

Lakhi Baug for realizing maximum income from coconut

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Konkan region of Maharashtra is a long narrow strip of 720 km running North to South with Arabian Sea on the west and western ghats on the east with hilly terrain. The region comprises of Thane, Raigad, Ratnagiri, Sindhudurg and greater Mumbai districts of Maharashtra. In konkan region, soils of Ratnagiri and Sindhudurg districts are lateritic, which are acidic, poor in nutrient, low water holding capacity whereas Thane and Raigad district, soil is medium black with comparatively better in fertility and water holding capacity.



Previously coconut cultivation was restricted to sea shore and river bank, however now it is spread to interior parts of Konkan region as well as other districts of Maharashtra where irrigation facilities are available. Maharashtra ranks eighth in area, seventh in production and sixth in productivity of coconut. The total area under coconut cultivation is about 21000 ha with a production of 175.10 million nuts. During 1990-91 the area under coconut was

16396 ha. which increased to 33426 ha during 2008-09 (Table-1). Coconut is primarily a small holder's crop grown in this region as the agro-climatic conditions are very congenial for its cultivation. About 92 percent of the total area and production of coconut in the state is concentrated in this region.

In konkan region, coconut is used for edible, social and religious purposes. It is used as mature as well

as tender nuts. Maximum production of coconut from Thane and some parts of Raigad district goes for tender coconut trade in Mumbai where as maximum production of coconut from Ratnagiri and Sindhudurg districts are used for mature nuts. Tapping of toddy is also popular in this region.

Cropping system in Konkan

Generally coconut plantation in the region is raised at a spacing of 4 x 4 m to 7.5 x 7.5 mixed cropped with perennial crops like arecanut, jackfruit, garcinia, mango and other fruits and forest crops. Spice crops like nutmeg, cinnamon and black pepper, annuals like banana, pineapple, vegetable crops, seasonal spices like ginger and turmeric, tuber crops and also intercropping is done with floriculture particularly in the Thane district. Coconut growers of this region are adopting high density

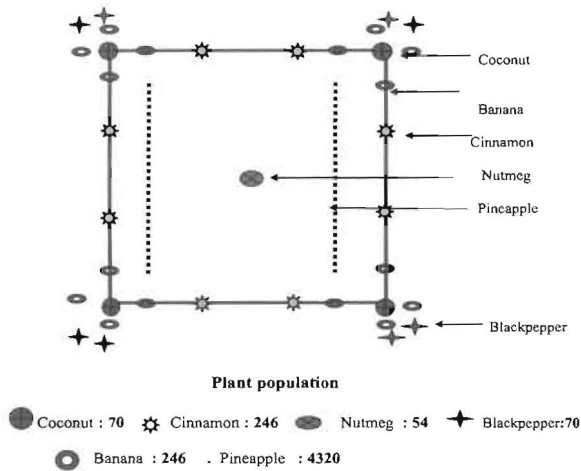
Table 1 : Increase in area under coconut in Konkan region (M.S.)

Sr.No	District	before 1989-90 (ha)	2007-08 (ha)
1	Thana	1607.76	3082
2	Raigad	1858.68	4869
3	Ratnagiri	2065.65	5066
4	Sindhudurg	10863.82	14282
5	Others	—	6127
6	Total	16395.91	33426

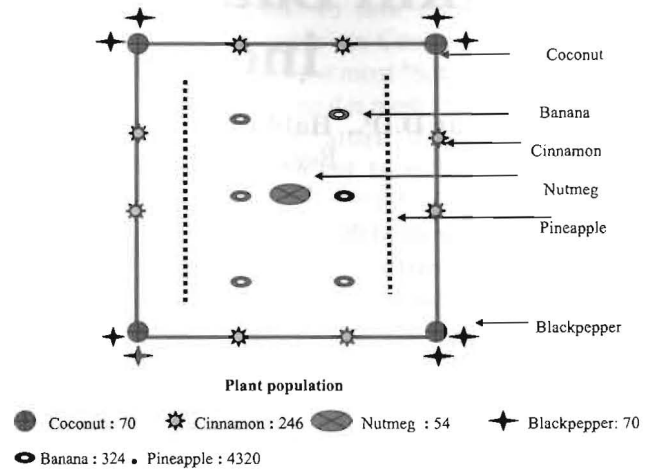
Source: Dept. of Agriculture, Pune

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Lakhi Baug Model I (A)



Lakhi Baug Model I (B)



multispecies cropping system without considering the growth habit of the palm, rooting pattern, canopy of the main and component crops. Hence planting of coconut palms at proper spacing and selection of subsidiary crops in a coconut based farming system in the region needs proper planning.

