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Research Article

Efficacy of Different Types of Composts on Growth, Yield and Quality Parameters of Okra (*Abelmoschus esculentus* L.) cv. Kashi Pragati

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ABSTRACT

The experiment entitled "Efficacy of different types of Composts on growth, yield and quality parameters of Okra (Abelmoschus esculentus L.) cv. Kashi Pragati" was conducted during Rabi season of the year 2020-2021 on experimental farm of Department of Horticulture, AKS University, Satna (M.P.). The experiment was laid out in a randomized block design with three replicated 12 treatments viz., T_0: Without compost (Control), T_1: 100% Vermicompost + 100% Biogas slurry compost, T_2: 100% Vermicompost + 100% Mushroom Spent compost, T_3: 100% Biogas slurry compost + 100% Mushroom Spent compost, T_4: 100% Vermicompost + 100% Biogas slurry compost +100% Mushroom Spent compost, T_5: 100% Vermicompost + 50% Biogas slurry compost, T_6: 100% Vermicompost + 50% Mushroom Spent compost, T_7: 100% Biogas slurry compost + 50% Vermicompost, T_8: 100% Biogas slurry compost + 50% Mushroom Spent compost, T_9: 100% Mushroom Spent compost + 50% Vermicompost, T_{10}: 100% Mushroom Spent compost + 50% Biogas slurry compost, T_{11}: 50% Vermicompost + 50% Biogas slurry compost +50% Mushroom Spent compost. The results reveal that increase in Composts level had significant response on vegetative growth yield and quality of Okra. The treatment T_{4-} 100%Vermicompost +100% Biogas slurry compost +100% Mushroom Spent compost was found to be the best treatment among the different treatments with growth, yield and quality for Okra under satna condition.

Keywords: *Okra, Biogas slurry compost, Mushroom Spent compost, Vermicompost.*

INTRODUCTION

Okra (*Abelmoschus esculentus* L.) is the most important vegetable crop in the tropical and subtropical parts of the world. It is also known as lady"s finger or *bhindi*, belong to family malvaceae and originated in tropical Africa. The okra plant is erect, herbaceous annual green, stem with radish tinge.

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Okra is an important vegetable grown for its tender fruits which are used as a vegetable in a variety of ways. It can be fried or cooked with necessary ingredients. The tender fruit can be cut into small pieces, boiled and served with soup. Matured fruits and stem containing crude fibres are used in the paper industry. The roots and stems are used for clearing cane juice in preparation of Jaggery "Gur". Okra plants are characterized by indeterminate growth. Flowering is continuous but highly dependent upon biotic and abiotic stress. The plant usually bears its first flower one to two months after sowing. The fruit is a capsule and grows quickly after flowering. The greatest increase in fruit length, height and diameter occurs during 4^{th} to 6^{th} day after pollination. It is at this stage that fruit is most often plucked for consumption. The okra pods are harvested when immature and high in mucilage, but before becoming highly fibrous. Generally the fiber production in the fruit starts from 6^{th} day onwards of fruit formation and a sudden increase in fiber content from 9^{th} day. Okra plants continue to flower and fruit set for an indefinite time, which depending upon the variety, the season and soil moisture and fertility. Infect the regular harvesting stimulates continue fruiting, so much so that it may be necessary to harvest every day where growth is especially vigorous. Okra produces fruit for a long time and needs balanced and sufficient supply of nutrients for higher yield and better quality. Indiscriminate use of inorganic fertilizers has resulted in decreased nutrient uptake, poor quality of vegetables and deterioration of soil health. Organic manures constitute a dependable source of macro and micro nutrients and are helpful in improving physical, chemical and biological health of soil, reduces nutrient losses, increases nutrient availability and uptake leading to sustainable production devoid of harmful residues, beside improving quality of vegetables. It has been observed that sole application of organic manures or inorganic fertilizers are not able to sustain the soil fertility and crop productivity. However, their integration has proved superior than individual components with respect to yield, quality and nutrient uptake. In traditional agriculture, farmers use farm manure like cow dung, Poultry manure, Vermicompost as nutrient sources to the crops to supplement the natural supply available through soil and atmosphere. This system of low nutrient supply can only sustain low productivity of crops. Increasing needs for enhanced crop productivity due to ever increasing population necessitate the high amount of nutrition. Organic form of nutrient constitutes a potential renewable source of nutrient supply to crops under all situations. Organic sources are relatively bulky materials and are added mainly to improve the physical condition of soil, to replenish and keep up its humus status to maintain the optimum condition for the activities of soil micro-organism. Organic manure has the capability of supplying a range of nutrients and improving the physical and biological properties of the soil. However, at high level of crop production, these nutrients are not adequate. Moreover they are very slow action, so they are useful at a long run only. Although the inorganic manure are required in very small quantities and are very quick in action. The interaction of chemical fertilizers with the soil is considered less favorable to the soil environment in comparison to organic sources of crop nutrient.

