

# Performance of Coriander at different doses of nitrogen fertilizer under coconut based cropping system

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**Coriander seed and fresh coriander leaves are too well known and does not need any introduction or description in India, particularly to the housewives, as it is used almost daily in curries. Practically all the parts of the plant, i.e tender stem, the leaves, flowers and the fruits have a pleasant odour or fragrance. The coriander leaves constitute of the richest sources of vitamin C and vitamin A.**

## Abstract

An experiment was carried out at Horticultural Research Station, Mondouri, B.C.K.V. Nadia, W. B. for two consecutive years in a randomised block design (RBD) with four replications to evaluate the performance of coriander (*Coriander sativum* L) at different doses of nitrogen under coconut based cropping system. The treatments taken were six varying nitrogen doses viz. (Nitrogen 0, 20, 40, 60, 80 and 100 kg/ha). The plants under T<sub>6</sub> (N dose 100kg/ha) recorded the maximum (73.75 cm) height followed by 72.25cm under T<sub>5</sub> (N dose 80kg/ha). Number of primary and secondary branches and biomass production increased with the increase in the dose of nitrogen. Maximum number of umbel per plant, number of seed per umbel and dry yield per plant per plot (25.75, 28.50 and 693.75g/9.5m<sup>2</sup> respectively) were recorded with nitrogen 100kg/ha but yield per plot under nitrogen dose of 60kg/ha and

80kg/ha were at par. The average nut yield during the experimentation period was 59.33 and 61.33 in monocrop and intercrop plot with increase in nut yield of 6.98% and 11.96% respectively over initial. The data clearly indicates the advantage of growing intercrop on the nut yield of coconut. The gross return realised was as high as Rs. 69,500/- from intercropping where as it was only about Rs. 39,500/- for coconut under monocrop. The net return/ha from intercrop and monocrop were Rs 37,000/- and Rs 18,300/- respectively with an additional return (profit) from coriander i.e. Rs 19,700/-. Hence it may be advised 60 kg N per ha along with 40kg each P&K for better growth and yield of coriander grown under coconut plantation for more income generation.

## Introduction

Coriander seed and fresh coriander (dhania) leaves are too well known and does not need any introduction or description in India,



particularly to the housewives, as it is used almost daily in curries. Practically all the parts of the plant, i.e tender stem, the leaves, flowers and the fruits have a pleasant odour or fragrance. The coriander leaves also constitute of the richest sources of vitamin C (250mg /100g) and vitamin A (5,200IU/100g). Its use as a condiment in curries and particularly as fresh leaves for garnishing of dishes and in chutney as an appetizer should be encouraged. The essential oils are used for flavouring liquors, in confectionary and pharmaceutical preparations. It has medicinal properties too. Fruits are said to have carminative, diuretic, tonic, stomachic properties. It is a tropical crop and can be grown throughout the year except during very hot season. For higher grain yield it is



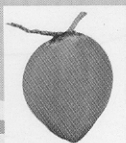
An intercropped garden with coriander and coconut

grown in rabi season. A dry and cold weather free from frost especially during flowering and fruit setting stage favours good grain production. It can be cultivated on almost all types of soil.

Coconut (*Cocos nucifera* L.) which is popularly known as *Kalpavriksha*, yields more products to the human race than any other tree. Rooting pattern of mature coconut palms at 7.5 m x 7.5 m spacing also does not pose any problem for the uptake of nutrients and moisture from the soil by the compatible intercrops properly arranged in the systems, as the effective root zone of coconuts is confined mainly within a 2 m radius around its base and more than 85 per cent of coconut roots are found between 30 and 120 cm depth (Kushwah *et al.*, 1973). Hence, from land utilization point of view, a pure stand of coconut utilizes only 22 per cent of the area at 7.5 x 7.5 m spacing leaving considerable inter-row space for utilization by the intercrops. Of the solar radiation received, on an average about 50% only is intercepted by the coconut canopy. Making use of the underutilised soil, space and solar radiation in the monocrop stands, frenchbean can be inter cropped in

Table 1. Area and production of coconut and coriander in West Bengal (2005-06)

