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EFFECT OF ORGANIC NUTRIENTS ON CERTAIN GROWTH AND YIELD CHARACTERS OF BITTER GOURD (*MOMORDICA CHARANTIA* L.) ECOTYPE "MITHIPAGAL"

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Abstract

An investigation on effect of organic nutrients on certain growth and yied characters of bitter gourd (*Momordica charantia* L.) ecotype Mithipagal through organic nutrient management practices was carried out at the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar during 2016-17.The experiment comprised of 13 treatments replicated thrice was executed following the principles of Randomized Block Design. Results of the experiment revealed that the application of vermicompost @ 5t ha^{-1} and sea weed extract 3% along with *Azospirillum* @ 2 kg ha^{-1} improved the growth, yield and quality performance of bitter gourd ecotype "Mithipagal". Among the treatments, T_5 (vermicompost 5t + sea weed extract 3% + *azospirillum* 2kg ha^{-1}) selected the highest in growth parameters *viz.,* vine length, number of primary branches, number of leaves per plant. It was closely followed by T_2 (vermicompost 5t + humic acid 2% + *Azospirillum* 2 kg ha^{-1}). Regarding with yield characters fruit weight, fruit yield per plant (36.39 kg) and fruit yield per ha (2.92 t). And it was followed by T_2 which registered the yield per plant (35.35 kg) and fruit yield per ha (2.72t).

Keywords **:** Organic nutrients, Bitter Gourd (*Momordica charantia* L.) etc.

Introduction

Vegetables are rich and comparatively cheaper source of vitamins and minerals which constitute an important part in human nutrition. They are also called as Protective food. Besides the nutritional value of vegetables, increased interest is being bestowed on the functional and therapeutic benefits. (Satish Sing Baghal *et al*., 2017). Bitter gourd (*Momordica charantia* L.) is one of the most important popular vegetable crops grown in south east Asia. The genus name Momordica is derived from Latin word 'Mordeo' indicating jagged seeds and belongs to the family Cucurbitaceae. Cultivation area of Bitter gourd in India is 211.23 ha and total production is 1030 Mt. Fruits are considered as a rich source of vitamins and minerals and rich in Vitamin 'C' (88 mg/100g) .It is a leading vegetable crop of India and the higher yield and maximum returns make it the most preferred vegetable crop of Indian farmers (Sangeeta *et al*., 2018).The fruits, leaves and even the roots of *Momordica charantia* have been used in Ayurveda for the cure of a number of diseases such as a bitter stomachic, laxative and anathematic. It is used as ahypoglycaemic and anti diabetic agent because it posses hypoglycaemic (blood sugar lowering) properties (Parmar *et al.*, 2011) Bitter gourd has been found highly beneficial in lowering the blood and urine sugar level (Bharati *et al*., 2018). The leaf extract of Bitter gourd is also having a very good mosquitocidal effect (Muralee *et al*., 2008).

Depending on location bitter gourd is also known as bitter melon, karella (or) balsam pear. Apart from the small fruits, which is called as 'Mithipagal' and it is cultivated in almost all the parts of the India including Tamilnadu. 'Mithipagal' which does not trained in pandal system which is allowed to grow in the ground itself. The leaves of this bitter gourd is smaller than the bigger sized bitter gourd plant leaves. It is a trailing climber annual, branching freely, and semi angled monoecious crop with duration of 100-120 days (Sureshkumar *et al.,* 2015). During last four decades indiscriminate use of inorganic fertilizers, pesticides and fungicides caused environmental pollution, especially into the soil there by affecting its fertility on long term basis (Das *et al*., 2015). To avert this situation, reduced use of fertilizers without compromising on yield and quality can be achieved if the nutrient supply through organic manures, are used (Sheeba *et al*., 2015). Again it can better address the important threats of food security such as soil degradation, climate change and pest problems. (Azarmi *et al*., 2009).

Organic matter plays a key role in achieve sustainability on agricultural production because it possesses many desirable properties such as high water holding capacity, cations exchange capacity, beneficial effect on the physical, chemical and biological characteristics of soil. It also adds organic matter to the soil which may improve soil structure, aeration, soil moisture holding capacity and water infiltration (Sundararasu, 2017). The organic farming practice need

to be standardized for many crops so also for bitter gourd keeping all the above factors, an experiment conducted to assess the productivity enhancement of bitter gourd ecotype 'Mithipagal' through organic nutrient management practices.

Materials and Methods

The experiment was conducted in the department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalainagar. The seed were sown at spacing of 1m between plants and 0.75m between rows. The design adopted was RBD with three replication. The seeds were subjected to 13 treatments.

