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EFFECT OF FOLIAR APPLICATION OF BIOSTIMULANTS ON GROWTH AND YIELD OF BRINJAL (*SOLANUM MELONGENA* L.)

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Abstract

A field experiment on "Effect of foliar application of biostimulants on growth and yield of brinjal" was carried out in our own field at Elaiyaperumal patti village in Karur district, Tamilnadu during 2018-2019 to find out the suitable biostimulant for better growth and yield of brinjal. The study was established in completely randomized design with nine treatments and three replications. The nine treatments are panchagavya 5 percent (T_1), panchagavya 10 percent (T_2), seaweed extract 5 percent (T_3), seaweed extract 10 percent (T_4), humic acid 5 percent (T_5), humic acid 10 percent (T_6), vermiwash 5 percent (T_7), vermiwash 10 percent (T_8), control (T_9). Among the various biostimulants, humic acid 10 percent significantly increased the growth and yield attributes when compare to all other treatments. Growth parameters such as plant height (90.33 cm), no of branches per plant (27.75), no of leaves (79.64), leaf area (78.73 cm^2), stem girth (4.85 cm), days taken for flower initiation (37.77) were significantly influenced by humic acid 10 percent and this was followed by humic acid 5 percent.

Key words: brinjal, biostimulants, humic acid**.**

Introduction

Vegetables play an important role in protective food security, particularly in a country marked by malnutrition and under nutrition and providing good regular source of income and to farmers. Brinjal, commonly known as egg plant (*Solanum melongena* L.) is employment an often cross pollinated crop and belongs to the family Solanaceae and synonymously known as aubergine. It is a popular and principle vegetable crop widely grown in tropics and subtropics (Rao, 2011). In recent years, innovation in agriculture production have been evolving towards low-cost, organic, sustainable and environmental friendly system and at the same time increase the yield and quality of the crops. Organic biostimulants are such molecules useful in increasing productivity of crops. These biostimulants applied in small amounts, can promote plant development, increase yield and support plants to overcome from stress by acting directly or indirectly on plant physiology (Kauffman *et al.,* 2007). Foliar fertilization is used as a means of supplying supplemental doses of macro and micro nutrients, plant hormones, stimulants and other beneficial substances (Haytova, 2013). Panchagavya is an organic product blended with five different cow products, commonly applied to crop plant in organic farming. It act as a growth promoter and immunity booster and also restricts the incidence of common diseases (Vallimayil and Sekar, 2012). Panchagavya is also known to contain growth regulatory substances such as IAA, GA and cytokinin. Marine algal seaweed species are often regarded as an underutilized bio resource, many have been used as a source of food industrial raw materials and in therapeutic and botanical applications for centuries. Seaweeds used for biostimulant production which contain cytokinins and auxins or other hormone-like substances (Hamza & Suggars 2001). Humic acid was noted as another alternative for chemical fertilizer since it is economical and environment friendly bio fertilizer. Humic acid is formed by the breakdown of organic matter and can be obtained from coal, soil, peat and dystrophies lakes. Vermiwash is a liquid fertilizer collected after passage of water through a column of worm activation. It is a collection of excretory and secretory products of earth warms along with major micronutrients of the soil and soil organic molecules (Ansari, 2008).

Materials and Methods

The experiment was carried out at Elaiyaperumal patti village in Karur district of Tamil Nadu during 2018–2019. The trail was laid out in Randomized block design with nine treatments and three replications with the spacing of 60×60cm. The nine treatments are panchagavya 5 percent (T_1), panchagavya 10 percent (T_2), seaweed extract 5 percent (T_3), seaweed extract 10 percent (T_4), humic acid 5 percent (T_5), humic acid 10 percent (T_6), vermiwash 5 percent (T_7), vermiwash 10 percent (T_8), control (T_9). Observations like plant height, number primary branches per plant, number of secondary branches per plant, stem girth, number of leaves, leaf area , days taken for first flower initiation, 50% flowering, number of flowers per plant were recorded.