MATERIALS AND METHODS

The experiment entitled "Efficacy of different types of Composts on growth, yield and quality parameters of Okra (*Abelmoschus esculentus* L.) cv. Kashi Pragati" was conducted during Rabi season of the year 2020-2021 on experimental farm of Department of Horticulture, AKS University, Satna (M.P.). The experiment was laid out in a randomized block design with three replicated 12 treatments *viz*., T_1: Without compost (Control), T_2: 100% Vermicompost + 100% Biogas slurry compost, T_3: 100% Vermicompost + 100% Mushroom Spent compost, T_4: 100% Biogas slurry compost + 100% Mushroom Spent compost, T_5: 100% Vermicompost + 100% Biogas slurry compost

+100% Mushroom Spent compost, T_6: 100% Vermicompost + 50% Biogas slurry compost, T_7: 100% Vermicompost + 50% Mushroom Spent compost, T_8: 100% Biogas slurry compost + 50% Vermicompost, T_9: 100% Biogas slurry compost + 50% Mushroom Spent compost, T_{10}: 100% Mushroom Spent compost + 50% Vermicompost, T_{11}: 100% Mushroom Spent compost + 50% Biogas slurry compost, T_{12}: 50% Vermicompost + 50% Biogas slurry compost +50% Mushroom Spent compost. The seeds were sown on 9th October -2020, germination started and completed on 20 October the recording of observations was done 30 days after sowing and subsequent readings were recorded after every 30 days interval. The crop was harvested 28th December -2020. The experimental field was prepared and ploughed with a disc harrow by tractor drawn two times with cultivator and well levelled by planker before sowing. After that rocks and debris were removed from the field soil. After field preparation, the area was marked and laid out as per plan. Organic manures (Vermicompost, S FYM and phosphate solubilizing bacteria PSB) obtained from department of horticulture, A.K.S. University, Satna (M.P.). Organic manures (Vermicompost, Biogas slurry compost and Mushroom Spent compost) help plants to quick uptake of nutrients from soil, increase nutrient availability in soil and reduce soil pollution, minimize soil erosion and degradation, improve nutritional security and reduce many problems related to crop production. On the basis of organic manure of well rotten farm yard manures was applied in the field after the field was prepared and mixed up thoroughly as the recommendation of treatment combinations before sowing the corms in the entire plot. In order to get good tilth of the soil for sowing one cross cultivation was done by tractor draw cultivator followed by two harrowings and one planking before sowing of seed. For proper growth and development Seed rate of 8 Kg/ha is followed. Okra seeds are directly sown in a well prepared field or beds having sufficient soil moisture. Seeds are sown to a depth of 1cm and after sowing the seeds were properly covered with soil by the use of rake. In the beginning of the experiment, seeds were dibbled. After two weeks of sowing, thinning was carried out to maintain plant to plant distance. All the recommended package of practices was followed to raise healthy crop. The observations were taken at 30, 60 and 90 days after transplanting. treatments and three replications. The data recorded during the course of investigation were subjected to statistical analysis as per method of analysis of variance (Panse & Sukhatme, 1967). The significance and non-significance of the treatment effect were judged with the help of 'F' variance ratio test. Calculated 'F' value (variance ratio) was compared with the table value of 'F' at 5% level of significance. If calculated value exceeded the table value, the effect was considered to be significant. The significant difference between the means was tested against the critical difference at 5% level of significance.