Treatment Details

T_1 - Press mud @ 3.5 + humic acid @ 2% + *azospirillum* @ 2kg ha^{-1}
T_2 - Vermicompost @ 5t + humic acid @ 2% + a*zospirillum* @ 2kg ha^{-1}
T_3 - Poultry manure @ 2.5t + humic acid @ 2% + a*zospirillum* @ 2kg ha^{-1}
T_4 - Press mud @ 3.5t + sea weed extract @ 3% + a*zospirillum* @ 2kg ha^{-1}
T_5 - Vermicompost @ 5t + sea weed extract @ 3% + a*zospirillum* 2kg ha^{-1}
T_6 - Poultry manure @2.5t+sea weed extract @ 3%+a*zospirillum*@2kg ha^{-1}
T_7 - Press mud @3.5 t + humic acid @ 2% + phosphobacteria @2.5 kg ha^{-1}
T_8 - Vermicompost @5t + humic acid @2%+ phosphobacteria @2.5 kg ha^{-1}
T_9 - Poultry manure @2.5t+humic acid @2%+phosphobacteria @2.5kg ha^{-1}
T_{10} - Press mud@5.3t+sea weed extract @3%+phosphobacteria@2.5kg ha^{-1}
T_{11} - Vermicompost @ 5t +Sea weed extract @ 3%+phosphobacteria@2.5kg ha^{-1}
T_{12} - Poultry manure @2.5t+Sea weed extract @3%+phosphobacteria @2.5kg ha^{-1}
T_{13} - Control

RDF: 75% NPK (60:30:20 kg ha^{-1})

The experiment was laid out in Randomised Block Design with three replications. Pits were taken at a spacing of 1 X 0.75 m. In each pit, four seeds were sown. The cultural and management practices were adopted according to the management practices recommended by Tamilnadu Agricultural University. Three plants were tagged randomly in each treatment for recording the observations on the vine length, number of primary branches, number of leaves, Fruit weight and fruit yield

Result and Discussion

The data on the influence of organic nutrients on the vine length, number of primary branches and number of leaves of bitter gourd is presented in Table 1. Among the treatments maximum vine length was observed in T_5 (223.01 cm) at final harvest. While, the minimum vine length was observed in control T_{13} (182.36 cm) at final harvest which was significantly differed from all other treatments. Data presented in table.1 on number of primary branches reflected significant difference among the treatments. Among the treatments the maximum number of primary branches was observed in T_5 (13.39) at final harvest followed by T_2 (12.76) at final harvest respectively whereas, the minimum number of branches per vine was observed in control T_1 (6.59) at final harvest respectively. Values on number of leaves have been depicted in Table 1. The maximum number of leaves was observed under T_5 (419.62) at final harvest respectively. The combined application of vermicompost @ + sea weed extract + *Azospirilum* recorded the maximum vine length, number of primary branches, leaf area index and number of leaves. Vermicompost which would have improved the physical properties of the soil, such as they would have provided more nitrogen and phosphorous in the soil. Organic manures improve the soil physical conditions and improves microbial and soil organic matter which in turn produces organic acids which inhibits particularly IAA oxidase enzymes, resulting in enhancing the promotive effect of auxins which has direct effect on plant (Hammad *et al*., 2011). The result of the present study is in agreement with the findings of Singh *et al*. (2012) in tomato, John *et al*. (2013) in capsicum.

The data on number of fruits per plant was recorded in table 2. It showed significant difference among the treatments. T_5 treated with combination of vermicompost @ 5t + seaweed extract @ 3% + *azospirillum* 2k ha^{-1} produced maximum number of fruits per plant (36.39) followed by T_2 (35.35) and minimum fruits was recorded in control (25.16).Fruit weight for various treatments was recorded and it is presented in table 12. The heaviest fruits were produced by T_5 (Vermicompost @ 5t + sea weed extract @ 3% + a*zospirillum* 2kg ha$^{-1)}$ which weighed 30.69 g of fruits followed by T_2 weighed 29.69 g of fruits and less weighed fruits were from control. The yield obtained after harvest was recorded in table 15 and T_5 gave the maximum yield at final harvest with 1.17 kg of fruits which was significantly superior over T_2 (1.09 kg) aid the control recorded the lesser yield (0.50 kg).Further, Amirthalingam and Balakrishnan (1988) opined that the increase in number of fruits and fruit weight may be attributed to the increase in the number of cells as well as elongation of individual cells, which might be rendered possible through better translocation of soluble

irons under optimum levels of nutrients. Taller plants with more number of branches and leaves increased photosynthetic area and favorable physiological activity under higher nutrient levels could have resulted in more production and translocation of photosynthates in plants, which accelerated the formation of more number of large sized fruits resulting in higher yields. As suggested by Aisha *et al*. (2014).The highest fruit weight might have been due to accelerated mobility of photosynthate from the source to the sink as influenced by the growth hormones released or synthesized due to the organic sources of fertilizers.

