

## COCONUT ARECANUT MIXED CROPPING

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### Abstract

The experience based on the survey conducted in the coconut gardens of Kasaragod district during October and November 1999 is discussed in this paper. In general coconut and arecanut mixed cropping is not recommended due to common disease, pest and morphological features due to which various intensity of competition occurs in different periods of crop growth. Planting arecanut in the interspace of coconut when coconut age is five to eight years leads to lanky palms, delayed flowering and 60-70% reduction from expected yield. The technical flaws in the existing plantations and ways to overcome the same are discussed in detail.

### Introduction

Coconut is basically a small holders crop in Kerala and from time immemorial, it is grown along with other crops. However in Tamil Nadu, Karnataka and Andhra Pradesh even today coconut is grown as mono crop where the land holding is comparatively larger. This may be attributed due to lack of knowledge about scientific cultivation of component crops and wrong notion that the coconut yield will get reduced due to the competition. There is no doubt that by growing incompatible crops, the yield of main crop will go down. Of late, the land area under coconut is increasing in Tamil Nadu, the main reason attributed to this is due to labour shortage. This is also one reason for not adopting the mixed cropping. There is a steady increase in labour charges but the prices of agricultural produce have not increased to that extent. So growing coconut alone as monocrop in one way advantageous compared to the annuals as the labour requirement is considerably less and other operation are also not that time bound. But considering the small holdings in Kerala, fragmentation of holding in all states, unemployment problems, the price fluctuation of coconut and also to meet the demand due to population explosion. we need to go for inter/mixed crops in coconut garden. This in turn will generate more income from unit area and generate labour for many unemployed youths. Other than these favourable aspects if there is a failure of one crop, atleast other crop will provide some income. The available vertical (air space) and horizontal space (soil) can also be utilized to the maximum extent possible.

In this regard, the life of coconut can be divided into three phases for inter/mixed cropping depending upon the light availability. Initial phase, (planting to 8 years old) where the space and light availability will be adequate for intercropping of short statured annuals, biennials and

perennials with life period upto 4-6 years. (For e.g., Papaya, annual drumstick, Jasmine etc.,). In the second phase, from 8 to 20 years there will be very little penetration of light downwards and practically no cropping is possible during this period as the leaf of one tree will touch the leaves of other tree. In the third phase after 20 years, mixed cropping with perennials of longer duration is possible. In this stage coconut leaves permit more light diffusion to the ground level because of increase in palm height and change in size and shape of coconut crown. This is the stage we can go for mixed cropping of any compatible tree crops. Though arecanut is not a compatible palm for mixed cropping in coconut garden, farmers prefer arecanut because of high price. Scientifically coconut and arecanut mixed cropping is not recommended since there are few common pest, disease and both the palms compete with each other for light and soil moisture. However, since there is no law and farmers get more income from arecanut most of the farmers are going for this combination. This paper may help such farmers, the proper method of such combination to attain maximum benefit with minimum effect on the crops.

### Scope for intercropping in coconut gardens

There is vast scope for multiple cropping in coconut gardens. Some of the features which favour inter/mixed cropping are :

**Soil space availability :** It has been found that active roots of adult palms under good management are concentrated within a radius of 1.8 m from the bole, and vertically from 30 to 120 cm soil depth. Thus, roots of coconut palms spaced at 7.5 m apart effectively forage

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only 23% of the soil surface. Hence, the remaining space could be utilized for intercropping.

**Sunlight availability :** Coconut being a widely spaced crop, considerable amount of solar radiation reaches the ground depending upon the age of the palms. It has been reported that a mature palm actually intercepts only 40% of the total solar radiation. The best use of the remaining solar radiation could be made possible only by raising subsidiary crops. Coconut gardens thus offer the best opportunity for growing a variety of crops in the interspaces.

#### Advantages of intercropping :

1. Better utilization of natural resources and applied nutrients.
2. Improvement of soil fertility.
3. Reduces risk of soil erosion.
4. Better control of weeds.
5. Increases productivity of palms.
6. Provides additional employment for the family.
7. Increases the income of the farmer.
8. Provides safeguards against market risks.

#### Why Coconut and Arecanut mixed cropping is discouraged

Since both coconut and arecanut roots are adventitious and fibrous with approximately the same spread, they compete with each other for nutrients and moisture. Further, in Kerala most of the areas, coconut is grown as rain dependent, and also it can withstand moisture stress to a certain level. But arecanut is highly sensitive to stress and generally where the rain spread is for few months it cannot be grown as rainfed crop. In addition to the above reason, there are few common disease and pest problems. Thus the basic idea of mixed cropping is to get income from one crop if the other crops in that combination fails, will be ruled out. From the demand point of view, the high price for the arecanut product may not continue as most of the farmers continue to plant arecanut in high density and thus the arecanut production will be increased. Besides this, the government policy decision on the arecanut byproduct (Gutka) may change the demand scenario in future.

The common disease and pest due to which the combination is discouraged is discussed below.