Result and Discussion

Effect of biostimulants on growth characters of brinjal are summarized in Table 1. All the biostimulants significantly influenced the growth characters. Growth attributes are considered to be an important factors to judge the yield of the crop. Among the various treatments tested, plants which received humic acid at the concentration of 10 percent (T_6) increased the plant height (30.77, 86.88, 90.33 cm) at 60, 90, 120 DAT which was followed by T_5 (57.19, 82.18, 86.36 cm) which was applied with 5 percent humic acid. The minimum values were recorded in T_9 (control) which registered 36.80, 53.41, 62.85 cm at 60, 90, 120 DAT. In similar findings were reported on brinjal due to the application of humic acid in brinjal crop (Paramasivan *et al.,* 2015) and Kaya *et al.,* (2005) in common bean. In addition, physiological mechanisms through which humic substances exert their effects may depend on hormones and, in particular, on the presence of auxin or auxin like components in their structure and consequently its effect on plant growth and development (Eyheraguibel *et al.,* 2008). Number of branches per plant was also found to be influenced by various treatments. The T_6 (humic acid 10 percent) recorded the maximum number of branches per plant at harvest (primary branches-10.27, secondary braches-27.75). The least number of branches per plant were recorded in control. Similar findings were reported on chilli plants due to the application of humic acid (Fathima and Denesh, 2013). Further earlier reports by El-Bassiony *et al.,* (2010) resulted that foliar spray of humic acid at the concentration of 2g/L increases the number of branches per plant in snap bean. Humic acid 6 percent (T_6) registered the highest number of leaves per plant which recorded 60.48 at 60 DAT, 75.28 at 90 DAT and 79.64 at 120 DAT. The lowest number of leaves per plant was observed in control (T_9) at 30, 60, 90 and 120 DAT (32.71, 60.48, 75.28, 70.64). The results are in the close agreement with the findings of Padem *et al.,* (1997) who reported that humic acid added foliar fertilizer increased the number of leaves per plant in egg plant and tomato seedlings. Leaf area was also significantly influenced by different biostimulants, the maximum leaf area (78.73 cm^2) was obtained from the plants which were sprayed with humic acid at the concentration of 10 percent. The lowest value (47.98 cm^2) was observed from the control. Accordingly Chen *et al.,* (2004) and (Kaya *et al.,* 2005) reported that direct effect of humic substances depend on biochemical action on cell wall, membrane or cytoplasm, mainly hormonal, acting in manner similar to plant growth substances and agricultural humic substances are reputed to drought tolerance, enhance nutrient uptake and overall plant performance resulting in increasing leaf area and biomass production. Among

Table 1: Effect of foliar application of biostimulants on growth parameters of brinjal (*Solanum melongena* L.)

T. No	Treatments	Plant Height (cm)	Primary branches	Secondary branches	No. of leaves $plant^{-1}$	Leaf area (cm^2)	Stem girth (cm)	Days Taken for first flower initiation	50% flowering	Number of flowers $plant^{-1}$
T_1	Panchagava @ 5%	67.17	5.57	18.49	65.39	54.91	2.56	51.55	57.33	46.02
T_2	Panchagavya@10 %	74.16	6.78	20.95	69.88	62.32	3.28	47.77	52.99	53.02
T_3	Seaweed Extract @ 5 %	81.34	8.21	23.47	74.42	69.80	4.03	42.33	47.33	60.11
T_4	Seaweed Extract@10 %	85.11	9.10	24.82	76.87	73.59	4.41	39.55	45.99	62.79
T_5	Humic acid @ 5%	86.36	9.29	25.38	77.16	74.84	4.50	39.33	44.77	64.58
T_6	Humic acid @ 10 %	90.33	10.27	27.75	79.64	78.73	4.85	37.77	41.33	68.27
T_7	Vermiwash @ 5 %	70.64	6.19	19.74	67.56	58.63	2.92	49.55	55.33	49.57
T_8	Vermiwash @ 10 %	77.58	7.46	22.18	72.04	66.07	3.65	44.77	50.55	56.54
T_9	Control	62.85	5.23	17.28	64.32	47.98	2.17	52.55	61.77	39.10
	S.Ed	**1.44**	**0.27**	**0.41**	**0.48**	**1.63**	**0.15**	**0.88**	**1.01**	**0.97**
	CD(p=0.05)	3.06	0.57	0.87	1.03	3.47	0.33	1.87	2.14	2.05