Table 1 : Effect of organic nutrients on vine length (cm), primary branches and number of leaves at final harvest of bitter gourd (*Momordica charantia* L.) ecotype 'mithipagal'

Treatment	vine length (cm)	primary branches	number of leaves
T_1 - Press mud @ 3.5 + humic acid @ 2% + *azospirillum* @ 2kg ha^{-1}	206.95	10.52	363.92
T_2 - Vermicompost @ 5t + humic acid @ 2% + a*zospirillum* @ 2kg ha^{-1}	219.29	12.76	407.31
T_3 - Poultry manure @ 2.5t + humic acid @ 2% + a*zospirillum* @ 2kg ha^{-1}	190.99	7.91	310.38
T_4 - Press mud @ 3.5t + sea weed extract @ 3% + a*zospirillum* @ 2kg ha^{-1}	210.67	11.15	376.21
T_5 - Vermicompost @ 5t + sea weed extract @ 3% + a*zospirillum* 2kg ha^{-1}	223.01	13.39	419.62
T_6 - Poultry manure @ 2.5t + sea weed extract @ 3% + a*zospirillum* @ 2kg ha^{-1}	187.24	7.30	298.08
T_7 - Press mud @ 3.5 t + humic acid @ 2% + phosphobacteria @ 2.5 kg ha^{-1}	198.42	9.14	334.98
T_8 - Vermicompost @ 5t + humic acid @ 2% + phosphobacteria @ 2.5 kg ha^{-1}	215.57	12.14	395.02
T_9 - Poultry manure @ 2.5t + humic acid @ 2% + phosphobacteria @ 2.5kg ha^{-1}	203.24	9.85	351.64
T_{10} - Press mud @ 3.5t + sea weed extract @ 3% + phosphobacteria @ 2.5 kg ha^{-1}	194.70	8.53	322.67
T_{11} - Vermicompost @ 5t + Sea weed extract @ 3% + phosphobacteria @ 2.5kg ha^{-1}	211.87	11.49	382.72
T_{12} - Poultry manure @ 2.5t + Sea weed extract @ 3%+phosphobacteria @ 2.5kg ha^{-1}	199.51	9.22	339.33
T_{13} - Control	182.36	6.59	284.08
SED	**1.74**	**0.20**	**6.04**
CD (p = 0.05)	**3.49**	**0.41**	**12.09**

Table 2 : Effect of organic nutrients on number of fruits$plant^{-1}$, fruit weight (g) and fruit yield $plant^{-1}$ (kg) of bitter gourd (*Momordica charantia* L.) ecotype 'mithipagal'

Treatment	Number of fruits $plant^{-1}$	Fruit weight (g)	Fruit yield $plant^{-1}$ (kg)
T_1 - Press mud @ 3.5 + humic acid @ 2% + *azospirillum* @ 2kg ha^{-1}	31.64	26.47	0.88
T_2 - Vermicompost @ 5t + humic acid @ 2% + a*zospirillum* @ 2kg ha^{-1}	35.35	29.69	1.09
T_3 - Poultry manure @ 2.5t + humic acid @ 2% + a*zospirillum* @ 2kg ha^{-1}	27.09	22.16	0.63
T_4 - Press mud @ 3.5t + sea weed extract @ 3% + a*zospirillum* @ 2kg ha^{-1}	32.70	27.46	0.96
T_5 - Vermicompost @ 5t + sea weed extract @ 3% + a*zospirillum* 2kg ha^{-1}	36.39	30.69	1.17
T_6 - Poultry manure @ 2.5t + sea weed extract @ 3% + a*zospirillum* @ 2kg ha^{-1}	26.07	21.14	0.57
T_7 - Press mud @ 3.5 t + humic acid @ 2% + phosphobacteria @ 2.5 kg ha^{-1}	29.15	24.14	0.73
T_8 - Vermicompost @ 5t + humic acid @ 2% + phosphobacteria @ 2.5 kg ha^{-1}	34.32	28.70	1.01
T_9 - Poultry manure @ 2.5t + humic acid @ 2% + phosphobacteria @ 2.5kg ha^{-1}	30.61	25.45	0.80
T_{10} - Press mud @ 3.5t + sea weed extract @ 3% + phosphobacteria @ 2.5 kg ha^{-1}	28.13	23.16	0.67
T_{11} - Vermicompost @ 5t + Sea weed extract @ 3% + phosphobacteria @ 2.5kg ha^{-1}	33.27	27.72	0.97
T_{12} - Poultry manure @ 2.5t + Sea weed extract @ 3% + phosphobacteria @ 2.5kg ha^{-1}	29.58	24.46	0.74
T_{13} - Control	25.16	19.82	0.50
SED	**0.41**	**0.39**	**0.01**
CD (p = 0.05)	**0.82**	**0.78**	**0.02**

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