RESULTS AND DISCUSSION

The production of okra is due to the combined effect of growth, development and yield attributes and data mentioned in table 1 clearly revealed that the optimum levels of nutrients were found to significantly improve plant height at all the growth stages. The optimum levels of nutrients were found to significantly improve plant height at all the growth stages. The significantly higher plant height of okra was recorded under T_4-100% Vermicompost +100% Biogas slurry compost +100% Mushroom Spent compost with the respective values of 35.22, 69.14 and 88.73cm at growth stage of 30, 60, 90 DAS and at harvest, respectively. The optimum levels of nutrients were found to significantly improve number of leaves per plant at all the growth stages. The significantly higher number of leaves per plant of okra was recorded under T_4-100% Vermicompost +100% Biogas slurry compost +100% Mushroom Spent compost with the respective values of 14.07, 28.84 and 41.82 at growth stage of 30, 60, 90 DAS and at harvest, respectively. These results closely match with the findings of Ribeiro et al. (2000), Agrawal et al. (2010), Meena and Meena (2018) and Mishra et al. (2019). The optimum levels of nutrients were found to significantly improve number of branches per plant. The significantly higher number of branches per plant of okra was recorded under T_{4-}100% Vermicompost +100% Biogas slurry compost +100% Mushroom Spent compost with the respective values of 12.47 proved significantly superior to rest of the treatments. The optimum levels of nutrients were found to significantly improve diameter of the main shoot. The significantly higher diameter of the main shoot of okra was recorded under T_{4-}100% Vermicompost +100% Biogas slurry compost +100% Mushroom Spent compost with the respective values of 15.60 cm proved significantly superior to rest of the treatments. The optimum levels of nutrients were found to significantly improve leaf area per plant. The significantly higher leaf area per plant of okra was recorded under T_{4-}100% Vermicompost +100% Biogas slurry compost +100% Mushroom Spent compost with the respective values of 219.36cm^2 proved significantly superior to rest of the treatments. These findings are come in conformity with the findings of Choudhary et al. (2003), Yadav et al. (2006), Tensingh et al. (2015) and Kumar et al. (2017). Treatment T_{4-}100% Vermicompost +100% Biogas slurry compost +100% Mushroom Spent compost recorded minimum fruit length (16.74cm) followed by 16.03cmwith the treatment T_{3-}100% Biogas slurry compost +100% Mushroom Spent compost and the maximum fruit length (8.72cm) was recorded with T_{0-} Without compost (Control). Treatment T_{4-}100% Vermicompost +100% Biogas slurry compost +100% Mushroom Spent compost recorded maximum fruit Diameter (9.12cm) followed by 8.96cm with the treatment T_{3-}100% Biogas slurry compost +100% Mushroom Spent compost and the minimum fruit Diameter (5.09cm) was recorded with T_{0-} Without compost (Control). Treatment T_{4-}100% Vermicompost +100% Biogas slurry compost +100% Mushroom Spent compost recorded maximum fruit weight (47.63g) followed by (45.76g) with the treatment T_{3-}100% Biogas slurry compost +100% Mushroom Spent compost and the minimum fruit weight (32.40g) was recorded with T_{0-} Without compost. Treatment T_{4-}100% Vermicompost +100% Biogas slurry compost +100% Mushroom Spent compost recorded maximum number of fruits per plant (36.40) followed by (35.17) with the treatment T_{3-}100% Biogas slurry compost +100% Mushroom Spent compost and the minimum number of fruits per plant (14.33) was recorded with T_{0-} Without compost (Control). The results of present study are almost match with the findings of Sharma et al. (2009), Sivagama and Gandhi (2013), Hemmannuella et al. (2019) and Ghosh et al. (2020). Treatment T_{4-} 100%Vermicompost +100% Biogas slurry compost +100% Mushroom Spent compost recorded maximum yield per plant (1.733kg) followed by (1.609kg) with the treatment T_{3-} 100%Biogas slurry compost +100% Mushroom Spent compost and the minimum yield per plant (0.464kg) was recorded with T_{0-} Without compost (Control). Treatment T_{4-} 100%Vermicompost +100% Biogas slurry compost +100% Mushroom Spent compost recorded maximum yield per plot (41.59kg) followed by (38.62kg) with the treatment T_{3-} 100%Biogas slurry compost +100% Mushroom Spent compost and the minimum yield per plot (11.14kg) was recorded with T_{0-} Without compost (Control). Treatment T_{4-} 100%Vermicompost +100% Biogas slurry compost +100% Mushroom Spent compost recorded maximum yield (7.221tonnes/ha) followed by (6.704tonnes/ha) with the treatment T_{3-}100%Biogas slurry compost +100% Mushroom Spent compost and the minimum yield (1.933tonnes/ha) was recorded with T_{0-} Without compost (Control). Treatment T_{4-}100% Vermicompost +100% Biogas slurry compost +100% Mushroom Spent compost recorded maximum TSS (2.74^{o}Brix) followed by TSS (2.72^{o}Brix) with the treatment T_{3-} 100% Biogas slurry compost +100% Mushroom Spent compost and the minimum TSS (2.47^{o}Brix) was recorded with T_{0-} Without compost (Control). Results related to fresh weight per curd (g) of Okra found to be close agreement with that of Oliveira et al. (2001), Ray et al. (2005), Natan et al. (2017) and Fasakin et al. (2019). Treatment T_{4}-100% Vermicompost +100% Biogas slurry compost +100% Mushroom Spent compost recorded maximum Ascorbic Acid (16.22mg/100g) followed by (16.04mg/100g) with the treatment T_{3}-100% Biogas slurry compost +100% Mushroom Spent compost and the minimum Ascorbic Acid (11.13mg/100g) was recorded with T_{0}- Without compost (Control). Treatment T_{4}-100% Vermicompost +100% Biogas slurry compost +100%Mushroom Spent compost recorded minimum crude fibre content (10.87%) followed by (11.40%) with the treatment T_{3}-100% Biogas slurry compost +100% Mushroom Spent compost and the maximum crude fibre content (14.97%) was recorded with T_{0}- Without compost (Control). From the present investigation it is concluded that treatment T_{4}- 100%Vermicompost + 100% Biogas slurry compost +100% Mushroom Spent compost was found to be the best treatment among the different treatments with growth, yield and quality.

