

# Mixed cropping of Pepper in coconut gardens

## Successful experiences of a farmer

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Coconut in India is predominantly cultivated in small and marginal holdings. Monocropping of coconut in such holdings does not fetch sufficient income to the farm family to meet their diverse needs. Besides, basic resources like soil, sunlight and aerial environment are not being fully utilized in a coconut garden when sole cropping of coconut is adopted. It has been amply demonstrated that mixed cropping in coconut garden i.e., growing of perennial plant species in the interspaces of coconut, enhances the income and productivity from coconut farming apart from utilizing the available natural resources effectively. Adoption of mixed cropping practices in coconut gardens assumes much significance in the present day context of price fall and price fluctuation of coconut.

A number of perennials can be grown in

association with coconut. The success of mixed cropping primarily depends on the availability of sunlight and level of adoption of crop management practices. In the third phase of life of coconut i.e. from 20 years after planting onwards, any form of mixed cropping with perennials is possible. By this time, the coconut palm would have attained sufficient height and about 55% of light is available below the palm canopy to benefit the component crops in the mixed cropping system. About 85 % of the coconut roots are concentrated in the soil upto a depth of 30 to 120 cm but the lateral root spread is limited to two metres from the bole, i.e., only 25% of the available land is being utilized by coconut roots. Hence, in this growth phase of coconut, perennial crops can be grown along with coconut for effectively utilizing the basic resources of soil, water and sunlight .

Availability of irrigation facility is important

for successful mixed cropping in coconut garden. Similarly, adoption of crop management practices recommended for coconut and component crops, especially integrated nutrient management practices, is to be ensured and competition between coconut and component crops should be avoided; otherwise yield of coconut will be adversely affected. A radius of 2 m has to be kept free around each palm to avoid any competition except for pepper which has not been found to affect the yield of coconut. During the initial years, banana can be raised in the space available which will provide shade for the mixed crop seedlings and also give additional returns. Depending on the availability of interspaces, other short duration crops such as pineapple, elephant foot yam, ginger etc. can also be raised along with the perennials in the initial years. Crop residues available in the mixed cropping system can be used for mulching the basin of coconut palms and mixed crops. Adoption of this kind of on farm recycling of bio mass enhances soil health in the coconut based mixed cropping system.

### **Mixed cropping of pepper in coconut garden – A success story**

Pepper is an important spice crop that can be grown as a mixed crop in coconut gardens in the West Coast region. Studies conducted by ICAR-CPCRI and other research institutions have unambiguously proved the technical feasibility and economic viability of mixed cropping of pepper compared to the monocropping of coconut. Many farmers also have demonstrated that pepper can be profitably grown as a mixed crop in coconut garden. The successful experiences of a farmer in mixed cropping of pepper in coconut garden is narrated as below:

Mr. Kunhambu Nair is a 68 year old farmer and his small farm of 2.5 acres is located in Periya village of Kasaragod district of Kerala. He took up farming at a very young age of 17 years. He belongs to the category of farmers who is a rarity now a days – a full time farmer who solely depends on farming for his livelihood. Major crops cultivated in his farm are coconut and arecanut and he successfully maintains black pepper as a mixed crop along with these principal crops. Banana (Nendran variety) and vegetables are also cultivated in his farm and also



in leased land in the adjacent locality. His farm is located in an undulating sloppy terrain and the upper portion of the farm is covered by coconut maintained in an extent of 70 cents and mixed cropping of pepper is adopted in the entire 70 cents of land along with coconut. Arecanut is grown in the lower reach in 50 cents out of which pepper is mixed cropped in 20 cents of land along with arecanut leaving the remaining 30 cents for monocropping of arecanut.

The coconut palms of West Coast Tall variety numbering 50 are now 15 years old. A wider spacing of 9 m has been given for coconut and the pepper has been planted at 4 m in the interspaces in between the rows of coconut leaving about 3 m from coconut basin. He has accommodated 40 pepper vines in the interspaces. For both the crops, he has given wider spacing than the recommended spacing. Mr. Kunhambu Nair says wider spacing avoids competition

between crops for water and nutrients and also there is scope for cultivating short duration crops like banana and vegetables within the system, apart from coconut and pepper, if spacing is wider.