The concept of Lakhi Baug

Considering the concept of coconut based cropping system, various experiments were conducted to identify best suitable inter and mix crops in coconut under Konkan conditions of Maharashtra at Regional Coconut Research Station, Bhatye under AICRP on Palm. Based on the results of these experimentations, high density multi storied cropping models are conceptualized which include tree spices (nutmeg, cinnamon and black pepper) and annual fruit crops

(banana & pineapple). These proposed models possess potential to earn profit of more than Rs 1.00 lakh per acre and hence popularized as Lakhi Baug. The layout of such models are presented in Fig 1 (A and B).

Planting of different crops in Lakhi Baug

In this model coconut should be planted at a distance of 7.5 x 7.5 m where as nutmeg should be planted at the center of four coconut palms. Banana should be planted on four sides of coconut at a distance of 2m from coconut bole and two cinnamon layers at distance of 1.25 m in between two banana in coconut rows. For planting the pineapple, trenches should be prepared in between two banana having canopy size of 90 cm width and 6m length and 15 cm depth and pineapple suckers should be planted at a

distance of 60 x 30 cm. Two black pepper rooted cuttings should be planted and trailed on each coconut palm. Therefore total plant population in one acre should be as follows in Table 2.

After harvesting the banana and pineapple, slight change need to be made in planting these two crops. Banana should be planted near nutmeg grafts in two rows (6 suckers of Banana) where as pineapple should be shifted nearer to cinnamon as indicated in Model I (B).

Management of Lakhi Baug

The recommended cultivation practices should be followed for both main and component crops. After rainy season from November to May all the crops should be irrigated by sprinkler irrigation system. Recommended fertilizer doses should be applied. For coconut, fertilizer should be applied in three splits (June, October and February) and other crops in two splits (June and October) The details are given in the Table 3.

Yield in Lakhi Baug

The yield of coconut before planting the different component crops was 5320 nuts / acre which was increased to 6300 to 9800 nuts

Table 2 : Plant population in one acre of coconut plantation

Name of the crop	Variety	No.of Plants
Coconut	D x T	70
Nutmeg	Konkan Swad	54
Cinnamon	Konkan Tej	246
Banana	Safed Velachi	246
Black Pepper	Panniyur - 1	140
Pineapple	Kew	4320

/ acre after planting of component crops. The yield increased from 30 to 40%. In an experiment started of CPCRI, Kasaragod on coconut based multi storied cropping system with cocoa in single and double hedge system, pepper and pineapple, the yield of coconut increased markedly during the experimental period compared to the pre-experimental yield in all the five crop combinations. It is reported that intercropping of tree spices like cinnamon, clove, nutmeg, garcinia, pepper and all spice in coconut gardens at Ratnagiri, Maharashtra increased the profitability of the system and there was increase in the nut yield of coconut as monocrop.

The banana and pineapple recorded average yield of 1.76 to 2.2 tonne and 4 to 6.4 tonne respectively from 2nd year onwards where as



nutmeg yield started from 4th year and it was 15000 nuts and 7.5 kg mace per acre from the 10th year onwards. The cinnamon yield started from 3rd year and it was 50 kg dried bark and 370 kg dried leaves per acre at the

10th year, further the black pepper yield started from 3rd year and recorded 105 kg dried black pepper at the age of 10th year. Experiments of CPCRI, Kasaragod on coconut mixed with pepper, clove, nutmeg and cocoa indicated that clove could yield 3 kg dry flowers, nutmeg average 1.5 to 2.0 kg mace and 8 to 12 kg nuts. It is reported that nutmeg yielded on an average 1.0 to 1.2 kg mace and 7 to 8 kg seed / tree / year under coconut based HDMSCS in root (wilt) affected area.

Table 3 : Application of manures & fertilizer

Sr. No	Name of the crop	First Year				3 rd , 5 th and 10 th year after planting				Full dose after Plants (years)
		FYM (kg)	N (g)	P (g)	K (g)	FYM (kg)	N (g)	P (g)	K (g)	
1	Coconut	10	200	100	200	50	1000	500	1000	After 5 th Years
2	Nutmeg	10	50	25	100	100	500	250	1000	After 10 th Years
3	Cinnamon	5	20	18	25	50	200	180	250	After 10 th Years
4	Black Pepper	7	50	50	50	20	150	150	150	After 3 th Years
5	Banana	5	180	100	120					FYM, P and K at the time of planting N - 60, 90 and 120 days after planting
6	Pineapple	5	12	6	12					FYM at the time of planting. NPK in 2 to 3 Splits at 3 months interval after planting

Table 4 : Yield of coconut & component crops in Lakhi Baug (Per Acre)

Sr. No.	Name of the Crop	Yield before planting (nuts/acre)	Yield after planting (nuts/acre)	Remarks
1	Coconut	5320	6300 to 9800	
		Initial Yield per acre	10 th year yield per acre	Yield started
2	Banana	1.76 to 2.2 MT	1.76 to 2.2 MT	2 nd year
3	Pineapple	4 to 6.4 MT	4 to 6.4 MT	2 nd year
4	Nutmeg	250 nuts 100 gm mace	15000 nuts 7.5 kg mace	4 th year
5	Cinnamon	12.3 kg dried bark 196 kg dried leaves	50 kg dried bark 370 kg dried leaves	3 rd year
6	Black Pepper	50 gm	1.5 kg	3 rd year

Biomass Production

Biomass collected from main and component crop and conversion of this biomass into vermicompost minimized the application of inorganic fertilizer and thereby management cost per acre.