the various biostimulants, T_6 (humic acid 10 percent) registered the maximum stem girth of 4.85 cm at harvest stage (120 DAT). This was followed by humic acid 5 percent with the value of 4.50 cm at 120 DAT. The lowest stem girth was observed in control (T_9) which recorded 2.17cm. All the biostimulants envisaged significant influence in days taken for first flower initiation of brinjal. Among the nine treatments, Humic acid 10 percent (T_6) enhance the earliness of flower initiation. In $T_{6,}$ flower initiation was took place on 37.18 days after transplanting. It was followed by T_5 (humic acid @ 5 percent) in which flower initiation was observed on 39.63 days after transplanting and it was on par with 10 percent foliar application of seaweed extract (T_4) which recorded 39.88 days for first flower initiation. Whereas, delay in flower initiation was recorded in control (T_9) which took 52.95 days for flower initiation. It was followed by panchagavya at 5 percent and it took 51.15 days for flower initiation. With regard to the biostimulants, in T_6 (humic acid 10 percent) 50 percent of flowering took place on 41.82 DAT. In control, it took 51.61 days for 50 percent of flowering. The maximum number of flowers per plant (68.27) was obtained in T_6 (humic acid 10 percent) which was followed by humic acid 5 percent (64.58). The least number of flowers were recorded in the control treatment which registered 39.10. Earlier reports by Kazemi (2014) in tomato indicated that the maximum number of flowers were recorded at 30 ppm ha 15Mm/Ca application.

Conclusion

It can be concluded from the results of this study that application of foliar sprays of humic acid and biostimulators can be safely used within the applied concentrations with a positive effect on plant growth parameters like plant height, number of branches per plant, number of leaves, leaf area, stem girth, days taken for flower initiation, 50% flowering and number of flowers per plant. From this study, I recommend humic acid @ 10% concemtration can better enhances the growth and yield characters than other bio stimulants used.

Reference

Ansari, A.A. (2008). Effect of vermicompost and vermiwash on the productivity of spinach (*Spinacia oleracea*), onion (*Allium cepa)* and potato (*Solanum tuberosum)*. *World Journal of Agricultural Sciences*, **4(5)**: 554-557.

Chen, Y., C.E. Clapp and H. Magen (2004). Mechanisms of plant growth stimulation by humic substances: The role of organo-iron complexes. *Soil Science and Plant Nutrition*, **50(7)**: 1089-1095.

Eyheraguibel, B., J. Silvestre and P. Morard (2008). Effects of humic substances derived from organic waste enhancement on the growth and mineral nutrition of maize. *Bioresource technology*, **99(10):** 4206-4212.

Fathima, P.S. and G.R. Denesh (2013). Influence of humic acid spray on growth and yield of chilli (*Capsicum annum* L.). *International Journal of Agricultural Sciences*, ***9*(2)**: 542-546.

Haytova, D. (2013). A review of foliar fertilization of some vegetables crops. *Annual Research & Review in Biology*, 455-465.

Hamza, B. and A. Suggars (2001). Biostimulants: myths and realities. *Turf Grass Trends*, **8**: 6-10. *Int. Invention J. Agri. Soil Sci.,* **4(2)**: 22-26.

Kaya, M.U.H.A.R.R.E.M., M.E.H.M.E.T. Atak, K.M. Khawar, C.Y. Ciftci and S. Ozcan (2005). Effect of pre-sowing seed treatment with zinc and foliar spray of humic acids on yield of common bean (*Phaseolus vulgaris* L.). *Int. J. Agric. Biol*, **7(6)**: 875-878.

Kauffman, G.L., D.P. Kneivel and T.L. Watschke (2007). Effects of a biostimulant on the heat tolerance associated with photosynthetic capacity, membrane thermostability, and polyphenol production of perennial ryegrass. *Crop Science*, 47(1): 261-267.

Kazemi, M. (2013). Effect of foliar application of humic acid and potassium nitrate on cucumber growth. *Bulletin of Environment, Pharmacology and Life Sciences*, **2(11)**: 03-06.

Padem, H., A. Ocal and R. Alan (1997). November. Effect of humic acid added to foliar fertilizer on quality and nutrient content of eggplant and pepper seedlings. In *International Symposium Greenhouse Management for Better Yield & Quality in Mild Winter Climates,* **491**: 241-246.

Rao, C.K. (2011). Use of Brinjal in Alternative and Complementary Systems of Medicine in India is a Factoid.

Vallimayil, J. and R. Sekar (2012). Investigation on the effect of panchagavya on sounthern Sunnhemp Mosaic Virus (SSMV) infected plant systems. *Global Journal of Environmental Research*, **6(2)**: 75-79.