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Full Length Research Article

EFFECT OF ORGANIC NUTRIENTS ON GROWTH OF BITTER GOURD (*Momordica charantia* L.) cv. LONG GREEN

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An investigation on the influence of organic nutrients on growth and yield c bitter gourd *(Momordica charantia* L.) cv. Long green was carried out at the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar during July - October, 2012. The experiment comprised of 14 treatments each replicated thrice was CBBCued following the principles of Randomized Block Design. Results of the experiment revealed that the application of Vermicompost @ 5 t ha^{-1} and *Azospirillum* @ 5 t ha^{-1} along with panchkavya 3 per cent foliar spray improved the growth, yield and quality performance of bitter gourd. Among the different treatments, the application of Vermicompost @ 5 t $ha^{-1}$and *Azospirillum* @ 5 t ha^{-1} along with panchakavya 3 per cent foliar spray to bitter gourd (*Momordica charantia* L.) cv. Long green increased the growth components viz., vine length, number of laterals, first female flower, number of female flowers, sex ratio, fruit set percentage, DMP.

Key words: Bitter ground, Long green, Organic nutrients.

INTRODUCTION

Vegetables play a vital role in the health and nutrition of people throughout the world. Bitter gourd or balsam pear *(Momordica charantia* L.) is one of the commercially important cucurbitaceous vegetable crops extensively grown throughout India for its nutritive value and medicinal properties. It is very rich source of calcium, phosphorus, iron, protein, vitamin A and vitamin C Its juice consumption is also very useful for diabetic patient due to its potent oxygen free radical scavenging activity of the fruit juice (Sreejayan and Rao, 1991). The bitter principle in bitter gourd is cucurbitacin (tetracycline triterpenes), a bitter glucoside which prevents the spoilage of cooked vegetable and keeps fit for consumption even for two to three days (Aykrod *et al,* 1951). The leaf extract of bitter gourd has also very good mosquitocidal effect (Murlee Yadav *et al.,* 2008). The fruits are prepared for consumption in many ways and are quite commonly used in fried, boiled and stuffed forms. It is highly a cross pollinated crop and a climbing vine. Organic farming helps to improve the physical, chemical and biological properties of the soil and maintains the ecological balance as well as productivity of life supporting systems for the future generation. The use of organic manures like FYM, Vermicompost, Pressmud, Azospirillum, Panchakavya, EM (Effective Microorganisms) and Humic acid partly substitute chemical fertilizers and also reduce the cost of production. Organically grown horticultural produces are residue free and fetches a high price in the market. FYM promotes favourable soil properties such as Banulation, fine tilth, efficient aeration, easy root penetration, improved water holding capacity etc.

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MATERIALS AND METHODS

The present investigation entitled "" Influence of organic nutrients growth and yield of bitter gourd (Momordica charantia L.) cv. Long green" was carried out at the vegetable unit of the Department of Horticulture, Faculty of Agriculture, Annamalai Univeristy, Annamalai Nagar during July – October 2012. Bitter gourd cv. Long green, a local type was collected from Panruti area near Cuddalore. Fruits are dark green in colour, the fruit size is 25-30 cm long and the cultivar can be allowed to trail on the trellies. The organic manures viz., FYM *Azospirillum,* Vermicompost, Pressmud, Panchakavya, Humic acid, EM (Effective microorganisms) and recommended dose of inorganic fertilizers. The experimental field was ploughed twice, stubbles were removed and is were broken. Then the field was laid out into pits of size 45cm^3 were taken at a spacing of 2 x 1.5m. Fully matured seeds were selected and soaked in water before sowing. The seeds were sown at the rate of five seeds per pit. Fifteen days after sowing, thinning was done by maintaining three seedlings per pit. The organic manures like FYM, vermicompost, Pressmud and recommended dose of inorganic fertilizers were given as basal dose and *Azospirillum,* Panchakavya, EM (Effective Microorganism) and Humid acid were given as foliar spray at 15 days interval (30^{th}, 45^{th} and 60^{th} DAS).

RESEARCH AND FINDINGS

The results of the present investigation showed that the growth parameters *viz.,* vine length and number of laterals per plant were significantly influenced by the application of organic manures like vermicompost and *Azospirillum* along with foliar application of panchakavya. The vine length is considered to be an important factor to judge the vigour in bitter gourd.

