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&

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MY EXPERIENCE IN NUTMEG

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In India, Tamil Nadu leads in coconut production with high productivity. Many improved hybrids and local selections of coconut are cultivated with proper spacing and agronomical practices. Among the coconut growing tracts, Pollachi region comprising of Anamalai, Sethumadai have been the prime focus in view of moderate climatic conditions viz., distribution of both south-west and north east monsoon, better water resources, soil, besides the progressive nature of farmers in this region. Better natural resources, plus the innovative and scientific farming practices has helped the farmers to achieve the world's highest coconut productivity. The coconut products have diverse utilization ranging from tender coconut, edible oil, desiccated coconut besides coir products and charcoal. The highest nut yield in this region recorded in hybrids is more than 250, tender coconut 300 nuts/year, and 200 nuts/year in tall varieties. Due to the good agricultural practices followed, the area records higher turn out of copra leading to a preference to Pollachi coconut. Without any complicated efforts, coconut continues to be the major revenue earner until the past few years.

However in the recent years, monocropping of coconut has resulted in series of problems. The major problems faced by growers are price fall, pest and disease out break due to monocropping. The alley spacing in terms of area and light available in between the palms have been under utilized so far resulting in low returns. In spite of these problems, coconut enjoys the most favoured crop status due to its perennial nature, flowering and harvesting of nuts occurring almost throughout the year whereas other crops have seasonal behavior.

Coconut farmers have evinced interest to grow compatible intercrops in the recent years. Crops like cocoa, nutmeg, black pepper, banana have been successful and has improved the productivity of coconut palms also. Any intercrop grown in coconut needs to be a companion crop besides they should be capable of utilizing the available sunlight for their growth and productivity.

I have been growing coconut at Odayankulam, Pollachi since the past 37 years and I maintain coconut varieties viz., West Coast Tall, East Coast Tall, Dwarf x Tall and Tall x Dwarf.

A wider spacing of 29 feet with square planting method is followed for all varieties. Under this spacing, it is possible for intercropping perennial crops like nutmeg, cocoa and black pepper. However if coconut palms are spaced at 25 feet or lower than that, intercropping can be possible only after 20 years.

In my coconut plantation established in 1987, nutmeg is intercropped and the oldest nutmeg plants available in my plantation are 23 years old and the youngest plants of one year old. Nutmeg is one of the major evergreen tree spice crops which can be profitable and in my experience of intercropping, I could find that the income and profit level comes in the order of nutmeg, cocoa and coconut.

Both these intercrops viz., nutmeg and cocoa have international demand due to growing consumption levels, processing and value addition. Nutmeg and mace are required largely for culinary, oleoresin extraction, and pharmaceutical industry. Even the pericarp of the fruits is used in preparation of food products like pickles, jam, jelly and

wine. Indonesia is the largest producer of nutmeg followed by Grenada (West Indies). The year 2004 witnessed "Ivon" a hurricane which devastated Grenada nutmeg plantation, which resulted in wiping out almost the entire nutmeg plantation in West Indies. Most of the nutmeg procurement and processing centres were closed in Grenada.

Majority of the nutmeg and cocoa plantations in the world are cultivated under rainfed conditions with minimum care. Tamil Nadu can harness the potentials of nutmeg and cocoa production considering its ideal climatic conditions and resources like assured irrigation, through drip and fertigation. The micro climate in intercropped plantation is generally more with supplemented irrigation.

World over literature says both nutmeg and cocoa including coconut comes under warm and humid (moist) region only with a mean humidity levels ranging from 80-85%. However in my experience, these crops can be successfully cultivated in Pollachi region where the mean humidity levels range from 60-80%. This is possible because of better *micro climatic conditions induced by the intercrops*.

I have planted nutmeg as an intercrop in my coconut plantation at the ratio of 1:1. i.e., one nutmeg plant in between four coconut palms at the centre. By this way, I have planted 52 nutmeg plants and 104 cocoa plants in one acre of coconut plantation. The ratio of coconut to nutmeg is 1:1 while that of coconut to cocoa is 1:2.

