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Effect of soil and foliar application of organic nutrients on flowering and fruit-set of bittergourd cv. LONG GREEN

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Abstract : An investigation was carried out to find out the effect of soil and foliar application of organic nutrients on flowering and fruit set percentage of bittergourd (*Momordica charantia*) cv. LONG GREEN. Results of the experiment revealed that the application of FYM @ 25 t ha⁻¹ and vermicompost @ 5 t ha⁻¹ along with panchagavya 3 per cent foliar spray improved the number of female flowers and fruit set percentage of bittergourd cv. LONG GREEN. The same treatment was found to register early maturity of fruits in both season. Among the two seasons studied, the fruit set percentage was higher in season-II as compared to season- I, irrespective of the treatments.

Key words : Bittergourd, Flowering, Fruit set, Vermicompost, FYM

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Bitter gourd or balsam pear (*Momordica charantia* L.) is one of the commercially important cucurbitaceous vegetable crops extensively grown throughout the country for its nutritive value and medicinal properties. The fruits are prepared for consumption in many ways and are quite commonly used as fried, boiled and stuffed forms. It is highly cross pollinated crop and it is a climbing vine.

Organic farming is a crop production system, which favours maximum use of organic matter, keeps the environment healthy and discourages synthetically generated agro-inputs used for maintaining soil fertility and productivity and controlling insect-pests under conditions of sustainable natural resources (Rana, 2004). The organic farming practices need to be standardized for many crops so also for bitter gourd. With this background, the present investigation was carried out to study the effect of organic nutrients on flowering and fruit set percentage of bitter gourd cv. long green.

RESEARCH METHODS

An investigation was carried out in the vegetable field unit, Department of Horticulture, Faculty of Agriculture, Annamalai university, Annamalai nagar,

during two seasons viz., Season-I (January-April 2008) and season-II (July-October 2008) to study the effect of organic nutrients on flowering and fruit set of bitter gourd (*Momordica charantia*) cv. LONG GREEN under irrigated conditions. Bitter gourd cv. LONG GREEN, a popular local type collected from Panruti area near Cuddalore was used for the study. The fruits are dark green in colour, the fruit size is 25-30 cm long and the cultivar can be allowed to trail on the trellis. The crop duration is 120 days. The experiment was laid out in Randomized Block Design with 15 treatments and three replications. The treatments were T₁: Absolute control , T₂: FYM @ 25 t ha⁻¹, T₃: Vermicompost @ 5 t ha⁻¹, T₄: Neem cake @ 5 t ha⁻¹, T₅: FYM @ 25 t ha⁻¹ + Panchagavya @ 3 per cent, T₆: Vermicompost @ 5t ha⁻¹ + Panchagavya @ 3 per cent, T₇: Neem cake @ 5 t ha⁻¹ + Panchagavya @ 3 per cent, T₈: FYM @ 25 t ha⁻¹ + Sea weed extract @ 3 per cent, T₉: Vermicompost @ 5t ha⁻¹ + Sea weed extract @ 3 per cent, T₁₀: Neem cake @ 5 t ha⁻¹ + Sea weed extract @ 3 per cent, T₁₁: FYM @ 25 t ha⁻¹ + Vermicompost @ 5 t ha⁻¹ + Panchagavya @ 3 per cent, T₁₂: FYM @ 25 t ha⁻¹ + Neem cake @ 5 t ha⁻¹ + Panchagavya @ 3 per cent, T₁₃: FYM @ 25 t ha⁻¹ + Vermicompost @ 5 t ha⁻¹ + Sea weed extract @ 3 per cent T₁₄: FYM @ 25 t ha⁻¹ + Neem cake @ 5 t ha⁻¹ + Sea weed extract @ 3 per cent,

T₁₅: Recommended dose of NPK @ 70:25:25 kg ha⁻¹.

The observations like sex-ratio, fruit set percentage and days taken for fruit maturity were recorded. The sex-ratio was computed by the ratio of female flowers to the number of male flowers produced per vine. Fruit set percentage was calculated by the ratio of number of fruit to number of female flowers produced per vine and multiplied by hundred and expressed in percentage. Number of days required for the fruit to develop as a matured fruit from the date of fruit setting was counted and recorded.

