International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2020; 8(4): 3726-3728

Received: 11-05-2020
Accepted: 10-06-2020

Ravindra Kumar Meena
Department of Fruit Science, College of Horticulture and Forestry, Jhalrapatan, Jhalawar, Rajasthan, India

Prerak Bhatnagar
Department of Fruit Science, College of Horticulture and Forestry, Jhalrapatan, Jhalawar, Rajasthan, India

Jitendra Singh
Department of Fruit Science, College of Horticulture and Forestry, Jhalrapatan, Jhalawar, Rajasthan, India

Rahul Chopra
Department of Natural Resource Management, College of Horticulture and Forestry, Jhalrapatan, Jhalawar, Rajasthan, India

Hemraj Chhipa
Department of Basic Science, College of Horticulture and Forestry, Jhalrapatan, Jhalawar, Rajasthan, India

Corresponding Author:
Ravindra Kumar Meena
Department of Fruit Science, College of Horticulture and Forestry, Jhalrapatan, Jhalawar, Rajasthan, India

Multiple correlation studies among growth, development and soil parameters under utilization of vermicompost and PSB on Jamun cv. Goma Priyanka in vertisols of South Eastern Rajasthan

Ravindra Kumar Meena, Prerak Bhatnagar, Jitendra Singh, Rahul Chopra and Hemraj Chhipa

DOI: https://doi.org/10.22271/chemi.2020.v8.i4au.10225

Abstract
Correlation studies were determined during active growth phase to study the effect of different treatment combinations of Vermicompost and PSB during June to December 2019 with growth, development and soil parameters of Jamun cv. Goma Priyanka plants under vertisols at Instructional Farm, Department of Fruit Science at College of Horticulture and Forestry, Jhalawar. The soil parameter attributes at the end of experiment revealed that available nitrogen, phosphorus and potassium, pH, organic carbon, EC, fungi population and bacterial population exhibited significant and positive correlation with each other in augmentation of plant growth parameters in Jamun cv. Goma Priyanka plants. Correlation variable studies among different soil parameters are very important statistical measures to interpret the uptake behaviour of nutrients, soil health dynamics and phenotypic expression in morphometric growth and development of plants in continuum with environmental plasticity under ever changing climatic condition. The present study depicts important role of organic component vermicompost and bioinnoculants PSB in enhancement of growth of Jamun cv. Goma Priyanka plants under gestation phase.

Keywords: Available final nitrogen, electrical conductivity, organic carbon, fungi, bacteria

Introduction
Jamun (*Syzygium cumini* Skeels.) is a popular underutilised fruit of India. It belongs to the family Myrtaceae. Jamun is commonly known as jamun, jaman , black plum, Indian black berry, Jambolan plum, Java plum, Malabar plum and Portuguese plum in English (Sharma *et al*., 2012) [6]. The plant of Jamun is a medium to large evergreen tree up to 25-30 m height, bark pale brown, slightly rough on old stems, leaves opposite, simple, entire, elliptic to broadly oblong, smooth, glossy, somewhat leathery, 7.5-15.0 cm long, short pointed at tips. Flowers white 7.5-13 mm across in branched clusters at stem tips, calyx cuplike, 4 petals, fused into a cap, many stamens. Fruit variability in jamun size goes up to 2.5 cm long ellipsoid or oblong, crowned with truncate calyx limb, black with pink-juicy pulp (Sharma *et al*., 2012) [6]. The edible pulp of plant forms 75 per cent of the whole fruit. Jamun fruit is a source of various minerals and vitamins like Ca, Mg, P, Fe, Na, K, Cu, S, Cl, vitamin C, vitamin A, riboflavin, nicotinic acid and folic acid. Glucose and fructose are the principle sources of sweeteners in ripe fruit with no trace of sucrose. Maleic acid is the major acid (0.59% of the weight of fruit). Small quantity of oxalic acid has also been reported. Antioxidants comprising tannins mainly Gallic acid having strong hydroxyl group governs the astringency activity due to its efficiency to combine with tissues and proteins and precipitate them. Vermicompost is a tested organic product derived from the accelerated biological degradation of organic wastes by earthworms and microorganisms. The end product, commonly referred to as vermicompost is greatly humified through the fragmentation of the parent organic materials by earthworms and colonization by microorganisms (Edwards and Neuhauser, 1988) [1]. Vermicompost imparts better availability of macro and micro nutrients and helps in restoration of soil health.

