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Growth, flowering, fruiting and yield of guava (*Psidium guajava* L.) cv. 'SARDAR' grown under high-density-planting system as influenced by various organic and inorganic sources

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ABSTRACT

An experiment on winter season crop of guava (*Psidium guajava* L.) cv. SARDAR grown under High-density-planting system was conducted during 2005-06 and 2006-07 at Department of Horticulture, RCA, M.P.U.A.T., Udaipur (Rajasthan) to study the response of various organic manures, inorganic fertilizers and *Azotobector* at different rates namely, FYM (75 kg/plant), *neemcake* (5 kg/plant), vermicompost (10 kg/plant), 50 per cent recommended dose of NPK (500:200:500 g/plant), 25 per cent recommended dose of NPK (250:100:250 g/plant) and *Azotobector* @ 20 g per plant on growth, flowering, fruiting and yield. The results indicated that 60 days after treatment the mean maximum increase in shoot length (41.76%) was observed in vermicompost @ 10 kg + 50 per cent recommended dose of NPK + *Azotobector* @ 20 g per plant treatment followed by 100 per cent recommended dose of NPK treatment (41.72%) and maximum increase in shoot diameter (35.63%) was recorded in vermicompost @ 10 kg + 50 per cent recommended dose of NPK + *Azotobector* @ 20 g per plant followed by *neemcake* @ 5 kg + 50 per cent recommended dose of NPK + *Azotobector* @ 20 g per plant treatment (35.29%). However, mean minimum days taken to initiation of flowering (25.85), maximum number of flowers per shoot (8.30/shoot), maximum fruit set (60.06%), highest fruit retention (59.83%) and maximum yield (44.25 kg/plant or 49.16 tones/ha) were recorded in vermicompost @ 10 kg + 50 per cent recommended dose of NPK + *Azotobector* @ 20 g per plant treatment as compared to control.

Key words : Guava, Organic manures, Inorganic fertilizers, *Azotobector*.

The increasing importance of guava (*Psidium guajava* L.) as a commercial tropical fruit crop, both for table purposes and processing demands its wide spread cultivation ensuring regular cropping and higher production grown under High-density-planting system. It belongs to family Myrtaceae and is a very common fruit, popular among rich and poors alike due to its moderate price, nourishing value and good taste. It is known as 'Apple of tropics' and rich in vitamin 'C' and pectin content besides being a good source of other vitamins and minerals. The use of organic manures, inorganic fertilizers and *Azotobector* has assumed an integral part of modern fruit production to improve quality and production of fruits. Thus the present study was aimed to asses the integrated approach of nutrition in guava cv. 'SARDAR' at Horticulture Research Farm, Rajasthan College of Agriculture, MPUAT, Udaipur.

MATERIALS AND METHODS

Twelve years old plants of guava cv. 'SARDAR' planted 3 x 3 m apart grown under High-density-planting system at instructional farm, Department of Horticulture, Rajasthan College of Agriculture, MPUAT, Udaipur (Rajasthan). During the year 2005-06 and 2006-07 were selected for the study. Single plant considered as an experimental unit was replicated four times in Completely Randomized Design with fourteen treatments. The treatments consisted of T_0 = Absolute control, T_1 = recommended dose of NPK (500 : 200 : 500 g/plant), T_2 = FYM @ 75 kg + 50 per cent recommended dose of NPK per plant, T_3= FYM 75 kg + 50% recommended dose of NPK + *Azotobector* @ 20 g per plant, T_4 = FYM @ 75 kg + 25 per cent recommended dose of NPK per plant, T_5 = FYM @ 75 kg + 25 per cent recommended dose of NPK + *Azotobector* @ 20 g per plant, T_6 = *Neemacake* @ 5 kg + 50 per cent recommended dose of NPK per plant, T_7 = *Neemcake* @ 5 kg + 50 per cent recommended dose of NPK + *Azotobector* @ 20 g per plant, T_8 = *Neemcake* @ 5 kg + 25 per cent recommended dose of NPK per plant, T_9 = *Neemcake* @ 5 kg + 25 per cent recommended dose of NPK + *Azotobector* @ 20 g per plant, T_{10} = Vermicompost @ 10 kg + 50 per cent recommended dose of NPK per plant, T_{11} = Vermicompost @ 10 kg + 50 per cent recommended dose of NPK + *Azotobector* @ 20 g per plant, T_{12} = Vermicompost @ 10 kg + 25 per cent recommended dose

