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The effect of pruning, organic and inorganic nutrition on flowering and fruiting behavior of mango CV. Amrapali

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Abstract

The present investigation was conducted with the objective to know the effect of different pruning intensity and nutrition on flowering and fruiting characters viz., time of panicle emergence, number of panicles, panicle length, number of flowers per panicle, panicles per branch, fruits set per panicle, sex ratio, fruit set and fruit drop. The experiments were conducted in Randomized Block Design with seven treatments i.e. T₁=5 cm pruning+FYM@ 20 kg per plant, T₂=5 cm pruning+ Vermicompost @ 10kg per plant, T₃=5 cm pruning+ ZnSO₄ @ 1.0% + Borax @ 0.4%, T₄=10 cm pruning+ FYM@ 20kg+ Zinc Sulphate@ 1.0% per plant, T₅=10 cm pruning+ Vermicompost @10kg+ Borax @0.4% per plant, T₆=10 cm pruning+PSB 250g+ MgSO₄ @0.5% per plant, T₇=15 cm pruning+FYM @20kg+ Zinc Sulphate @1.0% per plant, T₈=15 cm pruning+ Vermicompost @10kg+ Borax@0.4% per plant, T₉=15 cm pruning+ PSB 250g+ MgSO₄ @0.5% per plant, T₁₀= Control (no pruning+ water spray). The present investigation revealed that all flowering and fruiting characters influenced significantly due various pruning intensity, organic and inorganic nutrient treatments during both the years except fruit set and fruit drop per cent. The highest panicles emerges, number of flowers per panicle, panicle length, number of panicles per branch and fruits set per panicle were recorded with the treatment T₈.

Keywords: Pruning intensity, flowering and fruiting behavior

Introduction

Mango (*Mangifera indica* L.) is the fifth most important fruit of the world after apple, citrus, banana and grape. It is cultivated in more than 100 countries because of its delicious taste, excellent flavour, attractive fragrance and excellent source of vitamin A and C. The total annual production of mango in India is 18.43 million tonnes, cultivated in 2.52 million hectare with productivity (7.30 Mt/ ha), (Anonymous, 2014). The major mango producing states in India are Uttar Pradesh (4.30 million tonne) followed by Andhra Pradesh (2.74 million tonnes), and Karnataka (1.75 million tonnes) (Anonymous, 2014).

Considering the importance of mango there is dire need to initiate the nutrient management and pruning intensity programme to increase vegetative growth, fruit size, uniform ripening, fruit yield and quality of mango. In addition to nutrient intensity and pruning has also been reported to manage plant canopy and enhance the flowering, fruiting, yield and quality of many fruit crops (Ali *et al.*, 2001).

Generally Indian soil is deficient to N and P. Nitrogen is one of the most important essential plant nutrients. It is constituents of protoplasm, protein, chlorophyll, nucleotide, alkaloids, hormones and vitamins, which play an important role in crop production and awareness on health security with use of natural food. Organic food and quality produce, the judicious use of chemicals is gaining less importance and banned by few countries. The use of chemical fertilizers for production of herbal drugs is also advisable to maintain the quality and medicinal properties of herbal species. It requires favorable soil and climate condition for properly development of plant. The yield and quality of herbs is highly affected by agro-cultural practices. In most of the Horticultural, Medicinal and Vegetable crops, FYM is the most common organic manure used for supplement the initial requirement of nutrients for better establishment such as animal, plant wastage i.e. Nitrogen, Phosphorus, Potash and micronutrients. The continuous applications of huge amount of chemical fertilizers hamper the fruit quality, soil health and generate pollution. The combination of organic and in-organic nutrients paves away to overcome of these problems. Plant nutrient can be supplied from different sources viz., organic manures and chemical fertilizers for better utilization of resources and to produce crop with less expenditure. Organic manures enhance nutrient availability in order to improve the soil health, soil structure and provide conducive environment for the treatment of soil micro flora. Potentially of using organic manures along

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with balanced fertilizers are well established in increasing crop yield and sustained crop production (Nambiar and Abrol, 1992).