Influence of organic nutrients on growth attributes of bitter gourd cv. Long green

Treatment details	Vine length (cm) 90 Days	No. of lateral per plant 90 Days	Days to first female flower appearance	Node number of first female flower	Number of female flowers per vine	Sex ratio 90 Days
T1 – Absolute Control	243.01	0.97	59.87	15.12	11.96	3.86
T2- Recommenede dose of NPK @ 70:25:25 kg ha^{-1}	260.01	1.37	53.10	11.39	16.19	4.41
T3 – FYM @ 25 tonnes ha^{-1} + *Azospirillum* @ 5kg ha^{-1}	277.39	1.03	53.65	14.55	12.58	4.32
T4 – VC @ 5 tonnes ha^{-1} + *Azospirillum* @ 5 kg ha^{-1}	335.26	1.74	54.33	12.64	14.43	3.97
T5 – PM @ 25 tonnes ha-1+ *Azospirillum* @ 5 kg ha^{-1}	326.82	1.55	455.91	14.31	17.26	4.27
T6- FYM @25 tonnes ha-1+ *Azospirillum* @ 5 kg ha^{-1} +PK @ 3 % ha^{-1}	310.34	1.49	52.03	11.18	14.74	4.38
T7 – VC @ 5 tonnes ha^{-1}+ *Azospirillum* @ 5 kg ha^{-1}+ PK @ 3% ha^{-1}	434.25	2.21	51.19	9.37	19.21	1.16
T8 – PM @ 25 tonnes ha^{-1}+ *Azospirillum* @ 5 kg ha^{-1} + PK @ 3% ha^{-1}	293.99	1.66	51.98	10.92	13.96	3.97
T9 - @25tonnes ha^{-1} *Azospirillum* @ 5 kg ha^{-1} + EM (1 : 1 000 dilution)	368.21	2.01	52.54	11.31	17.64	2.86
T10 – VC @ 5 tonnes ha^{-1} + *Azospirillum* @ 5 kg ha^{-1} + EM(1 : 1 000 dilution)	417.77	2.12	51.37	10.65	18.75	1.46
T11 – PM @ 25 tonnes ha^{-1} + *Azospirillum* @ 5 kg ha^{-1}+ EM(1 : 1 000 dilution)	357.86	1.81	52.81	13.44	16.66	4.34
T12 – FYM @ 25 tonnes ha^{-1} + *Azospirillum* @ 5 kg ha^{-1}+ HA @ 0.2 % ha^{-1}	413.17	2.07	51.53	10.71	18.52	1.68
T13 – VC @ 5 tonnes ha^{-1} + *Azospirillum* @ 5 kg ha^{-1} + HA @ 0.2 % ha^{-1}	384.69	1.99	51.58	12.67	15.23	2.91
T14 – VC @ 5 tonnes ha^{-1} + HA @ 0.2 % ha^{-1}	343.11	1.87	52.79	13.53	17.10	4.32
S.Ed	2.0891	0.0149	0.0641	0.0149	0.0641	0.0986
CD (P=0.05)	4.3036	0.0308	0.1320	0.0308	0.1320	0.2031

In the present study, the vine length was found to increase significantly with the basal application of organic manures along with foliar spray of panchakavya. The combined application of organic manures with vermicompost @ 5 t ha^{-1} + *Azospirillum* @ 5 kg ha^{-1} + panchakavya 3 per cent as foliar spray recorded the maximum vine length, number of laterals per plant. The results of the present study are in agreement with the findings of Thamburaj (1994), Sendurkumaran *et al.* (1998) and Mohammed Rafi *et al.* (2002) in tomato, Subba Rao and Ravisankar (2001) in brinjal, Kalaipoovizhi (2007) in cucumber, Ponni and Arumugam Shakila (2007) in *Phyllanthus niruri.* Taha *et al.* (2011) reported that application of vermicompost 12.5 t/ha shows the highest vine length in summer squash due to the role of vermicompost which would have improved the physical properties of the soil, such as they would have provided more nitrogen and phosphorus 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 enzyme, resulting in enhancing the promotive effect of auxin-IAA, which has direct effect on plant (Leopold, 1974). Incorporation of vermicompost promotes the lush growth Promotes auxins and cytokinins, which are responsible for the cell division and cell elongation as observed by Radha *et al.* (1986). Chaudary *et al* (2004) reported that vermicompost contains biologically active substances such as plant growth regulators which enhances sufficient quantity of nutrient flow in the plant system, thereby, stimulating the auxiliary buds and leading to increase in plant height and number of branches, number of leaves, intermodal length, stem girth, leaf area and plant spread were greatly influenced by the combined application of Vermicompost @ 5 t ha-1+ *Azospirillum* @ 5 kg ha-1+ Panchakavya 3 per cent. Panchakavya is fermented organic manure with high microbial load with Effective Micro Organisms (EMO) and methylotrophs profile Bacteria. These EMO in panchakavya would have enhanced the productivity of phytohormones like auxins and gibberellins that might have in turn, stimulated the growth by increasing the growth parameters *viz.,* plant height, number of branches and leaf area as evidenced from the work of Sivakumar (2004). In the present study also, foliar spray of panchakavya (3%) along with other organic manures like *Azospirillum* (5 kg ha-^{1}) and vermicompost (5 t ha"^{1}) resulted in enhancing the growth parameters.

