth, yield and flower quality of carnation (*Dianthus caryophyllus* L.) under greenhouse. Asian J Hort. 2011;6(1):106-112.
11. Raushan Kumar. Effect of organic culture on growth and post-harvest life of galdious *(Gladious hybrida*) cv. Peter Pears. M.Sc. (Agri.) thesis submitted to GBPAU, Pantnagar; c2008.
12. Selvi SPT, Chezhiyan N, Ramar A. Studies on the effect of growth regulators, calcium, boron and organics on rose. South Indian Horticulture. 2002;50(4):430-436.
13. Singh B, Srivastava R, Chandra R. Response of panchgavya and manchurian mushroom tea on floral characters in tuberose (*Polianthes tuberosa* L.) cv. Pearl Double. J Orna. Hort. 2007;10(4):250-254.
14. Sivakumar V. Studies on standardization of protocol for maximization of growth, yield and alkaloid content in Black nightshade (*Solanum nigrum* L.). M.Sc., (Hort.) Thesis, Tamil Nadu Agricultural University, Coimbatore-3, India; c2004.
15. Somasundaram E, N Sankaran, S Meena, TM Thiyagarajan, K Chandaragiri, S Panneerselvam. Response of greengram to varied levels of Panchagavya (Organic Nutrition) foliar spray. Madras Agriculture Journal. 2007;90:169-172.
16. Suchitra Rakesh S, Poonguzhali B, Saranya S, Suguna, Jothibasu K. Effect of Panchagavya on Growth and Yield of *Abelmoschus esculentus* cv. Arka Anamika. Thanthai Roever Institute of Agriculture and Rural Development, Perambalur, Tamil Nadu, India. Int. J Curr. Microbiol. App. Sci. 2017;6(9):3090-3097.
17. Swaminathan C, Swaminathan V, Vijayalakshmi V. Panchagavya Boon to Organic Farming. International Book Distributing Corporation, India; c2007.
18. Tharmaraj K, Ganesh P, Sureshkumar R, Anandan A, Kolanjinathan KA Critical Review on Panchagavya – A boon plant growth. Int. J Pharm. Biol. Arch. 2011;2(6):1611-1614.
19. Thamaraiselvi SP. Physiological studies on petal shedding in Edward rose (*Rosa bourboniana* Desp.) and Red rose (*Rosa centifolia* L.). M.Sc., (Hort.) Thesis, HC & RI, TNAU, Coimbatore; c2001.
20. Sharma A, Dorman MF, Spahr AJ. A sensitive period for the development of the central auditory system in children with cochlear implants: implications for age of implantation. Ear and hearing. 2002 Dec 1;23(6):532-9.
21. Renukaradya S, Pradeepkumar CM, Santhosha HM, Dronachari M, Shashikumar RS. Effect of integrated system of plant nutrition management on growth, yield and flower quality of carnation (*Dianthus caryophyllus* L.) under green house. Asian Journal of Horticulture. 2011;6(1):106-12.