The micro-nutrients play vital role in growth, development, retention and quality of fruits. The foliar feeding of micro-nutrients has gained much importance in recent years and comparatively more effective for rapid recovery of plants, as under high soil pH conditions, most of macro and micro-nutrients are unavailable. Various trials have been conducted on foliar feeding of micro-nutrients in different fruit crops and found effective in improving the vegetative growth, yield and quality of fruits (Sindhu *et al.*, 1994; Banik *et al.*, 1997 and Babu and Singh, 1998).

Materials and Methods

The experiment was carried out on 25 year old mango orchard planted under sodic soil condition and site is located at Main Experiment Station, Horticulture, Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad on the Raibareilly road at the distance of 42 km away from Faizabad district head quarter. Geographically it is situated at 26⁰-47⁰N latitude, 82.12⁰E longitude of 113 meter away from mean sea level. This site is located in typical saline-alkaline belt of indigenous plains of eastern Uttar Pradesh.

The experiment was laid out in Randomized Block Design with 3 replications. One plant was taken as unit per plot in the treatment. The details of experimental plan employed in the present investigation are as follows:

Treatments : 10

T₁ : 5 cm pruning+FYM@ 20 kg per plant

T₂ : 5 cm pruning+Vermicompost@10kg per plant

T₃ : 5 cm pruning+ ZnSO₄ @ 1.0% + Borax @ 0.4%

T₄ : 10 cm pruning+FYM@20kg+Zinc Sulphate@ 1.0% per plant

T₅ : 10 cm pruning+Vermicompost@10kg+Borax@0.4% per plant
T₆T₆ : 10 cm pruning+PSB 250g+MgSO₄@0.5% per plant

T₇ : 15 cm pruning+FYM @20kg+Zinc Sulphate@1.0% per plant

T₈ : 15 cm pruning+Vermicompost@10kg+Borax@0.4% per plant
T₉ T₉ : 15 cm pruning+PSB 250g+MgSO₄@0.5% per plant

T₁₀ : Control (no pruning+water spray) per plant

Results and Discussion

The flowering and fruiting characters of mango cv. Amrapali

in respect to time of panicle emergence, number of panicles, panicle length, number of flowers per panicle, panicles per branch, fruits set per panicle, sex ratio, fruit set and fruit drop (%) presented for two consecutive years (2015-16 and 2016-17) of experimentation is being discussed here.

The all flowering and fruiting characters influenced significantly due various pruning intensity, organic and inorganic nutrient treatments during both the years except fruit set and fruit drop per cent.

Results indicated that the treatment T₈ (15 cm pruning + Vermicompost @10kg+ Borax @ 0.4%) took minimum days for panicle emergence followed by T₂ (5 cm pruning + Vermicompost @ 10 kg per plant) and maximum days for panicle emergence recorded in treatment T₁₀ (no pruning + water spray). The highest panicles emerges, number of flowers per panicle, panicle length, number of panicles per branch, fruits set per panicle were recorded with the treatment T₈ (15 cm pruning + Vermicompost @10kg+ Borax @ 0.4%) followed by T₅ (10 cm pruning + Vermicompost @10kg+ Borax @ 0.4%) as compared to T₁₀ (no pruning + water spray) during both the years. The reason for maximum number of flower and because of more open tree canopy with wider leaf area resulted allowing more light penetration that led assimilation of more photosynthesis materials and also less competition for the growth of individual fruit as compared to unpruned tree and application of bio-fertilizer might be due to the fact that bio-fertilizers enhanced productivity by biological nitrogen fixation of soluble or insoluble phosphate thus secreting hormones, vitamins such as thiamine, riboflavine, pyridoxine, nicotinic etc. Boron plays an important role in the translocation of food materials from leaf to developing fruits and thereby it reduces the fruit dropping. The beneficial effect of urea in increasing fruit retention because role of urea in improving the plant vigour thereby increasing food reservoirs similar observations on fruit drop and fruit retention in mango have been recorded by Singh *et al.* (1991) stated that appreciable decreased fruit drop and increased fruit retention in mango with the foliar spray of urea 3.0 per cent. Maximum fruit retention, fruit set and reduced fruit drop were also noted (Sinha *et al.* (1999) with the spraying of micro-nutrient 0.8% ZnSO₄ and 0.4% Borax. Sheikh and Hulmani (1993) and Jadhav *et al.* (2002) also reported effect of pruning intensity of flowering behavior in guava. Yadav *et al.* (2007) in aonla and Singh and Banik (2011) in mango reported significant result on fruiting behavior.