of NPK per plant and T_{13} = Vermicompost @ 10 kg + 25 per cent recommended dose of NPK + *Azotobector* @ 20 g per plant per year. Observations were recorded on vegetative growth, flowering, fruiting and yield of winter season crop during experimental period, vegetative characters (*i.e.* shoot length and diameter) were recorded at 30 days interval after recording initial observations in each treatment for a total period of 60 days. Five newly emerged uniform size shoots were selected randomly in each treatment for measuring length and diameter of shoot and expressed in per cent increase, on the basis of initial values. Days taken to initiation of flowering were recorded by visual observation through regular visiting of the orchard. The number of flowers were counted on the five selected shoots and average number of flowers per shoot was calculated. Total number of flowers which set into fruit were counted and per cent fruit set was calculated on the basis of number of flowers emerged. Similarly, total number of fruit present on the tagged shoot at the time of fruit maturity was counted and per cent fruit retention was calculate on the basis of initial number of fruit set. Number of days taken to first picking from date of treatment was counted as days taken to harvesting. The yield of fruit per hectare was calculated by multiplying the yield of fruit per plant with number of plants (1111) per hectare. Data calculated in percentage were angular transformed before statistical analysis, which was carried out as per the methods prescribed by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

The pooled analysis of two year mean data on growth, flowering, fruiting and yield as influenced by application of various organic manures, inorganic fertilizers and *Azotobector* at different rates on winter

Table 1: Effect of organic manures, inorganic fertilizers and *Azotobector* on vegetative growth and flowering of guava cv. 'SARDAR' (pooled mean of two years)

	Treatments	Per cent increase in shoot length (Pooled)		Per cent increase in shoot diameter (Pooled)		Days taken to initiation of flowering (Pooled)	No. of flowers/ shoot (Pooled)
		30 DAT	60 DAT	30 DAT	60 DAT		
T_0	Absolute control	23.86 (16.33)	29.93 (24.72)	23.49 (15.88)	26.82 (20.36)	37.18	4.95
T_1	100 % Recommended dose of NPK	32.21 (28.02)	41.72 (43.21)	27.17 (20.96)	35.20 (33.02)	27.15	8.17
T_2	FYM @ 75 kg + 50 % Rec. NPK/plant	26.83 (20.40)	34.91 (33.32)	24.86 (17.84)	31.12 (26.98)	30.50	6.50
T_3	FYM @ 75 kg + 50 % Rec. NPK + *Azotobector* @ 20 g/plant	28.92 (22.97)	38.15 (37.88)	25.16 (17.94)	32.24 (28.90)	29.63	7.65
T_4	FYM @ 75 kg + 25 % Rec. NPK /plant	23.16 (15.61)	31.98 (27.30)	26.74 (16.08)	28.38 (22.44)	34.93	4.70
T_5	FYM @ 75 kg + 25 % Rec. NPK + *Azotobector* @ 20 g /plant	24.40 (17.72)	35.10 (32.82)	24.04 (16.60)	29.92 (24.88)	33.25	6.10
T_6	*Neemcake* @ 5 kg + 50 % Rec. NPK/plant	18.52 (23.06)	37.86 (35.98)	25.44 (18.41)	32.47 (28.77)	28.88	7.25
T_7	*Neemcake* @ 5 kg + 50 % Rec. NPK + *Azotobector* @ 20 g/plant	30.43 (25.52)	38.82 (39.30)	25.80 (18.80)	35.29 (31.97)	27.64	7.85
T_8	*Neemcake* @ 5 kg + 25 % Rec. NPK /plant	26.47 (20.11)	34.59 (33.67)	24.86 (17.68)	30.75 (26.15)	33.75	5.58
T_9	*Neemcake* @ 5 kg + 25 % Rec. NPK + *Azotobector* @ 20 g/plant	28.11 (21.49)	37.55 (37.14)	25.03 (17.90)	31.79 (27.75)	31.13	6.64
T_{10}	Vermicompost @ 10 kg + 50 Rec. NPK/plant	28.23 (22.46)	38.79 (39.31)	26.01 (19.10)	33.04 (29.55)	27.75	7.53
T_{11}	Vermicompost @ 10 kg + 50 Rec. NPK + *Azotobector* @ 20 g/plant	31.43 (26.52)	41.76 (43.05)	27.25 (20.56)	35.63 (33.29)	25.85	8.30
T_{12}	Vermicompost @ 10 kg + 25 Rec. NPK /plant	26.01 (19.12)	35.46 (33.65)	24.54 (17.25)	30.96 (26.47)	30.18	6.33
T_{13}	Vermicompost @ 10 kg + 25 Rec. NPK + *Azotobector* @ 20 g/plant	27.92 (21.87)	37.31 (36.74)	24.71 (17.47)	31.65 (27.54)	29.50	6.60
	S.E. ±	0.587	0.713	0.520	0.655	0.592	0.196
	C.D. (P=0.05)	1.652	2.005	1.461	1.843	1.666	0.552