RESEARCH FINDINGS AND DISCUSSION

In season-I, (Table 1) among the various treatments, T₁₁ recorded the narrowest sex ratio (5.02), followed by T₁₅ (5.80) and T₁₂ (6.23). A similar trend was noticed in season-II also with T₁₁ recording the narrowest sex ratio (5.58), followed by T₁₅ (6.01) and T₁₂ (6.44). The broadest sex ratio of 13.18 and 12.74 was recorded in the control (T₁) in season-I and season-II, respectively. Among the treatments (Table 2) (season-I) T₁₁ registered the highest fruit set per cent of (79.86), followed by T₁₅ (76.23) and T₁₂ (75.25). T₁ (control) registered the lowest fruit set per cent of (67.60). In season-II also, the same treatments were found to register the highest fruit set per cent and the mean values were 82.19, 77.58 and 77.16 per cent, respectively, whereas T₁ (absolute control) recorded the lowest fruit set per cent of (69.13). Among the two seasons, the fruit set per cent was higher in season-II as

compared to season-I, irrespective of the treatments. Among the various treatments, in season-I (Table 3) T₁₁ was found to register early maturity of fruits (13.42 days), followed by T₁₅ (13.51 days) and T₁₂ (13.74 days). In Season-II also, the same treatments, T₁₁ followed by T₁₅ and T₁₂ produced matured fruits earlier (13.01, 13.41 and 13.67 days, respectively).

In the present investigation, the plants supplied with organic manures viz., FYM @ 25 t ha⁻¹ + vermicompost @ 5 t ha⁻¹ + panchagavya 3 per cent as foliar spray showed narrow sex ratio, higher fruit set percentage and early maturity of fruits. This might be due to the better nutritional status of the plant, which was favoured by this treatment. Raja gopal and Rao (1974) concluded that the increased nutrient availability from the organic manures might have increased the various endogenous hormonal levels in the plant tissue, which might be responsible for enhanced pollen germination and pollen tube growth, which ultimately increased the fruit set percentage resulting in higher yields. This is in line with the findings of Thamburaj (1994) in tomato. Further, due to greater photosynthetic effect, flowering was induced, thus affecting early initiation of flower bud formation. Subbarao and Sankar (2001) reported that application of FYM + vermicompost resulted in earlier flowering and higher flower production, which may be due to the 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

Table 1 : Effect of soil and foliar application of organic nutrients on sex ratio of bitter guard cv. LONG GREEN

Tr. No.	Treatment details	Sex ratio	
		Season I	Season II
T ₁	Absolute control	13.18	12.74
T ₂	FYM @ 25 t ha ⁻¹	8.78	8.76
T ₃	Vermicompost @ 5 t ha ⁻¹	10.65	10.20
T ₄	Neem cake @ 5 t ha ⁻¹	12.34	12.12
T ₅	FYM @ 25 t ha ⁻¹ + Panchagavya @ 3 %	7.22	7.22
T ₆	Vermicompost @ 5 t ha ⁻¹ + Panchagavya @ 3 %	7.63	7.63
T ₇	Neem cake @ 5 t ha ⁻¹ + Panchagavya @ 3 %	11.56	11.49
T ₈	FYM @ 25 t ha ⁻¹ + Sea weed extract @ 3 %	9.94	9.93
T ₉	Vermicompost @ 5 t ha ⁻¹ + Sea weed extract @ 3 %	11.02	10.86
T ₁₀	Neem cake @ 5 t ha ⁻¹ + Sea weed extract @ 3 %	11.02	11.02
T ₁₁	FYM @ 25 t ha ⁻¹ + Vermicompost @ 5 t ha ⁻¹ + Panchagavya @ 3 %	5.02	5.58
T ₁₂	FYM @ 25 t ha ⁻¹ + Neem cake @ 5 t ha ⁻¹ + Panchagavya @ 3 %	6.23	6.44
T ₁₃	FYM @ 25 t ha ⁻¹ + Vermicompost @ 5 t ha ⁻¹ + Sea weed extract @ 3 %	9.34	9.21
T ₁₄	FYM @ 25 t ha ⁻¹ + Neem cake @ 5 t ha ⁻¹ + Sea weed extract @ 3 %	8.26	8.26
T ₁₅	Recommended dose of NPK @ 70:25:25 kg ha ⁻¹	5.80	6.01
S.E.(d)		0.25	0.23
C.D. (P=0.05)		0.50	0.47

Table 2 : Effect of soil and foliar application of organic nutrients on fruit set percentage of bitter guard cv. LONG GREEN