Considering the little knowledge available 23 years back, I planted only seedlings sourced from Horticultural Farm, Kallar, along with two approach grafted plants, where plagiotropic scions were grafted. I believe, the oldest grafted nutmeg plants in India are available in my plantation. In the seedling progenies, I could find 60 percent of the population was female and the remaining was male.

Among the female trees of seedlings origin, out of 320 plants, only three plants were found to be more productive. Therefore my advice to the growers is to use only vegetatively propagated nutmeg plants either through budding (brown patch budding or green patch budding), grafting (epicotyl or approach grafting).

High degree of cross pollination in nutmeg results in extreme variation in tree size, shape, foliage, vigour, number of nuts, size and shape of the nuts, dry nut weight and mace weight. Therefore selection of scion from elite mother trees is very important. The criterias for selection of elite mother trees are good canopy, short internode, more number of nuts with less pericarp, yield of 2000 nuts and above per tree (after 12 years) under good management, dry nut weight of 8-12 g and dry mace weight of 2-4 g.

Nutmeg has two types of shoots viz., plagiotropic and orthotropic. The shoots which grow vertical along the main stem are called as orthotropic while the plagiotropic shoots (lateral shoots) grow laterally. In general, more buds and scion sticks of plagiotropic shoots are available in a single mother plant compared to the orthotropic buds.

Nutmeg is sensitive to both water logging and drought. Seedling type of plants of *Myristica fragrans* develop high canopy (upto 60 feet) with very shallow rooting. Under wet soil conditions, uprooting of trees are experienced during storm or heavy wind. To overcome this problem, grafting or budding on wild root stocks viz., *Myristica beddomei* and *M. malabarica* have been found to be successful. The roots grow deeply and tolerate the drought conditions besides providing better anchorage to withstand the high wind. The few limitations of these root stocks are low percentage of establishment, very less vigour compared to *M. fragrans*. Moreover the wild rootstock, performs well only in the uplands and in regions of very high humidity. In very old nutmeg plantation, removal of senile trees is very difficult.

I prefer *in-situ* budding of scions on two years old root stocks irrespective of the sex ratio. For this, 6 months old seedlings of *M. fragrans* are planted *in-situ* in the main field. After one and a half years of establishment, brown patch budwoods are used for *in-situ* budding. Many of the grafted or budded plants supplied by the nursery men, have coiled roots which exhibit poor establishment. The other problem with nursery budded plants is that budding is done in main stem below the first tier branches which results in poor growth and establishment.

Whereas, I am practicing brown patch budding on root stocks just above the first tier level which exhibits rapid growth and early yield. To facilitate higher success rate of establishment, both root stocks and scions should be healthy preferably of same size. Both root stocks and scion bud wood trees require favourable conditions like uniform scattered sunlight for high success rate of budding/grafting. Under heavily shaded orthotropic budwoods are used for budding, many such buds exhibited plagiotropic nature of growth.

For budding of nutmeg plants under nursery conditions, both green and brown patch bud woods are successful. If green bud woods are used, the age of buds of root stock should match with that of scion and only green to green budwood, are used for budding. Under nursery conditions, epicotyl grafting is also successful. This method can be adopted only during fruiting season, where as approach grafting can be done throughout the year.

The grown up seedling progenies with less productive female and male trees have to be topworked to improve the productivity. To topwork, the unproductive male and female trees are beheaded just above the first tier branches. The period of beheading should be one year before budding. Lot of coppices emerges along the main stem. Two healthy orthotropic shoots should only be allowed after removing the remaining shoots. Brown patch budding is done on both the selected shoots. If both the buds are successful, one will be allowed for collection of bud woods and the other budwood for producing the main crop. If budwoods are continuously collected from trees, it results in reduction in yield of the trees. To overcome this problem, budwoods can be collected from closely planted selected budded trees.

The uniqueness of nutmeg cultivation in Pollachi is intercropping followed by irrigation and fertigation. This system encourages better growth and consistent yield compared to the rainfed cultivation practiced in west coast region of India and other countries like West Indies. Moreover due to highly dense population of nutmeg maintained in these places, incidence of diseases during heavy and continuous rainy season for longer period is observed.