Table 1: Efficacy of different types of Composts on growth, yield and quality parameters of Okra

Treatments	Plant height (cm)	Number of leaves per plant	Number of branches per plant	Diameter of the main shoot (cm)	Leaf area per plant (cm^2)	Fruit length (cm)	Fruit Diameter (cm)	Fruit weight (g)	Number of fruits per plant	Yield (tonnes/ha)	TSS (ºBrix)	Ascorbic Acid (mg/100g)	Crude fibre content (%)
T_0	41.54	24.76	3.34	8.91	172.05	8.72	5.09	32.40	14.33	1.933	2.47	11.13	14.97
T_1	72.10	35.31	9.28	13.47	214.60	14.66	8.09	42.02	30.21	5.287	2.71	15.67	11.91
T_2	79.53	36.18	10.40	13.83	215.82	15.81	8.37	43.34	33.52	6.054	2.72	15.81	11.76
T_3	85.24	39.48	11.75	14.19	217.41	16.03	8.96	45.76	35.17	6.704	2.72	16.04	11.40
T_4	88.73	41.82	12.47	15.60	219.36	16.74	9.12	47.63	36.40	7.221	2.74	16.22	10.87
T_5	57.64	28.71	3.99	11.52	189.85	10.64	6.26	35.28	20.06	2.950	2.62	13.49	14.53
T_6	59.49	30.28	4.74	11.74	193.21	11.25	6.42	36.70	21.39	3.271	2.64	13.76	14.16
T_7	60.41	30.47	5.69	11.89	203.25	11.88	6.74	37.45	22.10	3.450	2.66	13.98	13.75
T_8	61.78	30.78	5. 78	12.23	205.49	12.06	7.08	38.26	23.48	3.742	2.68	14.06	13.27
T_9	63.41	31.20	6.35	12.60	208.37	12.90	7.23	39.72	25.67	4.250	2.69	14.32	12.90
T_{10}	65.95	31.34	7.49	12.93	211.66	13.84	7.65	40.56	26.19	4.425	2.70	14.55	12.51
T_{11}	69.46	32.83	8.12	13.07	213.28	14.12	7.83	41.47	28.53	4.929	2.70	15.23	12.03
S.Ed(±)	4.34	0.08	0.04	0.05	0.05	0.04	0.41	0.04	2.86	0.05	0.03	0.40	0.24
CD at 5%	9.01	0.17	0.09	0.11	0.11	0.08	0.85	0.08	5.92	0.11	0.06	0.84	0.50

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