Name of District	Coconut		Coriander	
	Area 000 ha	Production lakh nut	Area 000 ha	Production 000 T
Darjeeling	0.083	14.39	-	-
Jalpaiguri	1.647	165.68	0.39	0.32
Coochbehar	1.10	68.36	0.13	0.25
Uttar Dinnajpur	0.202	18.89	0.04	0.05
Dakshin Dinajpur	0.21	31.35	0.05	0.06
Malda	0.49	65.90	0.34	0.35
Murshidabad	5.10	650.35	0.52	0.52
Nadia	0.95	94.95	4.03	4.04
24 Parganas(N)	3.08	360.19	2.59	2.96
24 Parganas(S)	4.8	675.0	0.60	0.54
Howrah	3.17	412.16	0.08	0.08
Hooghly	0.89	123.14	0.25	0.26
Burdwan	2.68	368.99	0.33	0.35
Birbhum	0.28	21.54	0.15	0.17
Bankura	0.19	16.32	0.09	0.09
Purulia	0.11	7.95	-	-
Midnapur (N)	2.47	342.88	-	-
Midnapure(W)	4.33	612.50	0.09	0.11
Total	31.78	4050.75	10.15	2.98



the interspace of coconut. Profit maximization in agriculture can be achieved through proper utilization of available resources. Considering these the present investigation was undertaken to study the performance of coriander at varying nitrogen dose grown as intercrop in the coconut plantation and also to evaluate the effect of intercrop on yield of coconut.

### Materials and Methods

The experiment was carried out at Horticultural Research Station, Mondouri, B.C.K.V. Nadia, W. B. for two consecutive years in a randomised block design (RBD) with four replications. The treatments taken were six varying nitrogen doses viz. (Nitrogen 0, 20, 40, 60, 80 and 100 kg/ha). The plot size was 3m x 3.5m. The plots were prepared 2 m away from either side of the 22 year old adult coconut palms cv ECT planted at a distance of 7.5 m x 7.5 m.

Sowing of seed was done at finely prepared seed bed during November. Organic matter was applied @ 5-6 t/ha. Full dose of chemical fertilizers @ 40 : 40 kg PK/ha was applied as basal. 50% of N fertilizer applied as basal and the rest as top dressing 40DAS. The soil of the experimental site was gangetic alluvial with sandy loam texture, good water holding capacity, having the total nitrogen 0.06%, available phosphorus 25.50 ppm, available potassium 94.50 ppm, organic carbon 0.60% and soil pH 6.8. Scheduled agronomical management practices with fertilizer dose @ 500 : 250 : 750 g NPK/palm/year were followed in coconut under both intercropped (24 palms) and monocropped (8 palms) plots. The observations on different growth and yield parameters were recorded from five randomly selected plants per treatment. Pod yield was taken on net plot basis at harvest.

### Results and Discussion

#### Growth & yield parameters of coriander

Data presented in Table 2 clearly indicated that different levels of nitrogen had significant effect on all most all vegetative parameters. A significant linear increase in plant height was observed with the application of N from 0-100 kg/ha. The plants under  $T_6$  (N dose 100kg/ha) recorded the maximum (73.75 cm) height followed by 72.25 cm under  $T_5$  whereas minimum height 44.75 cm was recorded under  $N_0$ . Number of primary and secondary branches increased with the increase in dose of nitrogen. Maximum number of secondary branches (16.20) and primary branches (4.87) were recorded with nitrogen 100kg/ha. Biomass production was also highest in highest dose of nitrogen.

Significant variation in different yield parameters and yield were observed among the treatments (Table 2). It was observed that number of umbel per plant, number of seed per umbel and dry yield per plot was minimum (13.75, 19.75 and 439.25g/9.5m<sup>2</sup> respectively) under 0 dose of nitrogen. Maximum number of umbel per plant, number of seed per umbel and dry yield per plot (25.75, 28.50 and 693.75g/9.5m<sup>2</sup> respectively) were recorded with nitrogen 100kg/ha. These results are in good agreement with Rahaman *et. al.* (1990), Ghosh *et. al.* (1985) Pillai and Bhoominathan (1975) and Tiwari and Banafar (1996). It was interesting to observe that though yield per plot was highest under nitrogen dose of



A coconut garden intercropped with coriander

Table 2. Growth & Yield parameters of coriander at varying nitrogen doses

Treatments	Secondary branch	Biomass g/plant	Height	Primary branch	No of umbel	No of seed / umbel	dry Yield per plot (kg /9.2m <sup>2</sup> )
T <sub>1</sub> (N0kg/ha)	10.325	17.750	44.750	3.875	13.750	19.750	439.250
T <sub>2</sub> (N20kg/ha)	12.400	20.250	55.750	4.125	16.750	23.750	500.750
T <sub>3</sub> (N40kg/ha)	14.075	21.750	63.750	4.300	20.750	24.750	568.750
T <sub>4</sub> (N60kg/ha)	15.925	24.750	70.250	4.575	24.750	27.750	663.750
T <sub>5</sub> (N80kg/ha)	16.175	27.750	72.250	4.775	25.750	27.750	684.750
T <sub>6</sub> (N100kg/ha)	16.200	28.750	73.750	4.875	25.750	28.500	693.750
S.Em (±)	1.759	1.657	1.932	0.055	1.598	1.578	10.960
C.D. (0.05)	3.749	3.531	4.115	0.117	3.406	3.363	23.360

