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Cultivating clove in coconut garden

The morphology and growth patterns of coconut palms provide opportunities to grow a wide range of crops in the interspaces for maximizing productivity from unit area of land per unit time. The crops should be selected carefully for a locality/region so that the farmers derive the maximum employment opportunities for their family labour and high net returns. Clove being the important commercial crop, suits to high rainfall humid regions. It can be successfully cultivated under coconut plantations aged over 20 years with assured irrigation facility during summer in the west coast of the country. Although the yield potential of clove under coconut shade is slightly reduced, even then a coconut small-holder would gain substantially more profits.

GROWING coconut as monocrop is one of the most inefficient ways of using natural resources. The recommended spacing for coconut is 7.5 m x 7.5 m in the square system, mainly to accommodate large crown of palms. However, soil and air space and solar radiation are not fully utilized under 7.5m x 7.5 m spacing and so much area is generally left unproductive throughout the long life-span of palms. In India, coconut is primarily a crop of small and marginal farmers and about 98% of the 5 million coconut holdings in the country are below 2 ha. These small holdings neither provide gainful employment (coconut monocrop provides only 150 mandays/ha/year) opportunities for the family labour throughout the year nor generate sufficient income to meet the family requirements. One of the possible ways to step up production of coconut lands and enhance the family income is to grow compatible annual or perennial crops with coconut.

CULTIVATION

Mixed cropping

The experiment conducted at the CPCRI, Kasaragod, reveals that clove can be successfully grown as a mixed crop in coconut garden. Clove grows to a height of 10–12 m with a short tap root having 2–3 branches which penetrate up to a depth of 3m and lateral spread being up to a distance of 8 m. It flowers at the age of 6–7 years and full bearing comes at 20 years. Sustained production can be expected for 60 years.

Climate and soil

Clove requires a warm humid climate with an annual rainfall ranging from 1,500 to 2,500 mm. It grows well at an altitude of 800–900 m above mean sea-level. Sandy loam soils with high humus content and good drainage is suitable for its cultivation.

Planting system

The productivity of coconut as

well as the intercrops are affected by the planting arrangement. Under a monoculture system, the triangular system provides the optimum number of trees. However, in coconut-based farming systems, the square or rectangular arrangement not closer than 7.5 m are preferred as these facilitates the growing of perennials as mixed crop within palms, although plant density is slightly reduced compared to triangular method.

Based on the growth and canopy development, the life-span of coconut palm could be divided into 3 distinct phases from the point of view of intercropping. The first phase (up to 8 years) starts from planting till the full development of canopy. During this period, when the canopy size increases gradually, the interspace could be utilized for growing annuals or other short-duration crops which do not compete with the developing coconut palms for their requirements.

The period from 8 to 25 years is the second phase when the coverage of the ground by the coconut canopy is about 90% and the crown is low due to short trunk height. There is little or no space for growing other crops in the interspaces during this period. After about 25 years of age, there is a gradual decrease in apparent ground coverage with increase in trunk height and reduction in crown size which facilitates more and more sunlight to reach the ground. This period is ideal for growing clove as mixed crop in coconut garden.

Planting

In the centre of 4 palms in a square or rectangular system of planting, a pit of 75 cm × 75 cm × 75 cm size should be dug a month before planting. Fill up half the pit with a mixture of top soil and 15 kg of farmyard manure or compost. Two-year-old clove seedlings should be planted in the centre of the pit. May–June to August–September is ideal time of planting clove seedlings. Provide adequate shade and irrigation during breaks in the monsoon and summer. Banana may be planted in the interspaces of coconut to provide shade during early seedling growth and as an additional income to the farmers.

Fertilizer application

An adult clove tree requires a fertilizer dose of 300g N (650 g urea), 250g P₂O₅ (1,250 g musooriephos) and 750 g K₂O (1,250 g muriate of potash)/seedling/year. During the first year, 20g N (45 g urea), 18 g P₂O₅ (90g musooriephos) and 50g K₂O (85g muriate of potash)/seedling and in the second year double the dose of first year and so on has to be applied so as to reach the adult dose by the fifth year. Apply these fertilizers in 2 equal split doses in May–June and September–October in a circular basin of one

to one-and-a-half m around the tree and 0.5 m away from the base and mixed with soil. Coconut palms should be manured regularly as per the recommended package of practices.

Irrigation

Clove competes with coconut for soil moisture during the stress period. Therefore, intercropping should be practised only under assured irrigation during summer months. Perfo-irrigation is preferred as it wets the entire surface of the garden. Irrigation at the rate of 20 mm once is optimum for the system during summer months in the west coast region. In the gardens where there is a problem of water stagnation, it is essential to provide artificial drainage by opening trenches around the garden during rainy season.

Weeding

During the initial 4 years the growth of clove seedlings is very slow. Therefore, proper care is must during initial years. Weed slashing and light intercultivation twice in a year whenever optimum conditions prevail for proper soil aeration are required till the young seedlings are able to completely cover the ground. However, care should be taken not to damage the surface root system in the basin area.

Plant protection

Infestation of shoot-borer, *Sinoxylon* sp., on tender shoots or young plants is very common in clove. This can be controlled by prophylactic application of Carbaryl (0.15%). Prune off the laterals of older trees showing die-back symptoms and spray with 1% Bordeaux mixture to control die-back. Stem-borer infestation on main trunk can be treated with aluminium phosphate tablets. After removing the frass the tablet can be

introduced into the hole and plugged thoroughly with wax. The other diseases of clove include leaf spot, twig blight and flower bud shedding. Spray 1% Bordeaux mixture just prior to flower bud formation and continue till harvesting of flower buds at 1 month intervals. It reduces disease intensity, defoliation and flower bud shedding.

POSTHARVEST MANAGEMENT

The trees begin to yield 7–8 years after planting and stabilized yield can be expected 15 years after planting. The flowering is in September–October in plains and in December–January in high altitudes. Clove of commerce is the dried, aromatic, fully grown but unopened flower bud of clove tree. The fully developed buds become ready for harvesting in about 4 months. When most flowers in a cluster turn light pink or light yellow or when 1 or 2 flowers start blooming, that is the most appropriate time for harvesting them to assure high quality and maximum eugenol content. The very limited period available for harvesting to ensure the maximum oil content and more labour requirement for harvesting are major problems for farmers. The yield of 5–8 kg fresh buds/tree can be expected in a year. Because of the shade effect of coconut, the yield of cloves may be reduced up to 30–40% of pure stand yield. Even then, a coconut small holders gains substantial profit. Spread the buds uniformly and allow to dry for 4–5 days under sunlight till they become crisp and dark brown in colour. The properly cured clove yield becomes around 30% of the fresh weight of buds.

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