Phosphorus (P) is a key growth-limiting nutrient particularly for rhizosphere development and unlike the case for nitrogen, there is no large atmospheric source that can be made biologically available (Ezawa *et al.*, 2002). Root development, stalk and stem strength, flower and seed formation, crop maturity and production, N-fixation in legumes, crop quality, and resistance to plant diseases are the attributes associated with phosphorus nutrition. Although microbial inoculants are in use for improving soil fertility during the last century, however, a meager work has been reported on P solubilization in Jamun crop under vertisols. Soil microorganisms play a key role in soil P dynamics and subsequent availability of phosphate to plants (Richardson, 2001) [5]. Jamun cv. Goma Priyanka is medium tall, bears profusely at lower branches and having prominent petiole with broad leaf lamina is one of the new introductions in Jhalawar conditions.

Materials and Methods

The research experiment entitled "Effect of vermicompost and PSB on growth and development of Jamun (*Syzygium cumini* L.) cv. Goma Priyanka" was conducted during duration June to December 2019 at the Instructional Farm, Department of Fruit Science, College of Horticulture and Forestry, Jhalawar. The application of vermicompost and PSB treatments were applied during first week of June, 2019 with the help of spade after thorough mixing in the active root zone of 2.5 year old plants. The twenty treatments combinations incorporated in canopy rhizosphere of Jamun cv. Goma Priyanka plants were: T_0 (Basal dose of N.P.K), T_1 (1.5 kg vermicompost/plant), T_2 (3kg vermicompost/plant), T_3 (4.5 kg vermicompost/plant), T_4 (6 kg vermicompost/plant), T_5 (25 g PSB/plant), T_6 (50 g PSB/plant), T_7 (75 g PSB/plant), T_8 (1.5kg vermicompost+25g PSB/plant), T_9 (1.5 kg vermicompost + 50g PSB/plant), T_{10} (1.5 kg vermicompost + 75g PSB/plant), T_{11} (3.0 kg vermicompost + 25g PSB/plant), T_{12} (3.0 kg vermicompost + 50g PSB/plant), T_{13} (3.0 kg vermicompost + 75g PSB/plant), T_{14} (4.5 kg vermicompost + 25g PSB/plant), T_{15} (4.5 kg vermicompost + 50g PSB/plant), T_{16} (4.5 kg vermicompost + 75g PSB/plant), T_{17} (6.0 kg vermicompost + 25g PSB/plant), T_{18} (6.0 kg vermicompost + 50g PSB/plant), T_{19} (6.0 kg vermicompost + 75g PSB/plant). The experiment was laid in randomized block design with three replications. The RDF was applied in all the treatments including control. The present investigations were undertaken at Fruit Instructional Farm, College of Horticulture and Forestry; Jhalawar on 2.0 years old plants of Jamun cv. Goma Priyanka planted at spacing of 6 X 6 meter under square system of planting in vertisols. The total number of plants included in the studied trial was 60. All the selected Jamun plants were selected on the basis of uniformity in growth and at par vigour. All the treatment combinations were applied in first week of June 2019. Plant parameters were recorded at two months interval. Correlation analysis was done after completion of all plant growth and soil parameters and subsequently data were analyzed for multiple correlations as suggested by Panse and Sukhatme (1985) [4].

