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Enhancement of yield in nutmeg (*Myristica fragrans* Houtt.) through pruning

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Nutmeg (*Myristica fragrans* Houtt.) is a distinct spice crop that provides us two different unique spices *viz.,* nutmeg (dried seed) and mace (dried aril covering the seed). Belonging to the family Myrsticaceae, it is an evergreen aromatic tree, usually growing to a height of 10-20 m, or even more, with spreading branches. Its centre of origin is Indonesia and is widely prevalent in India, West Indies, the Philippines, Sri Lanka, Pacific islands and Tropical America (Varghese, 2000). In India, nutmeg is prevalent in some parts of Kerala, Karnataka, Maharashtra, Goa, Tamil Nadu, Andaman islands and North East. Generally, nutmeg starts flowering in 5th or 6th year and may reach peak yield in 20 years. The period from flower to fruit ripening takes around 6 to 9 months (Flach and Cruickshank, 1969). In nutmeg, though flowering and fruiting is noticed throughout the year, the peak fruiting season is about three months from June to August which is mainly attributed to asynchronous flowering. Owing to its tree structure, harvesting in nutmeg is laborious and cumbersome. Generally in fruiting trees, pruning is an important cultural operation resorted to maintain tree canopy and better yield as compared to unpruned trees which grows very large and crowded inhibiting penetration of sunlight, reduced yield, pest and disease incidence (Lal and Mishra, 2007). In commercial cultivation of nutmeg, development of suitable canopy structure would help to bear more number of fruits with synchronized flowering and facilitates ease of harvest.

To study the effect of pruning on yield parameters of nutmeg, an experiment was set up at ICAR-Indian Institute of Spices Research, Regional Station, Appangala, Karntaka during 2014-2017. The four treatments selected for the study consisted of cutting all the side plagiotropic branches at varying length of 1, 2 m and alternative side branches cut at 1 m and 2 m length and control (without pruning). All the trees under study (including control) were detopped at a height of 17 ft (Fig. 1) for ease of cultural operations. The treatments were replicated eight times and thirty year old trees were selected for the study.

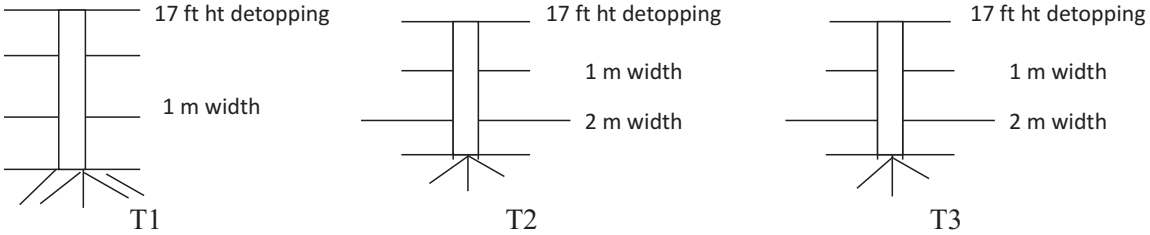

Fig. 1. Pruning treatments employed in 30 year old nutmeg trees

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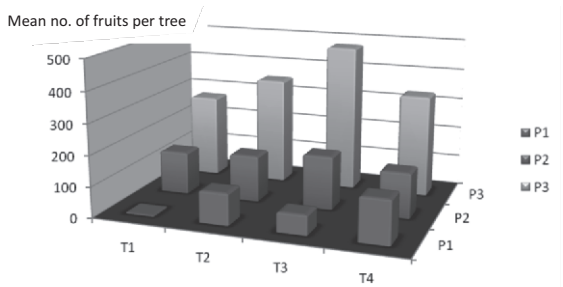
The observation on yield parameters like number of fruits, weight of nuts (fresh and dry) and weight of mace (fresh and dry) were recorded and mean values were taken for analysis. The data were subjected to statistical analysis to obtain information on the influence of pruning on yield parameters of pruned and unpruned trees of nutmeg.