Table 1: Effect of pruning, organic and inorganic nutrition on time of panicle emergence in mango cv. Amrapali.

Treatments	Time of panicle emergence (Days)	
	2015-16	2016-17
T ₁ 5 cm pruning+FYM@ 20 kg per plant	193.82	190.39
T ₂ 5 cm pruning+ Vermicompost @ 10kg per plant	184.22	183.96
T ₃ 5 cm pruning+ ZnSO ₄ @ 1.0% + Borax @ 0.4%	197.66	194.16
T ₄ 10 cm pruning+ FYM@ 20kg+ Zinc Sulphate@ 1.0% per plant	190.34	197.14
T ₅ 10 cm pruning+ Vermicompost @10kg+ Borax @0.4% per plant	186.65	193.31
T ₆ 10 cm pruning+PSB 250g+ MgSO ₄ @0.5% per plant	198.80	200.05
T ₇ 15 cm pruning+FYM @20kg+ Zinc Sulphate @1.0% per plant	198.97	200.79
T ₈ 15 cm pruning+ Vermicompost @10kg+ Borax@0.4% per plant	177.41	180.74
T ₉ 15 cm pruning+ PSB 250g+ MgSO ₄ @0.5% per plant	189.12	190.85
T ₁₀ Control (no pruning+ water spray)	202.91	204.76
SEm±	3.48	3.53
CD at 5%	10.43	10.56

Table 2: Effect of pruning, organic and inorganic nutrition on number of panicles in mango cv. Amrapali.

Treatments		Number of panicles	
		2015-16	2016-17
T ₁	5 cm pruning+FYM@ 20 kg per plant	43.63	41.61
T ₂	5 cm pruning+ Vermicompost @ 10kg per plant	44.50	42.44
T ₃	5 cm pruning+ ZnSO ₄ @ 1.0% + Borax @ 0.4%	41.47	39.55
T ₄	10 cm pruning+ FYM@ 20kg+ Zinc Sulphate@ 1.0% per plant	37.29	38.01
T ₅	10 cm pruning+ Vermicompost @10kg+ Borax @0.4% per plant	54.14	48.78
T ₆	10 cm pruning+PSB 250g+ MgSO ₄ @0.5% per plant	51.46	46.37
T ₇	15 cm pruning+FYM @20kg+ Zinc Sulphate @1.0% per plant	36.56	37.27
T ₈	15 cm pruning+ Vermicompost @10kg+ Borax@0.4% per plant	55.21	51.75
T ₉	15 cm pruning+ PSB 250g+ MgSO ₄ @0.5% per plant	38.80	36.30
T ₁₀	Control (no pruning+ water spray)	34.75	35.42
SEm±		1.20	1.14
CD at 5%		3.60	3.41

Table 3: Effect of pruning, organic and inorganic nutrition on panicle length in mango cv. Amrapali.

Treatments		Panicle length (cm)	
		2015-16	2016-17
T ₁	5 cm pruning+FYM@ 20 kg per plant	11.31	11.82
T ₂	5 cm pruning+ Vermicompost @ 10kg per plant	11.54	12.05
T ₃	5 cm pruning+ ZnSO ₄ @ 1.0% + Borax @ 0.4%	10.75	11.23
T ₄	10 cm pruning+ FYM@ 20kg+ Zinc Sulphate@ 1.0% per plant	12.93	13.23
T ₅	10 cm pruning+ Vermicompost @10kg+ Borax @0.4% per plant	13.18	13.49
T ₆	10 cm pruning+PSB 250g+ MgSO ₄ @0.5% per plant	12.29	12.57
T ₇	15 cm pruning+FYM @20kg+ Zinc Sulphate @1.0% per plant	15.86	15.55
T ₈	15 cm pruning+ Vermicompost @10kg+ Borax@0.4% per plant	16.17	15.86
T ₉	15 cm pruning+ PSB 250g+ MgSO ₄ @0.5% per plant	15.07	14.78
T ₁₀	Control (no pruning+ water spray)	10.60	11.40
SEm±		0.25	0.36
CD at 5%		0.75	1.04

Table 4: Effect of pruning and organic and inorganic nutrition on number of flowers per panicle in mango cv. Amrapali.