Table 3. Simple correlation coeff Matrix of coriander at varying nitrogen doses

1	2	3	4	5	6	7
1.000	0.944	0.997	0.967	0.995	0.989	0.991
	1.000	0.947	0.997	0.959	0.943	0.972
		1.000	0.969	0.989	0.990	0.984
			1.000	0.977	0.964	0.986
				1.000	0.976	0.998
					1.000	0.977
						1.000

Name of characters	Path coefficients
1 Secondary branch	p1 = 0.12344
2 Biomass g/plant	p2 = 0.03771
3 Height	p3 = 0.39203
4 Primary branch	p4 = 0.32170
5 No of umbel	p5 = 0.03898
6 No of seed / umbel	p6 = 0.08259
7 Dry Yield per plot	

100kg/ha, yield per plot under nitrogen dose of 60kg/ha and 80kg/ha was at par. Mathur *et al.* (1973) also obtained increased seed yields in coriander with increases in levels of N, but upto 60 kg N per ha. Prakasha Rao *et al.* (1983a) also reported that higher doses beyond 50 Kg N per ha were not desirable in coriander. Hence it may be advised 60 kg N per ha along with 40kg each P&K for better growth and yield of coriander grown under coconut plantation.

**Effect of intercropping on nut yield**

The experimental data presented in Table-4 revealed that nut

production was not adversely affected due to intercropping with coriander. The pre experimentation nut yield from both monocrop and intercrop plot was 57.25 and 58.50 nuts/palm/year. The average nut

yield during the experimentation period was 59.33 and 61.33 in monocrop and intercrop plot with increase in nut yield of 6.98% and 11.96% respectively. The data clearly indicates the advantage of growing intercrop on the nut yield of coconut. The findings of the present investigation are in good agreement with the observation of Singh *et al* (2002). They also recorded 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 in increasing the nut yield. Hedge *et al* (1993) reported that the average yield of coconut increased from 90.8 to 98.7 nut/palm/year indicating the beneficial effect of intercropping different vegetables. Maheswarappa *et al.* (1998) reported that the bacteria and fungi counts were more in the root region of intercropping system as compared to monocropping. The nitrogen fixers and 'P' solubilizing bacteria were more in mixed farming system as compared to coconut monocropping. The soil enzyme

Table 4. Effect of intercrop on nut yield of coconut

Years	Nut yield in monocrop block (8 palms)			Nut yield in intercropped block (24 palms)		
	Total nut production	Average nut production/palm/year	Percentage increase over initial	Total nut production	Average nut production/palm/year	Percentage increase over initial
1st year	458	57.25	-	1404	58.5	-
2nd year	476	59.50	3.93	1440	60.0	2.56
3rd year	490	61.25	6.98	1572	65.5	11.96
<b>Average of 3 years</b>	474.66	59.33		1472	61.33	
<b>Increase during experimentation</b>	32	4.00		168	7.00	



activities (urease and dehydrogenase) and soil microbial biomass were higher in coconut based mixed farming compared to coconut monocropping. Singh *et al.* (2004) conducted a field experiment at ICAR Research Complex, Old Goa, during 1999-2002 in a 12 year old coconut cv. Benaulim, with hybrid napier as an intercrop. Yield of coconut in NB – 21 grass plot increased from 42 nuts/palm/year (1998-99) to 67 nuts/palm/year (2001-02). Increased yield of coconut might have been realised due to better nutrient status through recycling of organic matter over the period.

### Economics of intercropping

The economic of intercropping is presented in Table 5. Economic assessment (mean of 2 years) considering all inputs revealed that total variable capital requirement/ha ie cost of cultivation amounts to Rs. 32500 for coconut + coriander while the same for coconut monocrop was Rs. 21200/-. The gross return realised was as high as Rs. 69500/- from intercropping where as it was only about Rs. 39500/- for coconut under monocrop. The net return/ha from intercrop and monocrop were Rs 37,000/- and Rs 18,300/- respectively with an additional return (profit) from coriander being

Rs 19700/-. These results are in good agreement with Sairam *et al.* (1997). Anithakumari and Remabai (2002) obtained a net return of Rs. 55,675/ha and Rs. 28,575/ha from coconut + banana and coconut + elephant-foot yam intercropping system as compared to net return of Rs. 16,675/ha from coconut sole crop. Intercropping will not in any way reduce the returns from the coconut, rather it improves and adds to the total return per unit area.

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Table 5. Economic analysis of coconut based intercropping system (Rs/ha) (Mean data of 2 years)

Crop combination	Cost of cultivation	Gross return	Net return	Return from intercrops	Cost for intercrops	Profit from intercrops
Coconut(Monocrop)	21200	39500	18300	-	-	-
Coconut+ Coriander	32500	69500	37000	30000	11300	19700