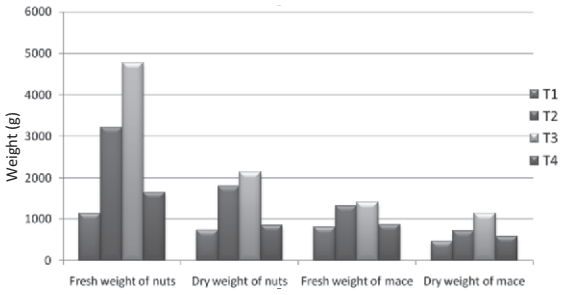
In horticultural crops, pruning is a basic tool which improves yield parameters, micro climate and yield. Analysis of pruning treatments on mean fruit production of nutmeg for three years from the date of pruning revealed that there was no significant difference in yield parameters in the first two years of pruning however, in third year, an increase in yield was recorded in moderately pruned trees (all side branches cut at 2 m and side branches alternatively cut at 1 m and 2 m length) as compared to control (unpruned) and severely pruned trees (all side branches cut at 1 m length) (Fig. 2). Ram *et al*. (2013) and Singh *et al*. (2010) also observed similar results when mango trees were subjected to pruning. During third year of pruning, mean fruit production of nutmeg trees where side branches were pruned at 2 m width (T3) produced 478 nuts while those pruned alternatively at 1 m and 2m width (T2) produced 350 nuts as compared to trees without pruning (332 nuts) and trees where side branches were pruned at 1 m width (272 nuts) (Fig. 2). The improvement in the mean fruit production of nutmeg in the moderately pruned trees might be attributed to better penetration of light into fruit bearing portions of nutmeg as against rigorous exposure in case of severely pruned trees. This is in accordance with Ammaan and Paramaguru (2017) who opined that nutmeg could efficiently utilize lower intensities of light for better growth and yield performance. The small canopy area of the severely pruned trees would also contribute to less fruit production in severely pruned nutmeg trees.



P1- I year after pruning, P2- II year after pruning, P3- III year after pruning

Fig. 2. Effect of pruning treatments on mean fruit production of nutmeg

During third year after pruning, the analysis of the influence of pruning treatments on yield parameters of nutmeg revealed that fresh (4776 g) and dry (2138 g) weight of nuts were as more in the treatment where side branches were pruned at 2 m width (T3) followed by the treatment where side branches were alternatively cut at 1 m and 2 m width (T2) which produced 3218 g fresh and 1793 g dry nuts as against control (Fig. 3). Similar trend was observed in the case of fresh and dry weight of mace with treatment T3 (side branches pruned at 2 m width) recording highest fresh (1401 g) and dry (1138 g) weight of mace (Fig. 3). The enhanced weight of nut and mace in the pruned trees might be due to the increased production of fruits in the moderately pruned trees as against severely pruned and unpruned trees. Sharma and Singh (2006) also reported that improved micro climate and increased rate of photosynthesis owing to pruning leads to increased fruit weight in mango.



T1- Side branches pruned at 1 m width

T2 - Side branches pruned alternatively at 1 m and 2m width

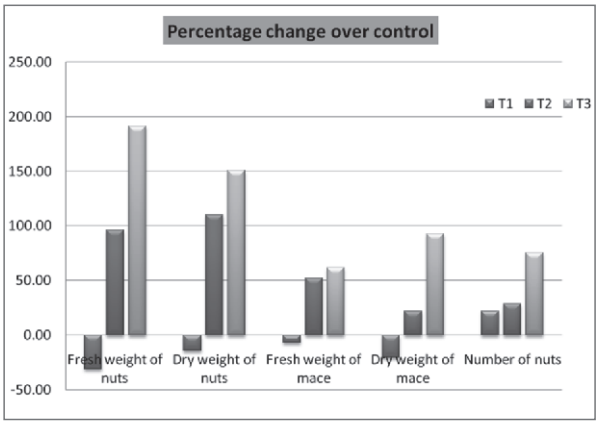
T3- Side branches pruned at 2 m width

T4- Control (without 0runing)

Fig. 3. Effect of pruning treatments on yield parameters of nutmeg (III year after pruning)

On analyzing change in yield parameters of pruned nutmeg trees over control (unpruned) it was revealed that pruning side branches at 2 m length produced more fresh (3136 g) and dry (1286 g) weight of nuts, fresh (536 g) and dry (448.50 g) weight of mace and number of fruits (205.37) over control in third year of pruning (data not shown). On converting to percentage basis it was found that detopping of nutmeg at a height of 17 ft combined with pruning plagiotropic side branches at a width of 2 m from the main stem resulted an increase of 150 per cent dry weight of nuts and 80 per cent dry weight of mace over control (Fig. 4) which is mainly due to rejuvenation effect following

pruning treatments. Also increase in the rate of photosynthesis leads to rapid movement of assimilates to sink (fruit) resulting in weight gain of fruits. Improvement in fruit size due to pruning treatments had earlier been observed in mango (Banik and Sen, 2002) and other crops *viz*. guava (Singh *et al*., 2001), pomegranate (Asha *et al*., 2018) and kinnow (Saeed *et al*., 2006).