Tr. No.	Treatment details	Fruit set percentage	
		Season I	Season II
T ₁	Absolute control	67.60	69.13
T ₂	FYM @ 25 t ha ⁻¹	74.42	74.61
T ₃	Vermicompost @ 5 t ha ⁻¹	71.14	73.64
T ₄	Neem cake @ 5 t ha ⁻¹	69.13	69.39
T ₅	FYM @ 25 t ha ⁻¹ + Panchagavya @ 3 %	70.13	72.13
T ₆	Vermicompost @ 5 t ha ⁻¹ + Panchagavya @ 3 %	69.73	70.71
T ₇	Neem cake @ 5 t ha ⁻¹ + Panchagavya @ 3 %	70.52	71.32
T ₈	FYM @ 25 t ha ⁻¹ + Sea weed extract @ 3 %	71.96	73.19
T ₉	Vermicompost @ 5 t ha ⁻¹ + Sea weed extract @ 3 %	71.26	71.44
T ₁₀	Neem cake @ 5 t ha ⁻¹ + Sea weed extract @ 3 %	69.92	70.12
T ₁₁	FYM @ 25 t ha ⁻¹ + Vermicompost @ 5 t ha ⁻¹ + Panchagavya @ 3 %	79.86	82.19
T ₁₂	FYM @ 25 t ha ⁻¹ + Neem cake @ 5 t ha ⁻¹ + Panchagavya @ 3 %	75.25	77.16
T ₁₃	FYM @ 25 t ha ⁻¹ + Vermicompost @ 5 t ha ⁻¹ + Sea weed extract @ 3 %	71.66	70.37
T ₁₄	FYM @ 25 t ha ⁻¹ + Neem cake @ 5 t ha ⁻¹ + Sea weed extract @ 3 %	68.59	74.96
T ₁₅	Recommended dose of NPK @ 70:25:25 kg ha ⁻¹	76.23	77.58
S.E.(d)		0.40	0.43
C.D. (P=0.05)		0.81	0.87

Table 3 : Effect of soil and foliar application of organic nutrients on days taken for fruit maturity of bitter guard cv. LONG GREEN

Tr. No.	Treatment details	Days taken for fruit maturity	
		Season I	Season II
T ₁	Absolute control	15.96	15.72
T ₂	FYM @ 25 t ha ⁻¹	14.55	14.51
T ₃	Vermicompost @ 5 t ha ⁻¹	14.86	14.56
T ₄	Neem cake @ 5 t ha ⁻¹	15.64	15.58
T ₅	FYM @ 25 t ha ⁻¹ + Panchagavya @ 3 %	13.92	13.72
T ₆	Vermicompost @ 5 t ha ⁻¹ + Panchagavya @ 3 %	13.98	13.86
T ₇	Neem cake @ 5 t ha ⁻¹ + Panchagavya @ 3 %	15.36	15.31
T ₈	FYM @ 25 t ha ⁻¹ + Sea weed extract @ 3 %	14.87	14.82
T ₉	Vermicompost @ 5 t ha ⁻¹ + Sea weed extract @ 3 %	15.07	15.01
T ₁₀	Neem cake @ 5 t ha ⁻¹ + Sea weed extract @ 3 %	15.09	15.03
T ₁₁	FYM @ 25 t ha ⁻¹ + Vermicompost @ 5 t ha ⁻¹ + Panchagavya @ 3 %	13.42	13.01
T ₁₂	FYM @ 25 t ha ⁻¹ + Neem cake @ 5 t ha ⁻¹ + Panchagavya @ 3 %	13.74	13.67
T ₁₃	FYM @ 25 t ha ⁻¹ + Vermicompost @ 5 t ha ⁻¹ + Sea weed extract @ 3 %	14.72	14.62
T ₁₄	FYM @ 25 t ha ⁻¹ + Neem cake @ 5 t ha ⁻¹ + Sea weed extract @ 3 %	14.24	14.17
T ₁₅	Recommended dose of NPK @ 70:25:25 kg ha ⁻¹	13.51	13.41
S.E.(d)		0.08	0.09
C.D. (P=0.05)		0.16	0.18

accordance with the findings Usha Kumari *et al.* (1999) in bhendi, and Jasvir Singh *et al.* (1997) in chilli. Higher fruit set percentage is due to application of vermicompost which may be attributed to the high level of nutrients along with growth stimulating substances excreted by earthworms into their casts. Tomati and Galli (1988)

emphasized the influence of microbial, hormone like substances on the plant metabolism, growth and development by vermicompost. This is in line with the findings of Sendurkumaran *et al.* (1998) in tomato and Nanthakumar and Veeraragavathatham (1997) in brinjal.

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