**Ganoderma wilt :** This is caused by fungus *Ganoderma lucidum*. Decay of root system, flaccidity of spindle leaves, browning of outer leaves, arrested fruit set and appearance of bleeding patches on the stem are the salient features of the malady. The bracket of fungus is seen on stems of the diseased palms in very advanced stages. Better drainage and clean cultivation are the

important factors. Apply Calixin @ 2ml/100 ml of water through root feeding at quarterly interval for one year. Soil drenching @ 25 litre of Calixin 0.1% solution/palm/year is also useful.

Though bud rot and mahali disease are common in arecanut and coconut but the causal organisms are of different species and there is no report of cross infection.

**Scale insect :(*Aonidiella orientalis*)** The scale insect damage the leaves, buttons and rachillae in coconut and in arecanut leaves, spathe, leaf sheaths and bunches gets affected. When the infestation is severe, button shedding is observed. Continuous feeding results in premature yellowing of nuts in arecanut. The infestation will be severe during summer in coconut and Oct-Feb in arecanut gardens. In severe case of infestation spraying with 0.1% Fenthion/Malathion will control the insect.

#### Existing situation and the possible approach.

Based on the survey conducted in Kasaragod district during October and November 1999 it was found that the arecanut has been planted in the various phases of coconut. Some farmers have planted coconut and arecanut simultaneously; some have planted in the second phase after 8 years or so, others after 22 years or so without thinking about the consequence and the returns. In many arecanut garden the coconut has been planted on the border in a single row.

In case, arecanut (in single row at 3.75 m x 2.5 m) planted along with coconut (7.5 x 7.5 m) the arecanut grows faster than that of coconut and the coconut will certainly get affected and the expected yield of coconut will come down by 20 to 25%. (Table). However, the reduction in yield will depend upon the number of arecanut palms planted as mixed cropping. The arecanut yield will not go down provided proper management practice is followed.

Planting arecanut after 6 to 8 years in coconut garden as mixed cropping the yield return in arecanut was only 30 to 40% of the normal yield, palms will be lankey, and there is all the chance for the stem to break down if heavy wind prevails. Further there will be delayed flowering. This is mainly because of the inadequate light availability for arecanut growth. If the arecanut is planted at the later stage i.e. after 20 years gradually, the coconut yield will not go down but the arecanut yield is expected to go down by 10 to 15%. With a spacing of 7.5 x 7.5 m we can accommodate 175 coconut palms per hectare and arecanut with a spacing of 3.75 x 2.5 m we can accommodate 315 palms per hectare. With normal good management practice, a coconut palm may yield 90 to 120 nuts/palm/year and arecanut around 300-400 nuts/palm/year.

### Maintenance of the Mixed Cropping Garden :

Fertilization, irrigation soil and water conservation practices are to be followed from the initial year of planting. Neglected or poorly managed palms in the initial year cannot be recouped to the same level as that of well managed palm. Therefore, care should be taken for proper management immediately from time of field planting.

The recommended level of fertilizer of coconut is 1 kg Urea, 2 kg Mussoriphos, and 2 kg Muriate of Potash and for arecanut; it is 0.22 kg of Urea, 0.24 kg of Mussoriphos and 0.23 kg of Potash. Organics is to be applied at the rate of 50 and 25 kg per palm for coconut and arecanut respectively. Efforts should be made to utilize the available organic wastes in the garden through effective composting methods like vermicomposting. Since these gardens are irrigated, fertilizer can be applied in 2 splits avoiding the heavy rainfall period. First split can be applied in September-October and second split is to be applied in January-February. In mixed cropping garden as the soil, space utilization is appropriate; there is better fertilizer use efficiency. Thus, instead of full dose 2/3rd of the recommended level can be applied in 2 splits equally. If fertigation is (fertilizer applied through irrigation water) followed, then fertilizer can be applied in 4 to 6 equal splits avoiding the monsoon period. The organic manure application is done along with second dose of fertilizer.

**Irrigation :** Perfo irrigation or Drip irrigation will be ideal to the mixed cropping. However, in perfo irrigation more water will be wasted as the operation time will be same though the water requirement will vary for coconut and arecanut. If perfo irrigation is followed we can provide water at the rate of the  $IW/CPE = 1$  ie., the quantity of

water evaporated from the open pan should be provided to the garden once in 4 to 7 days depending up on the type of soil. If it is laterite soil once in 4 days and if it is red sandy loam soil, it is sufficient to go for irrigation once in 6 to 7 days. Drip irrigation will be most ideal where we can save water. Water should be allowed to drip at 30 cm depth by making a pit and filling the pit with mulch to avoid the evaporation losses. For coconut under Kerala condition 30 to 35 litres/palm/day and for arecanut 20 litres/palm/day is sufficient for reasonable yield. In general irrigation @ 66% of the open pan evaporation is sufficient for humid area whereas in dry areas it may go up to 80 to 100% Eo.

**Other features :** Other than the high income from these crop combinations, if same disease/pest is prevalent, the same chemical spray can take care of the common disease/pest.