Figures in parenthesis are arc sin transformed value

season guava cv. 'SARDAR' are presented in Table 1 and 2.

Growth and flowering :

It is revealed from the pooled data presented in Table 1 that growth (length and diameter of shoot) and flowering (Days taken to initiation of flowering and number of flowers/ shoot) characters were significantly influenced by the use of various organic manures, inorganic fertilizers and *Azotobector* at different levels. Pooled mean indicated that application of vermicompost @ 10 kg + 50 per cent recommended dose of NPK + *Azotobector* @ 20 g per plant treatment, resulted increase in shoot length (41.76%) and shoot diameter (35.63%) which was closely followed by 100 per cent recommended dose of NPK and *Neemcake* @ 5 kg + 50 per cent recommended dose of NPK + *Azotobector* @ 20 gm per plant, respectively, on 60 days after treatment application. The increase in shoot length and shoot diameter may be due to the acceleration of the movement of assimilates and increase in the translocation of photosynthates as result of NPK application (Hartt, 1969). Similar increase in shoot growth due to NPK application has also been reported by Teaotia *et al*. (1972) in guava. The minimum days taken to initiation of flowering (25.85 days) were recorded at vermicompost @ 10 kg + 50 per cent recommended dose of NPK + *Azotobector* @ 20 g per plant treatment. The highest number of flowers (8.30/shoot) was also recorded from the above same treatment. The prolonged availability of nutrients during the growth period from vermicompost might have enhanced the flowering and increased the number of flowers. The present result are supported by the findings of Villasurda and Baluyut (1990); Ram *et al*. (2005) and Athani *et al*. (2005) in guava.