Treatments		Number of flower per panicle	
		2015-16	2016-17
T ₁	5 cm pruning+FYM@ 20 kg per plant	1135.00	1125.20
T ₂	5 cm pruning+ Vermicompost @ 10kg per plant	1035.80	1045.50
T ₃	5 cm pruning+ ZnSO ₄ @ 1.0% + Borax @ 0.4%	1015.70	996.48
T ₄	10 cm pruning+ FYM@ 20kg+ Zinc Sulphate@ 1.0% per plant	1106.80	1048.40
T ₅	10 cm pruning+ Vermicompost @10kg+ Borax @0.4% per plant	1166.00	1154.80
T ₆	10 cm pruning+PSB 250g+ MgSO ₄ @0.5% per plant	1052.00	1102.90
T ₇	15 cm pruning+FYM @20kg+ Zinc Sulphate @1.0% per plant	1128.70	1069.10
T ₈	15 cm pruning+ Vermicompost @10kg+ Borax@0.4% per plant	1247.00	1210.00
T ₉	15 cm pruning+ PSB 250g+ MgSO ₄ @0.5% per plant	1163.00	1048.30
T ₁₀	Control (no pruning+ water spray)	965.40	974.40
SEm±		26.48	19.89
CD at 5%		83.27	59.55

Table 5: Effect of pruning, organic and inorganic nutrition on number of panicle per branch in mango cv. Amrapali.

Treatments		Number of panicle per branch	
		2015-16	2016-17
T ₁	5 cm pruning+FYM@ 20 kg per plant	5.54	5.85
T ₂	5 cm pruning+ Vermicompost @ 10kg per plant	6.25	6.00
T ₃	5 cm pruning+ ZnSO ₄ @ 1.0% + Borax @ 0.4%	5.33	5.42
T ₄	10 cm pruning+ FYM@ 20kg+ Zinc Sulphate@ 1.0% per plant	5.67	5.76
T ₅	10 cm pruning+ Vermicompost @10kg+ Borax @0.4% per plant	6.67	6.56
T ₆	10 cm pruning+PSB 250g+ MgSO ₄ @0.5% per plant	5.98	5.91
T ₇	15 cm pruning+FYM @20kg+ Zinc Sulphate @1.0% per plant	5.10	4.98
T ₈	15 cm pruning+ Vermicompost @10kg+ Borax@0.4% per plant	7.10	6.90
T ₉	15 cm pruning+ PSB 250g+ MgSO ₄ @0.5% per plant	4.86	4.70
T ₁₀	Control (no pruning+ water spray)	3.98	3.80
SEm±		0.11	0.11
CD at 5%		0.34	0.33

Table 6: Effect of pruning, organic and inorganic nutrition on fruit set per panicle in mango cv. Amrapali

Treatments		Fruits set per panicle	
		2015-16	2016-17
T ₁	5 cm pruning+FYM@ 20 kg per plant	3.78	4.35
T ₂	5 cm pruning+ Vermicompost @ 10kg per plant	3.82	4.14
T ₃	5 cm pruning+ ZnSO ₄ @ 1.0% + Borax @ 0.4%	3.60	3.75
T ₄	10 cm pruning+ FYM@ 20kg+ Zinc Sulphate@ 1.0% per plant	4.12	4.13
T ₅	10 cm pruning+ Vermicompost @10kg+ Borax @0.4% per plant	4.53	4.81
T ₆	10 cm pruning+PSB 250g+ MgSO ₄ @0.5% per plant	3.96	3.44
T ₇	15 cm pruning+FYM @20kg+ Zinc Sulphate @1.0% per plant	4.42	4.60
T ₈	15 cm pruning+ Vermicompost @10kg+ Borax@0.4% per plant	4.73	4.85
T ₉	15 cm pruning+ PSB 250g+ MgSO ₄ @0.5% per plant	4.15	3.85
T ₁₀	Control (no pruning+ water spray)	3.59	3.20
SEm±		0.11	0.11
CD at 5%		0.32	0.34