**Harvesting :** Arecanut harvesting is generally done by climbing one tree and going to the next tree from treetop itself. This won't be possible if coconut arecanut mixed cropping is practised.

**Spacing :** More dependence of coconut may not be encouraging in the present situation because of the prevailing price fluctuation. It is suggested by increasing the spacing by 10 m x 10 m for coconut more components crops can be introduced and also by practising good management including organic recycling the coconut yield can be maintained/increased compared to the present productivity level. This reduces the cost of cultivation and the income from unit area can be considerably increased resulting in more profit.



Coconut arecanut mixed cropping with adequate light availability

**Table 1. Effect of coconut + arecanut mixed cropping on yield**

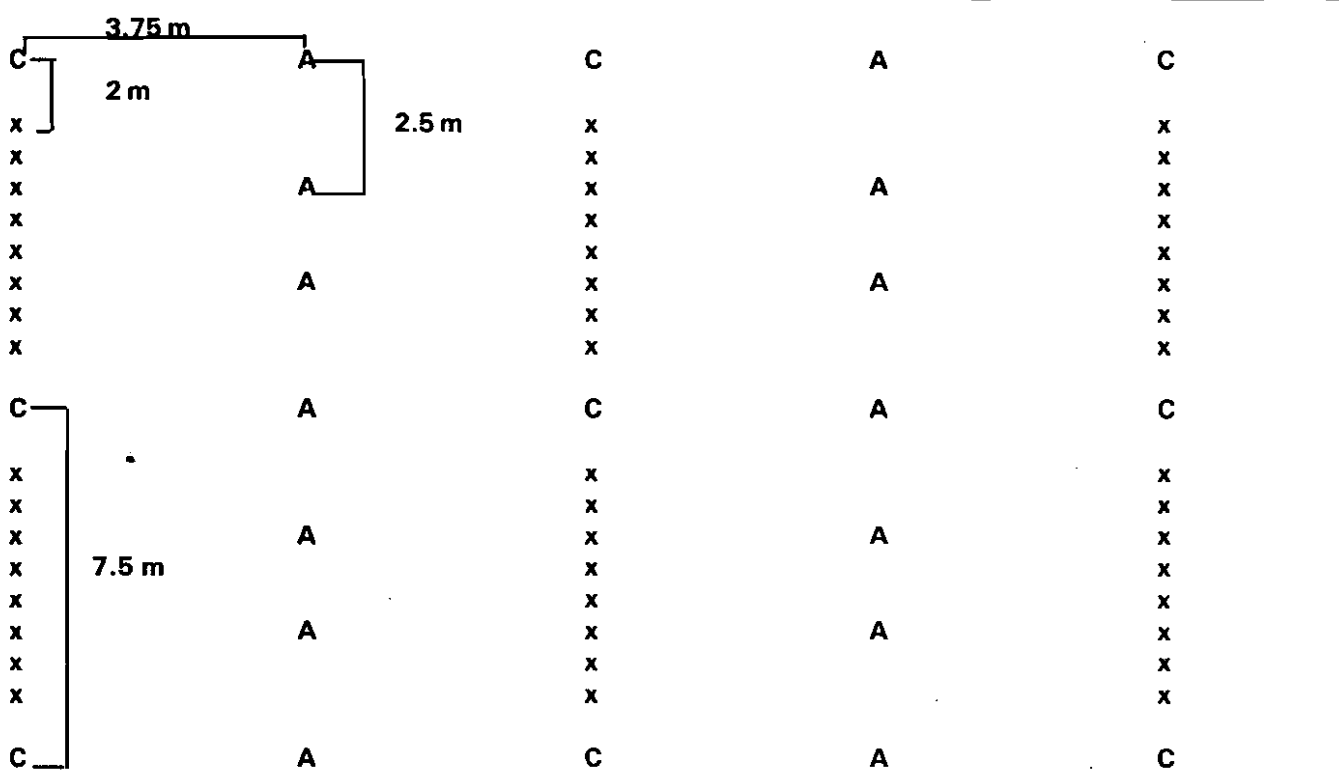
Situations	Coconut yield nut/palm/year	Arecanut yield nut/palm/year	Deviation yield from Normal	
			Coconut	Arecanut
Coconut + Arecanut simultaneous planting	60 - 70 (100)	300	(-)20-25% Flowering will be delayed	-
Arecanut planted between 5-8 years in coconut garden	102 (90-120)	180-240 (300)	-	(-)60-70% Flowering will be delayed
Arecanut planted after 20 years in coconut garden	105 (90-120)	255-270 (300)	-	(-)10-15%
Coconut planted in Border of the arecanut garden	90 (90)	300 (300)	-	-

(Figures in the parenthesis are the normal yield obtained from farmers)

(-) represents reduction in yield

\* Deviation from normal yield against depends upon number of arecanut palms planted. Here it has been given for one row arecanut planted at a spacing of 3.75 x 2.5 m.

#### Layout of Coconut Arecanut Mix :-



C - Coconut

A - Arecanut

xxxx - Banana/Pineapple/Vegetables for domestic use