Fruiting and yield :

It is evident from the pooled mean data that application

Table 2 : Effect of organic manures, inorganic fertilizers and *Azotobector* on fruiting and yield of guava cv. 'SARDAR' (pooled mean of two years)

	Treatments	Fruit set (%)	Fruit retention (%)	Yield (kg/plant)	Yield (tonnes/ha)
T_0	Absolute control	52.06 (62.20)	50.38 (57.85)	27.10	30.11
T_1	100 % Recommended dose of NPK	53.19 (64.09)	55.09 (67.26)	36.65	40.72
T_2	FYM @ 75 kg + 50 % Rec. NPK/plant	58.29 (72.37)	56.22 (69.09)	40.54	45.04
T_3	FYM @ 75 kg + 50 % Rec. NPK + *Azotobector* @ 20 g/plant	58.43 (72.58)	58.43 (72.74)	42.43	47.14
T_4	FYM @ 75 kg + 25 % Rec. NPK /plant	38.93 (63.35)	54.24 (64.18)	34.40	38.22
T_5	FYM @ 75 kg + 25 % Rec. NPK + *Azotobector* @ 20 g /plant	55.66 (68.32)	56.06 (68.83)	35.69	39.65
T_6	*Neemcake* @ 5 kg + 50 % Rec. NPK/plant	56.84 (70.09)	56.76 (69.96)	36.94	41.04
T_7	*Neemcake* @ 5 kg + 50 % Rec. NPK + *Azotobector* @ 20 g/plant	57.36 (70.67)	56.82 (70.31)	42.08	46.75
T_8	*Neemcake* @ 5 kg + 25 % Rec. NPK /plant	54.10 (65.70)	54.21 (65.80)	34.84	38.71
T_9	*Neemcake* @ 5 kg + 25 % Rec. NPK + *Azotobector* @ 20 g/plant	54.69 (66.59)	54.39 (66.09)	39.25	43.61
T_{10}	Vermicompost @ 10 kg + 50 Rec. NPK/plant	59.66 (74.48)	57.38 (70.94)	43.14	47.93
T_{11}	Vermicompost @ 10 kg + 50 Rec. NPK + *Azotobector* @ 20 g/plant	60.06 (75.06)	59.83 (73.57)	44.25	49.16
T_{12}	Vermicompost @ 10 kg + 25 Rec. NPK /plant	54.28 (65.85)	54.94 (67.18)	31.49	34.99
T_{13}	Vermicompost @ 10 kg + 25 Rec. NPK + *Azotobector* @ 20 g/plant	56..01 (68.73)	55.25 (67.45)	35.55	39.50
	S.E. ±	1.161	1.401	1.020	0.566
	C.D. (P=0.05)	3.266	3.941	2.868	1.592

Figures in parenthesis are arc sin transformed value

of organic manures, inorganic fertilizer and *Azotobector* treatments had significantly increased the fruit set, fruit retention and yield over control (Table 2). The mean maximum fruit set (60.06%) and fruit retention (59.83%) were recorded at vermicompost @ 10 kg + 50 per cent recommended dose of NPK + *Azotobector* @ 20 g per plant treatment as compared to mean minimum at control *i.e.* fruit set 52.06 per cent and fruit retention 50.38 per cent. These findings are quite analogous with that of Ram and Rajput (2000) and Jadhao *et al*. (2005) in guava. The findings of the present investigation are in close conformity with the findings of Villasurda and Baluyut (1990), Sharma and Sharma (1992) and Umashanker *et al*. (2002) in guava. Among the various plant nutritional treatments attempted the mean highest yield 44.25 kg per plant (49.16 tonnes/ ha) was recorded at vermicompost @ 10 kg + 50 per cent recommended dose of NPK + *Azotobector* @ 20 g per plant treatment followed by vermicompost @ 10 kg + 50 per cent recommended dose of NPK per plant and FYM @ 75 kg + 50 per cent recommended dose of NPK + *Azotobector* @ 20 g per plant treatment. Similar, beneficial effect of vermicompost with inorganic fertilizer on yield of banana was recorded by Ushakumari *et al*. (1997). The yield due to vermicompost with inorganic fertilizer may be attributed to the high level of nutrients besides some growth stimulating substances excreted by earthworms into their casts, that ultimately promote the yield attributing characters such as fruit set, fruit retention, number and weight of fruits. Tomati *et al*. (1988) also emphasized the influence of microbial hormone like substance on the plant metabolism, growth and development by vermicompost support the present results. Dey *et al*. (2005) also obtained highest fruit yield of guava cv. 'SARDAR' with the application of phosphobacterin, which support the present results. The possible explanation for increase in yield by application of *Azotobector* might be due to increase in vegetative growth, fruit set, fruit retention and fruit weight.

