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Influence of organic inputs in the eco-friendly cultivation of Bhendi

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Abstract

Organic cultivation practice is an eco-friendly crop management technique through which land pollution can be managed to a greater extent. This would increase the nutrient use efficiency, soil fertility, besides enhancing the yield. Hence there is a need to develop sustainable practices that require higher use of organic inputs in cultivation. This investigation was carried out in a randomized block design with 12 treatments in three replications. The treatments include the application of bulky organic manures, concentrated organic manure, biofertilizer consortium, liquid organic nutrients, and chemical fertilizers. The bulky organic manures used were FYM (12.5 and 25 t ha⁻¹) and vermicompost (2.5 and 5 t ha⁻¹). The concentrated organic manure used was neem cake (1 t ha⁻¹). Panchakavya @ 3% and humic acid @ 0.2% were tried as foliar nutrition. Farmyard manure, vermicompost, biofertilizers consortium, and neem cake were applied as basal nutrition. The foliar spray was given thrice starting from 15 days after sowing at fifteen days interval. The results revealed that the plant nutrient uptake, yield, and biomass production were maximum with the application of farmyard manure @12.5 t ha⁻¹ plus vermicompost @ 2.5 t ha⁻¹ plus biofertilizers consortium @ 2 kg ha⁻¹ plus neem cake @ 1 t ha⁻¹ along with the foliar application of humic acid @ 0.2%.

Keywords Bhendi, Organic manures, Biofertilizer consortium, Foliar organic nutrients

Introduction

Bhendi (*Abelmoschus esculentus* (L.) Moench.) is an important vegetable crop grown all over the world. Proper nutrition management improves the growth and yield of okra. Owing to the ill effects caused by continuous and overuse of inorganic fertilizers to the soil, water, and environment cannot be underestimated. Organic cultivation practice is an eco-friendly crop management technique through which land pollution can be managed to a greater extent. This would increase the nutrient use efficiency, soil fertility, besides enhancing the yield and quality. Hence there is a need to develop sustainable practices that require higher use of organic inputs in cultivation. A study was conducted on the influence of organic inputs in bhendi at the Department of Horticulture, Annamalai University.

Materials and Methods

This study was conducted to find the influence of organic inputs in bhendi. The experiment was conducted in RBD with 12 treatments in three replications. The treatments include application of bulky organic manures, concentrated organic manure, biofertilizer consortium, liquid organic nutrients, and inorganic fertilizers. FYM (12.5 and 25 t ha⁻¹) and vermicompost (2.5 and 5 t ha⁻¹) were the bulky organic manures used. The concentrated organic manure used was neem cake (1 t ha⁻¹). Panchakavya (3%) and humic acid (0.2%) were given through foliar nutrition. Farmyard manure, vermicompost, biofertilizers consortium, and neem cake were given as basal nutrition. The foliar spray was given thrice starting from 15 days after sowing at 15 days interval. Arka Anamika was chosen for experimentation.

Results and Discussion

From the results it is understood that the plant nutrient uptake, maximum yield and dry matter production were obtained when farmyard manure @12.5 t ha⁻¹ plus vermicompost @ 2.5 t ha⁻¹ plus biofertilizers consortium @ 2 kg ha⁻¹ plus neem cake @ 1 t ha⁻¹ along with humic acid @ 0.2% (Table 1) were applied. More yield might be due to improved aeration and water-holding capacity of FYM applied soil and the efficient utilization of nutrients in the FYM applied plants. In addition, nutrients source *viz.*, FYM and neem cake could have served as nutrient sources resulting in highest uptake of nutrients by plants. The major nutrients play a vital role in the growth attributes and these elements cannot be replaced by any other. Nitrogen is a major constituent of proteins, enzymes, chlorophyll and nucleic acid. It is involved in the cell division, cell enlargement and in respiration. Phosphorus plays a major role in the development of

reproductive parts and root formation. Potassium plays a major role in activating many enzymes to induce flowering, fruit set, and in translocation of carbohydrates. In the present study, the maximum uptake of major nutrients was observed in the treatment which had the application of FYM (12.5 t ha⁻¹) + VC (2.5 t ha⁻¹) + BFC (2 kg ha⁻¹) + NC (1 t ha⁻¹) along with foliar spray of HA @ 0.2%. Highest nutrient uptake might be because of the supplementation of higher nitrogen, phosphorus and potassium supplied by means of no farmyard manure, vermicompost, neem cake and biofertilizers consortium. When FYM added to soil, with the action of biofertilizers, complex nitrogenous compounds slowly available in the form of nitrate nitrogen is steady throughout crop period (Bhudhawant, 1994). Moreover, nutrients in vermicompost has absorbed by plants such as nitrates, exchangeable phosphorus and soluble potassium as reported by Edwards and Borrows (1988).

Table 1. Impact of organic inputs on yield (kg ha⁻¹), DMP (g plant⁻¹)Nutrient uptake (kg ha⁻¹) of bhendi cv. Arka Anamika

Treatment details	Yield (kg ha ⁻¹)	Dry matter production(DMP) (g plant ⁻¹)	Nitrogen Uptake (kg ha ⁻¹)	Phosphorus uptake (kg ha ⁻¹)	Potassium uptake(kg ha ⁻¹)
T ₁	9.08	101.22	54.26	15.53	53.47
T ₂	10.38	127.34	55.43	15.87	55.14
T ₃	11.76	147.79	56.29	16.41	56.81
T ₄	12.91	155.91	57.51	16.92	57.76
T ₅	14.00	157.36	57.78	17.11	58.60
T ₆	14.56	163.64	58.39	17.40	59.49
T ₇	15.11	174.32	58.91	17.84	59.93
T ₈	16.18	188.75	59.60	18.24	60.31
T ₉	17.94	211.07	61.06	19.14	61.82
T ₁₀	19.12	224.50	62.36	19.58	62.87
T ₁₁	16.64	201.14	60.39	18.72	60.70
T ₁₂	6.08	67.50	42.09	11.10	43.26
S.Ed.	0.22	3.27	0.25	0.15	0.17
CD (p = 0.05)	0.45	6.55	0.51	0.30	0.35

The maximum nutrient uptake by the crop due to neem cake can be attributed to the presence of alkaloids and releases nitrogen slowly. Moreover, nutrients for a long period, and its balanced reserve could have resulted in better uptake of nutrients as reported by Som et al. (1992). Further, the organic manures are solubilized by the biofertilizers consortium. The

soluble form of nutrients in the humic acid and the direct application of growth regulators and nutrients as foliar spray might have been absorbed by plants quickly. Hence the nutrient uptake was calculated as a maximum in this treatment. The results corroborate the findings of Uma Maheswari (2009) in hot pepper.

Conclusion

Finally, it is inferred that application of farmyard manure @ 12.5 t ha⁻¹ plus vermicompost @ 2.5 t ha⁻¹ plus biofertilizers consortium @ 2 kg ha⁻¹ plus neem cake @ 1 t ha⁻¹ along with humic acid @ 0.2 percent as foliar application increased the yield (19.12 t ha⁻¹), dry matter production (224.50 g plant⁻¹), and nutrient uptake (62.36 kg ha⁻¹ of N, 19.58 kg ha⁻¹ of P, and 62.87 kg ha⁻¹ of K) of bhendi.

Authors' contributions

All authors have contributed significantly to the conception and design of the study, the interpretation of data, and the drafting and revision of the manuscript. All authors read and approved the final manuscript.

Conflict of Interest

The authors hereby declare no conflict of interest.

Consent for publication

The authors declare that the work has consent for publication.

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