Similar findings on the increase in growth attributes due to application of panchakavya has been reported by Sridhar (2003) and Sivakumar (2004) in black night shade and Selvaraj *et al* (2003) in thyme and rosemary, Kanimozhi (2003) and Bharathi (2004) in *Coleus forskhlii,* Arjunan (2005) in tomato, Prabhu (2006) in mint and Kalaipoovizhi (2007) in cucumber. Baby (2012) reported that vermicompost 12.5 t/ha application recorded the highest number of branches in annual moringa. In the present investigation, the plants supplied with organic manures viz., vermicompost @ 5 t ha-1+ *Azospirillum* 5 kg ha-1-I- Panchakavya 3% as foliar spray showed early flowering and higher flower production. This might be due to the better nutritional status of the plant, which was favoured by this treatment. Further, due to greater photosynthetic effect, flowering was induced, thus affecting early initiation of flower bud formation. Subba Rao and Ravisankar (2001) reported that application of vermicompost + panchakavya resulted in earlier flowering and higher flower production, which may be due to better aeration, adequate drainage and creation of favourable soil environment for deeper penetration of root and higher nutrient extraction from the soil. The results of the present study are in accordance with the findings of Nakasona (1989), Renuka and Ravisankar (2001) and Mohammed Rafi *et al.* (2002) in tomato, Ismail *et al* (1993) and Usha Kumari *et al.* (1999) in bhendi, Jasvir Singh *et al.* (1997) and Kalaipoovizhi (2007) in cucumber. Taha *et al.* (2011) reported that application of vermicompost 12.5 t/ha shows the early flowering and higher flower production in summer squash. Productivity of the crop is primarily a resultant function of dry matter production. The increased dry matter production was the result of better plant growth as reflected by increased vine length, more laterals, higher number of leaves and leaf area. The dry matter production was found to be significantly higher in the treatment which received combined application of Vermicompost @ 5 t ha-1+ *Azospirillum* 5 kg ha-1+ Panchakavya 3%. Higher production of dry matter by the plant could be due to the fact that organic manures have high amounts of humus matter, facilitate N-fixation by the microbes, regulate the nitrogen supply to the plants and also helps in the production of plant growth promoters (Subba Rao and Ravisankar, 2001). Renuka and Ravisankar (2001) in tomato, Krishnan and Krishnappa (2002) in tomato and Kalaipoovizhi (2007) in cucumber. Taha *et al.* (2011) reported

that application of vermicompost 12.5 t/ha recorded highest dry matter production in summer squash. High organic matter content, presence of numerous active enzymes, vitamins, macro and micronutrients in panchakavya might have contributed to the increased dry matter production (Sridhar, 2003). Spraying of panchakavya was found to increase the plant height and total weight of plant, which in turn I resulted in the increased dry matter production due to higher amounts of nutrient uptake from the soil with the results of Selvaraj *et al.* (2003) in thyme and rosemary, Kanimozhi (2003) and Bharathi (2004) in *Colues forskholii* and Kalaipoovizhi (2007) in cucumber.

Conclusion

It could be concluded that the use of various organic nutrients application of vermicompost @ 5t ha^{-1} + *Azospirillum* 5 kg ha^{-1} + 3 per cent panchakavya as foliar spray was required the highest growth parameters of bitter gourd.

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