T1- Side branches pruned at 1 m width

T2 - Side branches pruned alternatively at 1 m and 2m width

T3- Side branches pruned at 2 m width

Fig. 4. Percentage change in yield parameters over control (III year after pruning)

The difficulty in harvesting of thirty year old nutmeg trees can be overcome by employing pruning techniques. Canopy designing in age old nutmeg trees not only facilitates ease of harvest but also synchronous flowering. Pruning also improves the microclimate, which enhances the reproductive as well as vegetative behavior of trees. The results of the present study where detopping of nutmeg trees at 17 ft height along with pruning side branches at 2 m width from the main stem leads to yield enhancement with synchronous flowering in nutmeg. In third year of pruning, only three harvests were undertaken in the pruned trees as against numerous harvest undertaken from the same trees in the previous years (data not shown). The staggered fruiting obtained in the previous years might be attributed to staggered flowering whereas in the pruned trees, pruning facilitated balance between vegetative and reproductive growth throughout the tree leading to synchronous harvest. Offseason bearing is economical in crops like mango whereas it is undesirable in nutmeg due to high labour cost in harvesting and processing thereby making pruning practices a beneficial one. Hence, pruning in nutmeg is an alternative strategy to develop suitable canopy structure, synchronous harvest and better yield.

References

Ammaan, M. and Paramaguru, P. 2017. Evaluation of growth and yield characters of nutmeg (*Myristica fragrans* Houtt.) ecotypes under coconut ecosystem. *Environment and Ecology* **35** (2A)**:** 808- 810.

Asha, H. Patil, S.N., Kulapati, H. Kantesh G. and Gollagi, S. G. 2018. Influence of pruning intensity on growth and yield of pomegranate (*Punica granatum* L.) cv. super bhagwa under organic conditions. *Journal of Pharmacognosy and Phytochemistry* **7**(2)**:** 1027-1031.

Banik, B.C. and Sen, S.K. 2002. Effect of pruning and fertilization on growth and yield of mango cv. Fazli. *Orissa Journal of Horticulture* **30** (1): 13-18.

Flach, M. and Cruickshank, A. M. 1969. Nutmeg – *Myristica fragrans* and *Myristica argentina* outilines of perennial crop breeding in the tropics. Misc. Papaer No. 8, Landbouwhogeschool, Washington, Netherlands. 329-338.

Lal, B. and Mishra, D. 2007. Effect of pruning on growth and bearing behavior of mango cv. Chausa, *Indian Journal of Horticulture* **64:** 268-270.

Ram, A. Patel Viswa Bandhu, P, Kalyan B. and Krishna, P.R., 2013. Pruning affects fruit yield and post harvest quality in mango (*Mangifera indica* L.) cv. Amrapali. *Fruits* **68**: 367- 380.

Saeed, H., Ahamad, C.Z., Nazir, M. A., Abdul, A., Ahhmad, V.N., and Rahmam, K.A., 2006. Effect of pruning on yield and quality of Kinnow fruit. *Journal of Agriculture and Social Sciences* **2** (1)**:** 51-53.

Sharma, R. R. and Singh, R. 2006. Effect of pruning intensity on light penetration and leaf physiology in Amrapali mango trees under high density planting, *Tropical Science* **46:** 16-19.

Singh, G., Singh, A.K. and Rajan, S. 2001. Influence of pruning date on fruit yield of guava (*Psidium guajava* L.) under subtropics. *Journal of Applied Horticulture* **3**(1): 37-40.

Singh, S. K., Singh, S.K., Sharma, R. R. and Patel, V.B. 2010. Influence of pruning intensity on flowering, fruit yields and floral malformation in three mango cultivars planted under high density. *Indian Journal of Horticulture* **67:** 84-89.

Varghese, J. 2000. Nutmeg and mace-I, general background, *Spice India* **13** (12): 2-4.