Results and Discussion:

1. Correlation among soil property attributes: The data presented in table 1 revealed significant outcome which are discussed underneath:

The attribute final available nitrogen reflected significant and positive correlation with initial nitrogen (r = 0.604**), final available potassium (r = 0.530*), final organic carbon (r = 0.451*), final EC (r = -0.474*), and final fungi population (r = 0.452*). The addition of Vermicompost and PSB resulted in enriched carbon, nitrogen and phosphorous content in canopy rhizosphere of Jamun plants which might facilitated improved protein synthesis and carboxylation efficiency thereby resulting in better growth and development parameters under differential doses of Vermicompost and PSB.

The attribute final available phosphorus exhibited significant and positive correlation with final available potassium (r = 0.820**), final pH (r = -0.943**), final organic carbon (r = 0.805**), final EC (r = -0.904**), final fungi population (r = 0.944**) and bacterial population (r = 0.987**). Phosphorous being an important component of ATP and regulates the growth energy vitally essential for plants also exhibited positive relationship with pH, EC and proliferation in fungi and bacteria count under various treatment combinations.

The attribute final available potassium determined significant and positive correlation with final available nitrogen (r = 0.530*), final available phosphorus (r = 0.820**), final pH (r = -0.914**), final organic carbon (r = 0.871**), final EC (r = -0.953**), final fungi population (r = 0.934**) and final bacterial population (r = 0.796**). The potassium regulates stomatal conductance in physiological mechanism and increased potassium imparts better stomatal conductance and sturdiness of plants.

The attribute final soil pH exhibited significant and positive correlation with final phosphorus (r = -0.943**), final potassium (r = -0.914**), final organic carbon (r = -0.826**), soil final EC (r = 0.936**), final fungi (r = -0.970**) and final bacteria (r = -0.926**). The reduction in soil pH has a favourable response on uptake of other nutrients and soil pH exhibited better and positive correlation with available phosphorous, potassium and augmentation in fungi and bacteria population.

The attribute final organic carbon content enumerated significant and positive correlation with final available nitrogen (r = 0.451*), final available phosphorus (r = 0.805**), final available potassium (r = 0.871**), final pH (r = -0.826**), final EC (r = -0.924**), final fungi population (r = 0.893**) and final bacterial population (r = 0.784**).

The attribute final soil EC exhibited significant and positive correlation with final nitrogen (r = -0.474*), final phosphorus (r = -0.904**), final potassium (r = -0.953**), soil final pH (r = 0.936**), final organic carbon (r = -0.924**), final fungi (r = -0.981**) and final bacteria (r = -0.881**).

The attribute final fungi population enumerated significant and positive correlation with final available nitrogen (r = 0.452*), final available phosphorus (r = 0.944**), final available potassium (r = 0.934**), final pH (r = -0.970**), final organic carbon (r = 0.893**), final EC (r = -0.981**) and final bacterial population (r = 0.926**).

The attribute final bacterial population determined significant and positive correlation with final available phosphorus (r = 0.987**), final available potassium (r = 0.796**), final pH (r = -0.926**), final organic carbon (r = 0.784**), final EC (r = -0.881**) and final fungi population (r = 0.926**). The role of organic additives particularly Vermicompost and PSB might helped in increasing microbial population particularly bacteria and fungi under the present studies which perhaps facilitated in creating overall congenial conditions for contributing better growth and development of Jamun cv. Goma Priyanka plants.

Table 1: Correlation among soil parameters under utilization of Vermicompost and PSB in Jamun cv. Goma Priyanka