Stem cuttings of *Erythrina indica* (Murikku), as the standard tree, were collected from a nearby locality and planted in pits of 50 cm x 50 cm x 50 cm size filled with cow dung and top soil. The planting was done at a spacing of 4 m. The black pepper vines were trailed on the standards after three years when they attained sufficient height. With the onset of monsoon, pits of 50 cm x 50 cm x 50 cm were taken at a distance of 30 cm away from the base, on the

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north side of *Erythrina*, the supporting tree to plant pepper cuttings. The pits were filled with a mixture of top soil, farm yard manure @ 5 kg/pit and 150 g rock phosphate. Neem cake @ 1 kg enriched with *Trichoderma harzianum* @ 50 g was also added at the time of planting. Rooted cuttings of Panniyur-1 pepper variety were used for planting. Though Panniyur -1 variety generally performs well



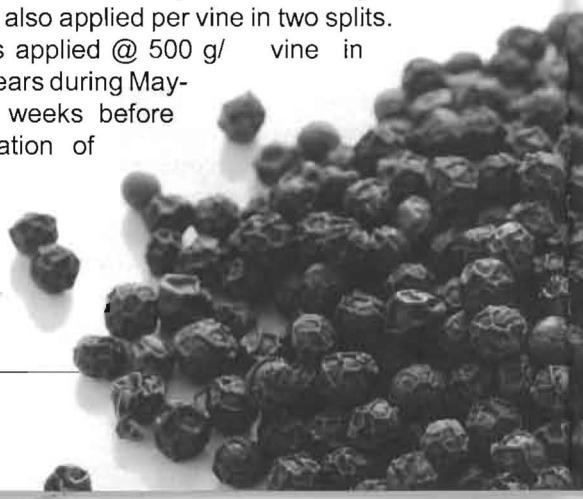
under open condition compared to mixed cropping situation, since wider spacing is adopted for coconut palms and pepper vines, the variety is giving very good yield in Mr. Kunhambu Nair's garden. Two rooted cuttings were planted individually in the pits. As the pepper vines grew, shoots were tied to the standard. Since 700 nos of banana (Nendran variety) was cultivated in the first year utilizing the left over interspaces, young pepper vines received adequate shade and were protected from hot sun during summer. An average yield of 15 kg per bunch was obtained from these nendran plants. After the bunches were harvested, the crop residues were used for mulching. Lopping of the branches of standards is done twice i.e. during June and September for providing optimum sunlight to the pepper vines which also enabled the standards to grow straight. If lopping of branches of standards is not properly done excessive shade will be resulted which will increase chances for pest infestation. According to Mr. Kunhambu Nair, another cultural practice of much importance is mulching the base of the pepper vines with green leaf or organic matter towards the end of north east monsoon. The cardinal principle is not to disturb the base of the vines to avoid root damage. Disturbing the base will cause damage to the roots which in turn attract fungal pathogens causing wilt disease.

During the second year he cultivated bitter melon (Variety- Priyanka) which was trailed over the left over 700 supports given for the previous crop of banana cultivated. About 4 tonnes of bitter melon was harvested with an average yield of 5-6 kg per pit. Subsequent to the harvest of bitter melon, he raised cowpea and the total yield was 2 tonnes. During the third year, he again planted nendran banana and an average yield of 15 kg per bunch was harvested.

Thus Mr. Kunhambu Nair got a substantial amount of additional income from these subsidiary crops raised during the initial three years. Apart from the monetary benefits, shade for pepper vines was assured and also lot of biomass obtained as crop wastes was used for recycling within the coconut based cropping system. As the pepper vines started flowering by third year, he discontinued

the intercropping of banana and vegetables thereafter.

He adopts soil test based nutrient management practices for coconut and pepper which according to him holds the key for higher yield from coconut and pepper. Organic manure application is important for improving soil fertility as well as enhancing water holding capacity of the laterite soil in his farm. He regularly applies goat manure @ 25 -30 kg per coconut palm and also neem cake @ 5kg per palm. Besides, he used to apply fish manure @ 2 kg / palm in alternate years. Green leaves collected from his farm and adjacent localities are also applied on a regular basis. Organic manures are applied towards the end of South West monsoon with the cessation of heavy rains. Muriate of Potash is given @ 2 kg per palm in three equal splits ( May-June, September and January). Since boron deficiency is indicated in the soil test results, he is applying 100 g borax to every coconut palm. Dolomite is applied @ 1 kg per palm which will correct the acidity in the soil and also take care of magnesium requirement of coconut palms. Integrated nutrient management practices are adopted for pepper vines also. Organic manures viz., goat manure and cowdung @ 4 kg each per vine are being regularly applied besides 1 kg neem cake. About 100 g urea and 400 g Muriate of Potash are also applied per vine in two splits. Dolomite is applied @ 500 g/ vine in alternate years during May-June, two weeks before the application of first split of





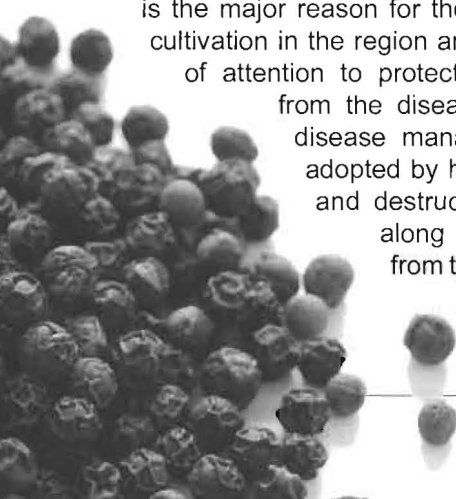
chemical fertilizers. Micronutrient mixture is diluted @ 5 g per litre water to spray pepper vines twice a year, at the start of flowering and after one month.

