

# Performance of black pepper (*Piper nigrum* L) as intercrop with coconut in the alluvial plains of West Bengal

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## Abstract

**B**lack pepper or 'Kali mirch' is the most important spice of the world and so also of India. It, therefore, is rightly called the 'King of Spices', It is one of the most important and earliest known spices produced and exported from India. Intercropping of pepper with coconut has several advantages. The system relieves the farmer of the burden of raising separate trees for growing pepper. The experiment was carried out in a 23 year old coconut (cv. East Coast Tall) plantation at Horticultural Research Station, Mondouri, Bidhan Chandra Krishi Viswavidyalaya to evaluate the performance of black pepper as an intercrop. Average plant (vine) height of pepper vine was 4.5 m. The leaf length and breadth were 12.5 cm & 7.7 cm respectively. The spike length was recorded 14.6 cm. Yield per vine was recorded 1.5 Kg. and dry recovery percentage was 32%. It was observed that coconut yield per ha under monocropping was 10974 nut/ha whereas yield was 13275 nut/ha under intercropping system. Economic assessment as presented in table-3 reveals that cost of cultivation for coconut monocrop was Rs. 19,000 with a gross return

of Rs. 37,170 giving a net return of Rs. 18,170. But if the coconut is trailed with black pepper from 5<sup>th</sup> year an additional return of Rs. 8,000 will come per ha with a gross return of Rs. 45,170 giving a net return of Rs. 24,570. The performance of black pepper as an intercrop with coconut was quite satisfactory in the alluvial plains of West Bengal and can be well grown as a companion crop with coconut palms.

## Introduction

Black pepper or 'Kali mirch' is the most important spice of the world and so also of India. It, therefore, is rightly called the 'King of Spices', as the volume of international trade of it is the highest among all the spices known. Black pepper is the dried mature but unripe berry (fruit) of *Piper nigrum* a branching vine or climbing perennial shrub which is indigeneous to the tropical forests of western ghats of India. It is largely distributed in Kerala (94%), Karnataka (5%) the rest being Tamilnadu, Andhra Pradesh and North Eastern states especially Assam (Purthi 1998). It is one of the most important and earliest known spices produced and exported from India. Pepper

**Black pepper or 'Kali mirch' is the most important spice of the world and so also of India. It is rightly called the 'King of Spices', as the volume of international trade is the highest among all the spices known. Black pepper is the dried mature but unripe berry (fruit) of *Piper nigrum* a branching vine or climbing perennial shrub which is indigeneous to the tropical forests of western ghats of India.**

Table 1. Morphological and Yield data of Blackpepper (5th yr) and coconut

Growth/yield parameter	value	Growth/yield parameter	value
Plant height	4.5 m	No. of fruit/spike	85
Leaf breadth	7.7. cm	1000 fruit weight (g)	95
Leaf length	12.5 cm	Yield/vine	1.5 kg
Spike length	14.5 cm	Dry recovery (%)	35%

cultivation has now spread to parts of Goa and Maharashtra. It is found to perform well in Andaman and Nicobar though the performance of it in the new location is not comparable with that of the traditional area. Pepper is a plant of humid tropics requiring adequate rainfall and humidity. The crop tolerates temperatures between 10°C and 40°C. A well distributed rainfall of 125-200 cm is considered ideal for pepper. Pepper can be grown in a wide range of soil, clay loam, red loam or sandy loam pH of 4.5 to 6. It thrives well in virgin soil rich in organic matter. Singh *et al* (82) reported intercropping of pepper in areca garden in North Bengal. Due to several socio economic factors monocrop cultivation of pepper has become more or less extinct. We have not yet seriously thought of growing pepper as a companion or intercrop in homestead garden. If a pepper vine is trailed on each of a coconut tree with 250 g yield per vine the production will be sufficient to meet the demand of the state.

The growth habit and canopy configuration of coconut palms strongly support different coconut based cropping systems. Depending upon the spacing adopted (7 m x 7 m to 10 m x 10 m), the amount of solar energy under the coconut canopy ranged from 43 to 88 per cent of normal sunlight. Companion or

intercropping of pepper with coconut has several advantages. The system relieves the farmer of the burden of raising separate trees for growing pepper. No separate cultural operations are needed for pepper vine as operations for the main crop too. Also, the system leaves inter spaces entirely free for raising other crops. But, it must be mentioned that the management techniques to suit main tree will have to be slightly deviated from the traditional system to make the venture a success.

#### Harvesting

Pepper vine start yielding from the 4th year. It takes 8-9 month from flowering to ripening stage. Flowering starts in June. Harvest can be done in February when one or two berries turns yellow red. Berries are separated from the spike by rubbing them between the hands or trampling them under the feet. After separation the berries are dried in sun for 10 days until the outer skin becomes black and shrunken and assume the characteristic wrinkled appearance of commercial black pepper.

#### Disease pest problem

During dry months, foliar yellowing defoliation and die back symptoms appear in few plants, and during monsoon some of the affected vines recovers and put forth fresh foliage. This may be due to slow wilt infestation caused by soil borne fungi (*Fusarium* sp, *Rhizoctoma* sp or nematodes.). Phorate @ 15 g or carbofuran @ 50 g at the time of planting or afterwards may be applied in the pit.

Prophylactic spray with 1 % Bordeaux mixture can be done. Neem cake may be applied at the base @ 200 g / plant.