Table 7: Effect of pruning, organic and inorganic sources of nutrients on fruit set in mango cv. Amrapali

Treatments		Fruit set (%)	
		2015-16	2016-17
T ₁	5 cm pruning+FYM@ 20 kg per plant	0.33	0.39
T ₂	5 cm pruning+ Vermicompost @ 10kg per plant	0.37	0.40
T ₃	5 cm pruning+ ZnSO ₄ @ 1.0% + Borax @ 0.4%	0.35	0.38
T ₄	10 cm pruning+ FYM@ 20kg+ Zinc Sulphate@ 1.0% per plant	0.37	0.39
T ₅	10 cm pruning+ Vermicompost @10kg+ Borax @0.4% per plant	0.39	0.42
T ₆	10 cm pruning+PSB 250g+ MgSO ₄ @0.5% per plant	0.38	0.31
T ₇	15 cm pruning+FYM @20kg+ Zinc Sulphate @1.0% per plant	0.37	0.43
T ₈	15 cm pruning+ Vermicompost @10kg+ Borax@0.4% per plant	0.38	0.40
T ₉	15 cm pruning+ PSB 250g+ MgSO ₄ @0.5% per plant	0.36	0.37
T ₁₀	Control (no pruning+ water spray)	0.37	0.33
SEm±		0.07	0.11
CD at 5%		0.23	0.34

Table 8: Effect of pruning, organic and inorganic nutrition on fruit drop in mango cv. Amrapali

Treatments		Fruit drop (%)	
		2015-16	2016-17
T ₁	5 cm pruning+FYM@ 20 kg per plant	99.67	99.61
T ₂	5 cm pruning+ Vermicompost @ 10kg per plant	99.63	99.60
T ₃	5 cm pruning+ ZnSO ₄ @ 1.0% + Borax @ 0.4%	99.65	99.62
T ₄	10 cm pruning+ FYM@ 20kg+ Zinc Sulphate@ 1.0% per plant	99.63	99.61
T ₅	10 cm pruning+ Vermicompost @10kg+ Borax @0.4% per plant	99.61	99.58
T ₆	10 cm pruning+PSB 250g+ MgSO ₄ @0.5% per plant	99.62	99.69
T ₇	15 cm pruning+FYM @20kg+ Zinc Sulphate @1.0% per plant	99.63	99.57
T ₈	15 cm pruning+ Vermicompost @10kg+ Borax@0.4% per plant	99.62	99.60
T ₉	15 cm pruning+ PSB 250g+ MgSO ₄ @0.5% per plant	99.64	99.63
T ₁₀	Control (no pruning+ water spray)	99.63	99.67
SEm±		0.07	0.11
CD at 5%		0.23	0.34

Table 9: Effect of pruning, organic and inorganic nutrition on sex ratio (Male : female ratio) in mango cv. Amrapali'

Treatments		Sex ratio	
		2015-16	2016-17
T ₁	5 cm pruning+FYM@ 20 kg per plant	4.21	4.25
T ₂	5 cm pruning+ Vermicompost @ 10kg per plant	4.21	4.36
T ₃	5 cm pruning+ ZnSO ₄ @ 1.0% + Borax @ 0.4%	4.07	4.26
T ₄	10 cm pruning+ FYM@ 20kg+ Zinc Sulphate@ 1.0% per plant	3.61	4.88
T ₅	10 cm pruning+ Vermicompost @10kg+ Borax @0.4% per plant	3.43	4.95
T ₆	10 cm pruning+PSB 250g+ MgSO ₄ @0.5% per plant	3.61	3.67
T ₇	15 cm pruning+FYM @20kg+ Zinc Sulphate @1.0% per plant	3.39	3.59
T ₈	15 cm pruning+ Vermicompost @10kg+ Borax@0.4% per plant	3.24	3.57
T ₉	15 cm pruning+ PSB 250g+ MgSO ₄ @0.5% per plant	3.38	3.74
T ₁₀	Control (no pruning+ water spray)	4.65	4.74
SEm±		0.13	0.11
CD at 5%		0.38	0.34

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