Since sufficient water is available from the bore well in his garden, he is able to provide irrigation to coconut palms once in four days @ 200-250 litres per palm per irrigation during the period from December to May. Basin irrigation method is adopted using hose pipes. Pepper vines are also provided irrigation during the summer period from March to May. Pepper vines are irrigated at the basin through hose and each vine gets about 40-50 litres of water.

Except for the incidence of rhinoceros beetle and eriophyid mite, pest and disease problems are very less for the coconut palms in his garden. Crown cleaning of palms is taken up regularly and rhinoceros beetles are collected and destroyed using beetle hooks. According to Mr. Nair, the most important aspect of successful mixed cropping of pepper in coconut garden is the integrated management of foot rot (quick wilt) disease of pepper. He is quite aware that loss of vines due to quick wilt disease is the major reason for the decline in pepper cultivation in the region and thus he gives lot of attention to protect the pepper vines from the disease. The integrated disease management strategies adopted by him include removal and destruction of dead vines along with root system from the garden to reduce the build up of inoculums of the

fungus *Phytophthora capsici* causing the disease, avoiding injury to the root system of pepper vines due to cultural practices such as digging, pruning off the freshly emerging runner shoots so that they are not allowed to trail on the ground, pruning of the branches of *Erythrina* at the onset of monsoon to avoid build up of humidity and for better penetration of sunlight, drenching of pepper vines at a radius of 50 cm with copper oxychloride @ 5-10 litres/vine and foliar spray with 1% Bordeaux mixture after the receipt of few summer showers during May, and during August-September and a third round of drenching during October if the monsoon is prolonged. Mr. Nair also says that if infection is observed on pepper leaves even after spraying with 1% Bordeaux mixture, foliar spray with potassium phosphonate is also done.

During the first harvest i.e. three years after planting, he was able to harvest about 100 kg of pepper. The yield of pepper gradually increased and stabilized by 6th year. Now he is harvesting 5-6 kg pepper per vine per year which is quite an attractive yield compared to the state average of less than one kg per vine. In the mixed cropping system, he is able to realize high productivity in coconut also. Average yield of coconut palms in the system is 150 nuts per palm per year. As a fulltime farmer he is able to use family labour to a great extent. Hired labour also is used for some of the farm activities such as harvesting of coconut and pepper, weeding, manuring and plant protection. According to him, pepper mixed cropping in coconut garden has been highly beneficial during the tough times of price fluctuation experienced for both pepper and coconut. Few years back pepper price recorded





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practices including use of tapioca leaves based bio-pesticides ‘Nanma’ and ‘Menma’ against banana pseudo stem weevil were successfully demonstrated in his Nendran banana plot with the support from Krishi Vigyan Kendra (KVK) Kasaragod. During this year, he is cultivating vegetables (600 pits of bitter gourd, 300 pits each of ridge gourd and snake gourd) in two acres of leased land along with six other members of a farmer Self Help Group in his locality. His enterprising nature has enabled him to enhance his income through another activity i.e. production and sales of planting material of *Erythrina indica*, the standard tree for pepper.

He is very keen to share his experiences and knowledge in farming to other farmers. His achievements in farming, especially mixed cropping of pepper and high density planting of nendran banana, have been highlighted through media including farm columns in newspapers and radio programmes broadcasted through All India Radio, Kannur. He maintains regular contact with research institutions such as Central Plantation Crops Research Institute, Kasaragod and College of Agriculture, Padannakkad and participates in the scientist-farmer interface programmes whenever conducted in these institutions.

The excellent stand of pepper vines as mixed crop along with high yielding coconut and arecanut palms easily attracts the attention of any visitor to Mr. Kunhambu Nair's farm. And deservedly, he has been awarded by Department of Agriculture for his achievements in farming. He was selected as the best pepper grower of Kasaragod district in the years 2009 and 2013.

Mr. Kunhambu Nair can be contacted in his mobile phone number 9947634224 ■

all-time high when the coconut price situation was rather grim. Now the pepper price has come down but there is an encouraging trend observed in price of coconut. During last year he was able to realize a net income of about Rs. 1.6 lakhs from the coconut based mixed cropping system maintained in 70 cents of land.

The key to his success in farming, according to Mr. Kunhambu Nair, is the scientific management of soil health and plant health. Adoption of inter/mixed cropping to effectively utilize the basic natural resources of sunlight, soil and water is very important for realizing higher returns from farming in small holdings. Apart from managing the coconut and arecanut based cropping system, he also regularly grows nendran banana and vegetables like bitter gourd, in leased land. Integrated Pest Management