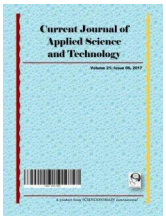

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Biochemical Study on Kashi Pragati of Okra Cultivar in Respect with Organic, Inorganic, and Bio Fertilizers

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Authors' contributions

This work was carried out in collaboration between both authors. Author SS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author RBR managed the analyses of the study and managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Field experiment was carried out at the Horticulture Research Farm of the Department of Horticulture, Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India during the year 2016-1017. A single standard variety (Kashi Pragati) released from IIVR Varanasi, is sown with the different treatment combinations. A total of 16 treatments:- T1 (control), T2 (FYM), T3 (Vermicompost), T4 (Neemcake), T5 (50% RDF+FYM), T6 (50%RDF+Vermicompost) T7 (50%RDF+Neemcake), T8 (75%RDF+FYM), T9 (75%RDF+Vermicompost), T10 (75%RDF+Neemcake), T11 (50%RDF+Azotobacter), T12 (50%RDF+PSB), T13 (50%RDF+VAM), T14 (75%RDF+Azotobacter),T15 (75%RDF+PSB), and T16 (5%RDF+VAM), with three replicates of each were Performed with respect to yield and yield Attributing characters were observed T6 (50%RDF+ Vermicompost) performed better followed by T15 while the lowest performance was

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recorded in T1. On the basis of overall performance under the present investigation, it may be concluded that the application of T6 (50%RDF+Vermicompost) in kashi pragati increased the growth, yield and nutritional quality of okra under study area.

Keywords: Okra; cultivar; yield; RBD and biofertilizers.

1. INTRODUCTION

Okra or bhindi [*Abelmoschus esculentus(*L). Moench] belongs to the family Malvaceae having chromosome number 2n=2X=130 and originated in Tropical Africa. It is a warm season crop and chief vegetable crop grown for its immature pods that can be consumed as a fried or boiled vegetable or may be added to salads, soups and stews [1]. Okra requires heavy manuring for its potential production and good quality green pods. However, the use of expensive commercial fertilizers as per requirements of the crop is not much affordable to the average farmers. All parts of okra (Ladies' fingers) likes fresh leaves, buds, flowers, pods, stems and seeds can be used for different purpose and hence it is a multipurpose crop in term of its use [2]. Okra is rich source of Iodine. And type of fruit found is capsule. Mucilage present in Okra fruit is polysaccharides i.e, galacturonic and glucuronic acids. The mucilage found in okra may be used for plasma replacement or blood expender [3]. Nitrogen is a single most important nutrient which contributes to the proper growth of plant and yield. Organic manures improve the quality of green pods. Therefore, the applications of plant nutrients through organic sources like compost, farm yard manure and bio- fertilizers remain the alternative choice of the growers For maintaining its sustainable production. The production and productivity okra is seriously affected due to the use of low yielder local varieties, suboptimal plant density, inappropriate planting date, and decline in soil fertility and a decreased use of organic amendments, heavy attack of various insect pests and weeds [4]. Because of its richness in nutrition, taste, medicinal and industrial value okra is one of the most popular vegetables in all section of people. Immature okra fruits commonly consumed as a vegetable. The fruit composition is enriched with about 88 IU of vitamins and as high as 300 mg of different minerals per 100 g edible portion [5]. Nutrients added through combined inorganic and organic sources are better utilized than inorganic alone, besides reducing cost of production and maintaining the soil health [6]. However, nitrogen availability to plants depends on the source, soil type, and environmental conditions, which may affect crop performance [7]. A greenhouse study conducted by Ufere et al. [8] concluded that application of organic manure like cow dung and poultry manure gave better growth. A study conducted by Padma Priya [9] showed that the co-inoculation of Azospirillum and Phosphate solubilizing bacteria improved soil characters, plant growth and yield. Fertilizers are generally applied to improve the crop yield, nutritional quality and aesthetic value of crops. Among the manures, vermicompost is being a stable fine granular organic matter, when added to soil, it loosens the soil and improves the passage to the entry of air Azotobactor is free living bacteria. It has been reported to fix 20 kg N ha-1 in field of non-legume me crop and also secretes some growth promoting substances. The most feasible and economically viable fertilizer package is one which improves the crop yield with ought deterioration soil health. India is the largest producer of okra with 5.78 metric tons Annual production from 0.50 million hectare cultivation (average productivity 11.61 t/ha) (National Horticulture Board, 2011). The objective of this study is to evaluate the performance of integrated nutrient management on certain chemical parameters. The indiscriminate use of inorganic fertilizer leads to nutrient imbalance in soils, causing ill - effects on soil properties. Hence, there is a need to supplement the inorganic fertilizers along with the application of organic and bio - fertilizers to the maximum possible level. Organic manures generally improve the soil physical, chemical, biological properties along with conserving the moisture holding capacity of soil and thus resulting in enhanced crop productivity along with maintaining the quality of crop production. The use of organic amendments applied to soil not only enhances its nutrient status but also reduces the incidence of pest (Adilakshi et al., 2007).