	Initial Nitrogen	Final Nitrogen	Initial phosphorus	Final phosphorus	Initial potassium	Final potassium	Initial pH	Final pH	Initial OC	Final OC	Initial EC	Final EC	Initial Fungi	Final Fungi	Initial Bacteria	Final Bacteria
Initial Nitrogen	1.00	0.604**	0.02	-0.30	0.09	-0.03	0.22	0.18	-0.27	-0.13	-0.15	0.11	0.10	-0.14	-0.26	-0.38
Final Nitrogen	0.604**	1.00	0.27	0.32	0.43	0.530*	0.08	-0.39	-0.39	0.451*	-0.32	-0.474*	0.16	0.452*	0.15	0.27
Initial phosphorus	0.02	0.27	1.00	-0.07	0.43	-0.07	-0.16	0.01	-0.21	-0.09	-0.01	0.09	-0.03	-0.05	0.14	-0.04
Final phosphorus	-0.30	0.32	-0.07	1.00	0.08	0.820**	0.05	-0.943**	-0.02	0.805**	-0.08	-0.904**	0.19	0.944**	0.24	0.987**
Initial potassium	0.09	0.43	0.43	0.08	1.00	0.00	-0.01	0.06	0.08	0.08	-0.23	-0.04	0.16	0.02	0.34	0.05
Final potassium	-0.03	0.530*	-0.07	0.820**	0.00	1.00	0.11	-0.914**	-0.25	0.871**	-0.14	-0.953**	0.18	0.934**	0.26	0.796**
Initial pH	0.22	0.08	-0.16	0.05	-0.01	0.11	1.00	-0.12	0.09	0.07	0.08	-0.10	0.25	0.14	-0.16	0.07
Final pH	0.18	-0.39	0.01	-0.943**	0.06	-0.914**	-0.12	1.00	0.12	-0.826**	0.01	0.936**	-0.18	-0.970**	-0.25	-0.926**
Initial OC	-0.27	-0.39	-0.21	-0.02	0.08	-0.25	0.09	0.12	1.00	-0.09	0.36	0.19	0.37	-0.16	0.10	-0.05
Final OC	-0.13	0.451*	-0.09	0.805**	0.08	0.871**	0.07	-0.826**	-0.09	1.00	-0.32	-0.924**	0.16	0.893**	0.27	0.784**
Initial EC	-0.15	-0.32	-0.01	-0.08	-0.23	-0.14	0.08	0.01	0.36	-0.32	1.00	0.18	0.03	-0.17	-0.02	-0.06
Final EC	0.11	-0.474*	0.09	-0.904**	-0.04	-0.953**	-0.10	0.936**	0.19	-0.924**	0.18	1.00	-0.20	-0.981**	-0.23	-0.881**
Initial Fungi	0.10	0.16	-0.03	0.19	0.16	0.18	0.25	-0.18	0.37	0.16	0.03	-0.20	1.00	0.20	0.18	0.14
Final Fungi	-0.14	0.452*	-0.05	0.944**	0.02	0.934**	0.14	-0.970**	-0.16	0.893**	-0.17	-0.981**	0.20	1.00	0.24	0.926**
Initial Bacteria	-0.26	0.15	0.14	0.24	0.34	0.26	-0.16	-0.25	0.10	0.27	-0.02	-0.23	0.18	0.24	1.00	0.19
Final Bacteria	-0.38	0.27	-0.04	0.987**	0.05	0.796**	0.07	-0.926**	-0.05	0.784**	-0.06	-0.881**	0.14	0.926**	0.19	1.00

* Correlation is significant at the 5% level of significance
** Correlation is significant at the 1% level of significance

References

1. Edwards CA, Neuhauser EF. Earthworms in waste and environmental management, SPB Acad. Publ. The Hague, The Netherlands, 1988
2. Ezawa T, Smith SE, Smith FA. P metabolism and transport in AM fungi. Plant Soil. 2002; 244:221-230.
3. Meena LK, Bhatnagar P, Singh J, Chopra R, Solanki P. Correlation amongst yield and quality attributes of guava fruit in response to foliar feeding of zinc and iron in Vertisols of Jhalawar district. The Pharma Innovation Journal, 9(6):349-351.
4. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. Published by ICAR, New Delhi, 1985.
5. Richardson AE. Prospects for using soil microorganisms to improve the acquisition of phosphorus by plants. Aust. J Plant Physiol. 2001; 28:897-906.
6. Sharma S, Mehta BK, Mehta D, Nagar H, Mishra A. A review on pharmacological activity of *Syzygium cumini* extracts using different solvent and their effective doses. Int. Res. J Pharmacol. 2012; 3:54-58.