In Lakhi Baug coconut palms register maximum recyclable biomass productivity which was followed by nutmeg 740 kg, Banana 738 kg, Pineapple 432, Cinnamon 142 kg and Black Pepper 14 kg. Hence the total biomass available from one acre of Lakhi Baug was 4066 kg which gives approximately two tonnes of vermin compost. In coconut based HDMSCS, the recyclable biomass available was the highest under 2/3rd of recommended fertilizer treatment in different crops

Table 4 (A) :Yield of coconut & different component crops in Lakhi Baug (in one acre)

Sr. No.	Name of the crop	Year									
		1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th
1	Coconut	6300	7000	8400	8400	8400	9100	9100	9100	9100	9800
2	Nutmeg i)No. of Nuts ii)Mace (Kg)	-	-	-	250 0.100	500 0.200	1000 0.500	2500 1.250	5000 2.500	10000 5.000	15000 7.500
3	Cinnamon i)Dried bark (Kg) ii)Dried leaves(Kg)	-	-	-	12.3 196	-	24.6 370	24.6 370	37 370	37 370	49 370
4	Banana (t)	-	2.2	1.76	2.2	1.76	2.2	1.76	2.2	1.76	2.2
5	Pineapple (t)	-	6.4	4.0	-	6.4	4.0	-	6.4	4.0	-
6	Black Paper(Kg)	-	-	-	-	14	70	70	70	70	105

Rate in local market – 1) Coconut –Rs. 8/- per nut 2) Nutmeg –Rs.2/- per nut 3) Nutmeg mace

Rs. - 700/- per kg 4) Cinnamon Dried bark – Rs. 300/- per kg 5) Cinnamon dried leaves – Rs. 5/- per kg 6) Pineapple – Rs. 5 per kg 7) Banana- Rs. 12 to 15/- per kg & Black Paper – Rs 200/- per kg

(18.5 t) compared to the other fertilizer treatments.

Employment Generation

Employment generation of a particular system plays a important role in the economic viability of a system. Adoption of Lakhi Baug concept could provide additional employment than sole crop of coconut. Sole crop of coconut alone recorded 134 man days / acre However the Lakhi Baug recorded about 210 man days / acre i.e. 30% more over sole crop. Adoption of

coconut based spices mixed cropping system could provide additional employment than sole crop of coconut. The maximum employment generation over coconut as sole crop was recorded in nutmeg block (117 mandays / ha), followed by cinnamon block (102 mandays / ha) while other spice blocks recorded moderate employment generation (40 to 84 mandays / ha).

Economics

In the first year only yield of coconut can be obtained where as

establishment charges of this system wil highest in first year. The estimated approximate gross return is Rs. 50,400/- per acre. From the second year onwards, the net profit will also increase which is approximately Rs. 76,170 per acre. Within 10 years, the gross return will increase from Rs. 50,400 to Rs. 1,84,010 per acre. The net return ranges from Rs. 59,010 to Rs. 1,25,760 per acare (Table-5) and hence this intercropping system is named as Lakhi Baug.

Experiments at CPCRI, Kasaragod on coconut mixed with pepper, clove, nutmeg and cocoa indicated that the highest net return was obtained with coconut + nutmeg cropping system (Rs. 94,300/- per ha) followed by coconut + clove (Rs. 46,800/- per ha) compared to coconut + pepper (Rs. 26,200/-) and coconut + cocoa (Rs. 31,400/-). The net return under coconut as mono crop was only Rs.22,300/- per ha. Coconut + nutmeg resulted in higher net profit of Rs. 69,593/- per ha followed by coconut + cinnamon (Rs.50,807/- per ha.) compared to Rs. 22,081/- per ha of coconut alone under konkan condition.

Conclusion

Coconut provide ample scope for inter and mixed cropping. On the basis of mixed cropping, experiment on spice crops and fruit crops in coconut plantation, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli has formulated the 'Lakhi Baug' concept i.e. mixed cropping of spices with emphasis on cinnamon, nutmeg and black pepper and fruit crop banana and pineapple in the coconut plantation. From one acre of such planting system coconut growers can earn profit to the tune of rupees one lakh and hence it is named as ' Lakhi Baug'. It is necessary to popularize this system among coconut growers of konkan region of Maharashtra.

