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Short Communication

Shoot tip pruning and paclobutrazol soil drench on the yield of mango hybrid Ratna under HDP system

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Abstract

A study on the effect of tip pruning of shoots at two pruning levels (10 cm and 20 cm) with and without paclobutrazol application on the yield parameters of mango hybrid Ratna was conducted in the mango orchard attached to the Department of Fruit Science, College of Agriculture, Vellanikkara during 2018-2019. Seventeen treatments (T_1-T_8 consisted of pruning at 10 cm and 20 cm length from the tip of the shoot during June, July, August and September, T_9-T_{16} consisted of pruning at 10 cm and 20 cm length from the tip of the shoot along with paclobutrazol soil drench during June, July, August and September months and T_{17} as the control) with two replications were carried out following completely randomised block design (CRD). Pruning all the shoots of the tree to a length of 20 cm from the shoot tip along with paclobutrazol soil drench during June month was observed to produce maximum number of fruits per tree and maximum fruit yield (kg/tree) in Ratna. The individual fruit weight was maximum in the trees pruned at 20 cm length during September month drenched with paclobutrazol.

Key words: Fruitweight, June, September, Mango, Number of fruits per tree, Paclobutrazol, Pruning, Ratna, Yield

Mango (*Mangifera indica* L.), the king of fruits is known for its nutritional quality, appearance, taste and flavour. Low productivity of mango in Kerala is attributed to the complex flowering phenomenon that is greatly affected by the weather parameters, pest and disease incidence, inherent factors and the unscientific canopy management techniques. The productivity of mango orchards can be improved by adopting the high density planting system which could accommodate more number of plants per unit area along with pruning and growth regulator application. The canopy management techniques standardised elsewhere cannot be blindly adopted in the humid tropical condition of Kerala due to the variation in the climatic conditions and the unpredictable weather parameters prevailing during the flowering and fruiting period of mango.

In this context, the present experiment was undertaken with the objective to study the effect of different levels of pruning and time of pruning with and without paclobutrazol application on the yield parameters of seven year old trees of mango hybrid Ratna (3 m x 3 m). The work was conducted in the Mango orchard attached to the Department of Fruit Science, College of Agriculture, Vellanikkara during 2018-2019. The HDP mango trees were planted in the Mango orchard in 2011. The plants had attained an age of seven years during the period of study. The experiment was laid out in CRD. Each treatment was replicated twice. The pruning operations were carried out before the 5th of every month from June to September. Tip pruning of all the shoots was carried out at two levels *viz*. 10 cm and 20 cm length from the shoot tip with and without paclobutrazol

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soil drench. Paclobutrazol is a triazole fungicide that acts as a plant growth regulator due to its anti-gibberellic action in plants. It helps in the reduction of shoot growth, early flowering and production of more number of flowering shoots in mango. As the age of the experimental trees were of only seven years, the dose of cultar (commercial formulation of paclobutrazol) was calculated @ 0.07 % (0.01% for 1 year) for drenching each tree in the experimental plot. The quantity of paclobutrazol taken wasmixed in 10 litres of water and poured in the deep pits made on all the four sides in the circular channel taken 60 cm away from the base of the tree trunk. Adequate soil moisture was maintained in the soil before drenching and also after drenching. The pruned tips were smeared with fungicidal paste to avoid the fungal rot. The treatment details are given in Table 1.

Table 1. Treatment details

Treatments	Details
T_1	Pruning @ 10 cm length (June)
T_2	Pruning @ 20 cm length (June)
T_3	Pruning @ 10 cm length (July)
T_4	Pruning @ 20 cm length (July)
T_5	Pruning @ 10 cm length (August)
T_6	Pruning @ 20 cm length (August)
T_7	Pruning @ 10 cm length (September)
T_8	Pruning @ 20 cm length (September)
T_9	Pruning @ 10 cm length +PBZ (June)
T_{10}	Pruning @ 20 cm length + PBZ (June)
T_{11}	Pruning @ 10 cm length +PBZ (July)
T_{12}	Pruning @ 20 cm length + PBZ (July)
T_{13}	Pruning @ 10 cm length +PBZ (August)
T_{14}	Pruning @ 20 cm length + PBZ (August)
T_{15}	Pruning @ 10 cm length +PBZ (September)
T_{16}	Pruning @ 20 cm length + PBZ (September)
T_{17}	Control

Observations were recorded at weekly intervals and the fruits produced were evaluated for the yield parameters. The individual fruit weight of ten fruits was recorded for each replication and the average was worked out. The total number of fruits produced per replication was observed and the average was worked out. The yield was calculated by multiplying the number of fruits obtained per tree with the individual fruit weight separately for all the replications.