#### Results and Discussion

Data presented in table-1 reveals that the average plant (vine) height of the 5 yr old pepper was 4.5 m. The leaf length and breadth were 12.5 cm & 7.7 cm respectively. The spike length was recorded 14.5 cm. Thousand fruit weight was 95 g and number of fruit per spike was 85. Fresh (green) yield per vine was recorded 1.5 kg. and dry recovery percentage was 32%. Variations with respect to annual leaf, bunch and nut production were recorded under monocrop and intercropping system (Table 2). The plants under intercropping produced more number of leaves (11.9) as compared

Table 2. Morphological and Yield parameter of coconut

Coconut monocrop		Coconut (with intercrop)	
Growth/yield parameter	value	Growth/yield parameter	value
Number of leaves/palm	10.3	Number of leaves/palm	11.9
Number of bunch/palm	9.2	Number of bunch/palm	10.8
Nut yield/palm/year	62	Nut yield/palm/year	75
Nut yield/ha/year	10974	Nut yield/ha/year	13275
Weight of nut (g)	1052	Weight of nut (g)	1184
Copra weight/nut (g)	154	Copra weight/nut (g)	178
Copra yield/palm (kg)	9.55	Copra yield/palm (kg)	13.35

Table 3. Economics of coconut based cropping system including Blackpepper. (Rs/ha).

Crop	Cost of Cultivation	Gross Return	net Return	Return from Intercrop	Cost for intercrop	Profit from incrcrop
Coconut	19,000	37,170	18,170	-	-	-
Coconut + Blackpepper	20,600	45,170	24,570	8,000	1,600	6,400
Coconut + Ginger	73,950	1,32,370	58,400	95,200	54,950	40,250
Coconut + Gnger + Blackpepper	75,550	1,40,370	64,820	1,03,200	56,550	46,650

to (10.3) in monocropping. The plants under intercropping produced more bunch (9.2) indicating the positive influence of companion crops on growth and yield of coconut. Ravindran and Nair (1999) reported that sole stand of coconut recorded lower plant height and stem girth as compared to the plants in coconut + intercrop.

Variation in respect of nut weight, copra weight and copra yield were also recorded. The nut weight (1184 g), copra weight (178 g) and copra yield/palm/year (13.35 kg) were observed more in intercropping system as compared to lower nut weight (1052 g), copra weight (154 g) and copra yield (9.55 kg) in plants under monocropping. It was observed that coconut yield per ha under monocropping was 10974 nut/ha/yr whereas the yield was 13275

nut/ha/yr under intercropping system, suggesting that companion crops in the coconut garden did not affect the yield of base crop but increased the productivity as a whole as recorded earlier (Chowdhury and Deka, 1997). Similarly, it was reported by Singh *et al.* (2002) that due to intercropping the nut yield was 53.43 nuts/palm/year as compared to 41.8 nuts/palm/year in monocrop block in a period of two years showing a clear impact of intercropping with better management in increasing the productivity of the system as a whole. The present results are also in good agreement with the earlier observations of Marimuthu *et al.* (2001) and Nath (2002).

Economic assessment as presented in table-3 reveals that cost of cultivation for coconut monocrop

was Rs. 19,000 with a gross return of Rs. 37,170 giving a net return of Rs. 18,170. But if the coconut is trailed with black pepper from 5<sup>th</sup> year an additional return of Rs. 8,000 will come per ha (177 Vines) with a gross return of Rs. 45170 giving a net return of Rs. 24570. Even after that the whole inter space can be well utilized for other intercrops like ginger, turmeric & elephant footyam. (Ghose & Hore, Hore *et al.*). If the interspace is intercropped with ginger and pepper trailed on coconut i.e. coconut + ginger + blackpepper system the gross return of the system will be about Rs. 1,40,370 and net return Rs. 64,820. These are in good agreement with Nath 2002 and Sairam 1997.

### Conclusion

In West Bengal coconut is cultivated in an area of about 31,781 ha. during 2005-06 (Deptt. FPI & H Govt. of West Bengal, 2007). Coconut is mostly cultivated in homestead gardens in West Bengal. Pepper can be trailed as a companion crop in coconut. Even if only a part of this is utilized, its impact on pepper production area will be tremendous. This practice substantially contributes to the net farm income of the cultivators who are successfully growing pepper as a companion crop on areca nut. The performance of black pepper as an intercrop with coconut was quite satisfactory in the alluvial plains of

Table 4. Area and production of coconut in WB (2005-06)

Name of District	Area/ha	Production lakh nut	Name of district	Area/ha	Production lakh nut
Darjeeling	0.083	14.394	24 gs (S)	4.800	675.000
Jalpaiguri	1.647	165.689	Howrath	3.171	412.160
Cocohbehar	1.100	68.360	Hooghly	0.896	123.140
Uttar Dinjapur	0.202	18.890	Burdwan	2.678	368.990
Dakshin Dinajpur	0.208	31.553	Birbhum	0.276	21.536
Malda	0.490	65.900	Bankura	0.194	16.319
Murshidabad	5.100	650.350	Purulia	0.109	7.954
Nadia	0.950	94.947	Midnapore (W)	2.468	342.880
24 Pgs (N)	3.079	360.190	Midnapore (N)	4.330	612.500
<b>Total Area : 31.781 thousand Ha</b>			<b>Tota Production : 4050.752 lakh nut</b>		

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West Bengal. Now there is enough scope for further detailed research on variation in management practices or with different improved varieties of pepper. It can be concluded that black pepper can be grown as a companion crop with coconut palms in West Bengal.

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