Thus, from the present investigation it may be concluded that among various plant nutritional treatments used under study, vermicompost @ 10 kg + 50 per cent recommended dose of NPK + *Azotobector* @ 20 g per plant treatment is superior to the other nutritional treatments with regards to flowering, fruiting and yield of fruits of winter season guava cv. 'SARDAR' which grown under High-density-planting system.

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REFERENCES

Athani, S.I., Prabhuraj, H.S., Ustad, A.I., Swamy, G.S.K., Patil, P.B. and Kotikal, Y.K. (2005). Effect of organic and inorganic fertilizers on vegetative growth parameters, fruit characters, quality and yield of 'Sardar' guava. *1st Int. Guava Symp.*, Dec. 5-8, CISH, Lucknow, pp. 70.

Dey, P., Kumar, S., Das, B. and Nath, V. (2005). Efficacy of biofertilizers in guava grown on acid soil. *1st Int. Guava Symp.*, Dec. 5-8, CISH, Lucknow, pp. 63-64.

Hartt, C.E. (1969). Effect of potassium efficiency upon translocation of 14 C in attached blades and entire plants of sugarcane. *Plant Physiol.*, **44** : 1461-1469.

Jadhao, B.J., Ghawade, S.M., Nandre, D.R., Dalal, S.R. and Jogdande, N.D. (2005). Integrated nutrient management in guava cv. 'SARDAR'. *1st Int. Guava Symp.*, Dec. 5-8, CISH, Lucknow. pp. 79.

Panse, V.G. and Sukhatme, P.V. (1985). *Statistical methods for agricultural workers*. ICAR, New Delhi, pp. 145-155.

Ram, R.A. and Rajput, M.S. (2000). Role of biofertilizers and manures in production of guava (*Psidium guajava* L.) cv. 'ALLAHABAD SAFEDA'. *Haryana J. Hort. Sci.*, **29** : 193-194.

Ram, R.A., Bhriguvanshi, S.R. and Pathak, R.K. (2005). Integrated plant nutrient management in guava (*Psidium guajava* L.) cv. 'SARDAR'. *1st Int. Guava symp.*, Dec. 5-8, CISH, Lucknow, pp. 85.

Sharma, D.P. and Sharma, R.G. (1992). Effect of foliar application of N, P, K on growth and yield of guava (*Psidium guajava* L.). *Advances in Pl. Sci.*, **5** : 313-315.

Teaotia, S.S., Tripathi, R.S. and Phogat, K.P.S. (1972). Effect of nitrogenous, phosphatic and potassic fertilizers on growth, yield and quality of guava. *Int. Symp.Subtropical and Tropical Hort.*, pp. 139-140.

Tomati, U., Grappeli, A. and Galli, E. (1988). The hormone like effect of earthworm casts. *Biological Fertile Soils*, **5** : 288-294.

Uma Shankar, Pathak, R.A., Pathak, R.K., Ojha, C.M. and Shankar, U. (2002). Effects of NPK on the yield and fruit quality of guava cv. 'SARDAR'. *Prog. Hort.*, **34** : 49-55.

Ushakumari, K., Prbhakumari, P. and Padmaja, P. (1997). Efficiency of vermicompost on yield and quality of banana (AB) cv. 'NJALIPOOVAN'. *South Indian Hort.*, **45** : 158-160.

Villasurda, P.J. and Baluyut, N.M. (1990). Growth and yield of guava (*Psidium guajava* L.) as affected by different levels and sources of organic and inorganic fertilizers. *USM Col. Agri. Res. J.*, Philippines, **1** : 18-33.

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