Planting of too many intercrops tends to increase the micro climate inviting the incidence of pest and diseases. Therefore growers needs to adopt adequate spacing of inter crops as excess vegetation results in higher evapo-transpiration and induction of high humidity.

Nutmeg requires an integrated nutrient management system which is done based on soil and foliar diagnosis. Due to high evapo transpiration loss in tropical regions like Pollachi, irrigation is supplemented to coconut and nutmeg. Because of this, more of nutrients are utilized by the plants which is compensated by fertilizer application. I have been trying on the use of foliar spray of nutrients viz., 19:19:19, chelated micro nutrients, organic promoters like panchagavya, humic and fulvic acid etc., I have observed that

these treatments are very useful in encouraging the growth of exhausted nutmeg trees. Such trees tend to exhaust and die-back.

Nutmeg trees give out more of surface roots which requires mulching. The dry leaves of locally available plants have to be mulched. Mulching helps in encouraging the soil microbes, enrichment of soil nutrition, and conservation of moisture and maintenance of soil temperature.

Under Pollachi conditions, nutmeg is irrigated throughout the year except the rainy season. The quantum of irrigation required for bearing nutmeg trees is the same as that of coconut palms. Nutmeg should not be planted in new coconut plantations (upto 15-20 years depending on the spacing of coconut). If planted before this, the nutmeg trees will over grow the coconut trees.

Plagiotropic grafted plants exhibit un-uniform bushy nature which requires training for easy cultivation operations, accommodation of more plants and easy harvesting practices. Moreover, some grafts give orthotropic shoots naturally. To encourage the orthotropic shoots from the plagiotropic branches, the plagiotropic branches should be bent.

In established nutmeg plantations, possibilities of gap filling of coconut seedlings are ruled out resulting in pure nutmeg plantation. Under any circumstance, the yield of main crop (coconut) should not be affected due to the intercrop (nutmeg). Budded nutmeg plants comas to flowering in two years. After initiation of flowering, the emerging flower buds have to be nipped off to encourage a good growth. After five years, about 200 fruits can be allowed and the remaining fruits at berry stage have to be nipped off. I have observed alternate bearing in nutmeg especially in trees where extended bearing of fruits takes place.

In very old coconut plantations also, it is not advisable to plant nutmeg for varied reasons. The major reasons are excess sunlight for which necessary temporary shade trees /shade net are to be provided upto 7-8 years. The other problem in aged plantation is that older coconut fronds and the nuts (guided through the mid rib of fronds) tend to fall directly on the budded nutmeg plants causing damage to established nutmeg scion plants.

Under favorable conditions, old nutmeg trees (from 12th year onwards) bear heavily resulting in reduced size of the nuts. The small sized nuts are marketed only for extraction while only the graded bigger sized nuts are marketed with better export potential. To improve this, fruit thinning is essential.

Elite nutmeg trees yield about 2000 nuts every year after 15 years of planting. The yield increases later on ranging from 10,000 to 15,000 nuts after 40 years. On my 40 years of experience in plantation crops, my prime focus now is on intercrops like, nutmeg, cocoa etc.,.

I have traveled to countries like Grenada (West Indies), Papa New Guinea, Philippines, Thailand, Indonesia, Sri Lanka, Israel USA, Australia and Europe. Whatever knowledge I have gained, I am sharing with the farmers. I was invited by the Grenada Cooperative Nutmeg Association, Grenada, West Indies in 2009 to share my experience on nutmeg cultivation. The horticulture department, Government of Tamil Nadu is playing a major role in promotion of spices and cocoa. The other institutions which contribute to the growth of the plantation are Coconut Development Board, Indian Institute of Spices Research, Spices Board, Tamil Nadu Agricultural University, 'TAMWARM, Central Plantation Crops Research Institute. I owe my gratitude to these institutions plus many progressive farmers who helped me to acquire this knowledge. Whatever I have published in this paper is based on my experience.