Soil drenching of paclobutrazol induced precocious flowering in young trees and preponed flowering in bearing trees (Kulkarni, 1988). In the present study, the yield characters of Ratna showed significant variation among the treatments (Table 2). The highest number of fruits per tree (34.50) was recorded for T_{10} (pruning of shoots at 20 cm length during June and drenched with PBZ) and was on par with T_{16} (pruning of shoots at 20 cm length during September and drenched with PBZ). Maximum fruit weight (468.98 g) was recorded by the treatment T_{16} which was on par with treatment T_{10} (465.48 g). The control trees (T_{17}) which received no pruning and PBZ treatment produced the fruits with minimum weight (298.43 g). The treatment T_{10} (pruning of shoots at 20 cm length during June and drenched with PBZ) recorded the highest fruit yield of about 16.06 kg per tree and was found to be on par with the treatment T_{16} (15.95 kg per tree).

The anti-gibberellic action of paclobutrazol inhibited the conversion of Ent-kaurene to Ent

Table 2. Effect of treatments on yield of fruits of hybrid Ratna

Treat-ments	No. of fruits/tree	Fruit weight (g)	Fruit yield (kg/tree)
T_1	22.50^{efg}	342.03^{h}	7.69^{g}
T_2	24.50^{d}	368.93^{f}	9.04^{f}
T_3	21.50^{gh}	325.75^{i}	7.01^{h}
T_4	24.00^{de}	365.80^{fg}	8.78^{f}
T_5	22.50^{efg}	324.43^{i}	7.30^{gh}
T_6	24.00^{de}	358.83^{g}	8.62^{f}
T_7	22.00^{fgh}	344.93^{h}	7.59^{gh}
T_8	23.50^{def}	364.35^{fg}	8.57^{f}
T_9	27.50^{b}	428.65^{d}	11.79^{c}
T_{10}	34.50^{a}	465.48^{ab}	16.06^{a}
T_{11}	26.50^{bc}	415.78^{e}	11.02^{de}
T_{12}	28.00^{b}	457.53^{b}	12.82^{b}
T_{13}	24.50^{d}	423.10^{de}	10.37^{e}
T_{14}	25.00^{cd}	463.35^{ab}	11.58^{cd}
T_{15}	24.50^{d}	443.48^{c}	10.86^{e}
T_{16}	34.00^{a}	468.98^{a}	15.95^{a}
T_{17}	20.50^{h}	298.43^{j}	6.12^{i}
CD (0.05)	1.57	8.43	0.68

*Values not sharing a common superscript in the column differ significantly with each other ($P<0.05$)

kaurenoic acid in the gibberellin synthesis pathway (Burondkar and Gunjate, 1991, 1993). The inhibition of the gibberellin synthesis resulted in the reduction of vegetative growth and helped in the induction of floral buds in mango. Increase in the number of hermaphrodite flowers and the retention of more fruits per panicle by the application of paclobutrazol led to the increase in yield parameters of mango. Pruning the mango trees immediately after the harvest (Yashitela et al., 2005) increased the number of fruits per tree, fruit yield (Singh et al., 2011) and fruit weight in trees subjected to paclobutrazol application. Higher yield in paclobutrazol applied trees were related to the alteration in the source-sink relation that might have reallocated the carbohydrate reserve to the developing fruits (Sonawane et al., 2016). The superiority of 20 cm pruning during June and September months along with the paclobutrazol application was found to increase the productivity of mango. Hence the high density planting system coupled with shoot tip pruning and paclobutrazol application will help in getting more profit for the farmers.

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