2. MATERIALS AND METHODS

The field experiment with okra, cv. Kashi pragati was conducted from September to December 2016 at the Horticultural Research Farm, Department of Horticulture, Babasaheb Bhimrao

Ambedkar University Lucknow U.P. The design followed was Randomized Block Design with 16 treatments and three replications. A total of 16 treatments T1 (Control), T2 Farm yard manure (FYM), T3 (Vermicompost), T4 (Neemcake), T5 (50%RDF+FYM), T6 (50%RDF+Vermicompost), T7 (50%RDF+Neemcake), T8 (75%RDF+FYM), T9 (75%RDF+ Vermicompost), T10 (75%RDF+Neemcake), T11 (50%RDF+Azotobacter), T12 (50%RDF+ Phosphate solubilizing bacteria (PSB), T13 (50%RDF+VAM), T14 (75%RDF+Azotobacter), T15 (75%RDF+PSB) and T16 (75%RDF+ VAM). The land was brought to a fine tilth through ploughing and tillage. Irrigation channels and bunds were maintained properly. The crop was raised with a spacing of 60 cm × 30 cm and plot size of 2.40 m X 1.5 m (3.6 m^2). The seeds were sown directly to the field. Light irrigation was given after sowing. The organic manures were applied as basal dose before sowing, for proper decomposition, full dose of phosphorus and potassium and half dose of nitrogen as per treatment were applied just before the sowing. The remaining half dose of Nitrogen was applied 30 days after sowing. Standard cultural practices recommended for Okra was followed uniformly for all the experimental plots. The quality parameters were recorded in the five randomly selected plants in each plot was tagged to arrive mean values. Fibre content of the pod was estimated as per the procedure given by [10]. For estimating ascorbic acid content in pods one gram of sample was blended with 3 per cent meta phosphoric acid and then made up to 100 ml and filtered. From the filterate, 10 ml sample was pipetted into conical flask and titrated with the standard dye to a pink end point [10]. Observations were recorded on bio-chemical parameters i.e. total soluble solids (^{0}Brix), ascorbic acid, reducing sugar, non- reducing sugar and total sugars. The data on these parameters were subjected to statistical analysis to draw logical conclusions.

3. RESULTS AND DISCUSSION

The results obtained from the present investigation are presented in Table below.

The perusal data (table below) of result indicated that okra plants fertilized with organic, inorganic and bio-fertilizers. Among the treatments the maximum biochemical parameters growth in terms of T.S.S is found in T6 (50% RDF+Vermicompost) performed best (8.41), same as respectively Ascorbic acid (18.09), total sugar (2.07), reducing sugar (29.66), non reducing sugar (12.32) all these parameters found best in T6 as cleared from table too.. The minimum values for all above biochemical parameters were found in T1 (control). These results are closely confined with the findings of Obaji [11]; Patil et al. [12] and Bairwa et al. [13]. The reduction in ascorbic acid content by the application of inorganic fertilizer was reported by [14]. Organic sources of nutrients gave better quality parameters than inorganic sources.

Table 1. Effect of organic, inorganic and biofertilizers on chemical aspects of okra [*Abelmoschus esculentus* (L). Moench]

Treatments	Total soluble solids (^{0}Brix)	Ascorbic acid	Reducing sugar (%)	Non reducing sugar (%)	Total sugar (%)
T1	6.01	12.93	20.70	8.60	1.48
T2	6.24	13.42	21.48	8.92	1.54
T3	6.50	13.98	22.40	9.31	1.60
T4	7.10	15.27	25.71	10.68	1.75
T5	7.15	15.38	25.86	10.74	1.76
T6	8.41	18.09	29.66	12.32	2.07
T7	7.63	16.41	26.69	11.09	1.88
T8	7.76	16.69	27.58	11.46	1.91
T9	7.84	16.87	27.83	11.56	1.93
T10	7.97	17.14	28.29	11.75	1.96
T11	8.01	17.23	28.43	11.81	1.97
T12	8.16	17.55	28.50	11.84	2.01
T13	8.21	17.66	28.65	11.90	2.02
T14	8.31	17.88	28.75	11.94	2.05
T15	8.32	17.90	28.90	12.01	2.05
T16	7.36	15.83	25.35	10.75	1.81

These results are supported by [15]. Surekha and Rao [16] also showed that organic amendment was effective in bringing down population of aphids in okra. Prakash et al. [17] also showed lower percentages of fruit borer infestation in okra when treated with organic fertilizer. The reduction in ascorbic acid content by the application of inorganic fertilizer was reported by [14].

4. CONCLUSION

Thus on the basis of present investigation, it could be concluded that the okra var. Kashi Pragati performed well with respect to growth, yield, quality and net profit by the application of (50%RDF+Vermicompost) for highest yield per plot as well as yield per/ha. Use of organic manures increased DTPA extractable Zn and Fe in soil (Duhan and Singh, 2002) through redistribution of Zn from non-available forms to readily available (water-soluble plus exchangeable) and potentially available forms in soil (Sekhon et al. 2006). On the behalf of all the experiment it may be concluded best result was observed in T6 (50% RBD + Vermicompost) followed by T15 while the lowest performance was observed in T1. Integrated management of nutrients improved okra growth and brought significant augmentation in yields. This may be attributed to better nutritional profile of okra observed in corresponding situations. Similar observations that the combined use of organic manures, inorganic fertilizer and bio-fertilizers supported better fruit yield in okra, have also been reported by Jadhav et al. (2008) and Islam et al. (2011).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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