Performance of Morinda Citrofolia as Mixed Crop in Coconut under Konkan Region of Maharashtra

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ABSTRACT

An experiment was conducted on integrated cropping system in coconut to study the performance of Morinda citrifolia as mixed crop in coconut, during the year 2008-09 to 2012-13. The growth and yield performance Morinda citrifolia and coconut were recorded. Initial and final nutritional status was estimated. The economics of the cropping system was calculated in year 2012-13. The functional leaves on the crown were increased from 28.4 to 29.2 & annual leaf production per palm increased from 10.05 to 10.30 in years 2008-09 to 2012-13. Initial yield of coconut was recorded as 13300 nuts/ha which increased to 14387 nuts/ha in the year 2012-13. Maximum yield of Morinda citrifolia per plant (7.88 kg) was recorded in seedling plants than in tissue culture plants (4.45 kg) in the year 2012-13. The study indicated that inter cropping of Morinda citrifolia increased productivity of coconut. Economics of Morinda citrifolia as inter crop indicated profitability of cultivation in coconut than monocrop.

Keywords: Coconut, Cropping System

1. INTRODUCTION

Coconut (Cocus nucifera L.) is an important perennial oil yielding crop of humid tropics and is mainly grown in states like Kerala, Karanataka, Tamilnadu, Andrapradesh and coastal districts of Maharashtra. Being a small holders crop in India, when grown as monocrop dose not provide adequate income and gainful employment to the dependent families. The studies have revealed that adult palm of sole crop of coconut, spaced at 7.5 x 7.5 m apart effectively uses only 22.3 per cent of land area, while average air space utilization by the canopy is about 30 per cent and solar radiation interception is 45-50 per cent (Bavappa et al., 1986). Thus coconut gardens offers excellent opportunities for inclusion of compatible component crops in the inter spaces, for effective utilization of natural resources. Unlike in annuals, the potential for increasing productively per unit area of land, time and inputs is considerably higher in perennial crops (Bavappa and Jacob, 1982). The coconut based crop systems evolved in response to the pressure of shrinking land resource base coupled with high population density which necessitated a conscious attempt on the part of farmers to achieve their goals by living with in biophysical, ecological and economic constraints (Maheswarappa et al., 2013). Morinda citrifolia (Noni) is compatible perennial medicinal plant in coconut based cropping system. Its juice has antioxidant properties and targeted the digestive, intestinal, respiratory and immune systems (www. en.wikipedi.org/wiki/Morinda citrifolia). Hence study was initiated to evaluate performance of Morinda citrifolia as mix crop in coconut.

2. MATERIALS AND METHODS

Performance of Morinda citrifolia as mixed crop in coconut under konkan region of Maharashtra was conducted at Regional Coconut Research Station Bhatye Ratnagiri Dr. B.S.K.K.V., Dapoli during 2008-2013. The experiment was conducted on 28 years old COD x WCT garden spaced at 7.5 x 7.5 m. Regional Coconut Research Station Bhatye is situated at 17.00^0N latitude and 73.40^0 E longitude at an elevation of 3

m above mean sea level. The mean annual rainfall during 2008 to 2013 is 3000 mm. The mean maximum temp is 31.10^0 C, while minimum temp is 22.8^0C. Morinda citrifolia was planted in August 2008 as a mixed crop in single hedge system at 3.75 m plant to plant distance at the centre of two rows of coconut palm. Twenty five each of tissue culture plantlets and seedlings were planted as non replicated trial. The experiment plot of coconut mixed crop with Morinda citrifolia was maintained as organic block by applying 50 kg of vermicompost and three lopping of glyricidia leaves burial per year to the coconut and 10 kg of vermicompost to noni along with green leaf manuring with glyricidia leaves. Mulching with coconut leaves were followed in the summer months. Drip irrigation was followed after rainy season i.e. October-May for both coconut and noni Initial and final N,P,K content (Kg/ha) of soil at 0-25 cm, 25-50 cm and 50-100 cm. was estimated at the start and at end of experiment. The growth & yield observations of coconut i.e., average no. of functional leaves on the crown, annual leaf production per palm, no. of nuts per palm and no. of nuts per hectare were recorded in 2004-05 to 2007-08 and 2008-09 to 2012-13. The growth & yield observations of Noni viz. height (cm), no. of branches per plant, no. of fruits per plant, weight of fruits per plant were recorded during 2012-13. Juice percentage and T.S.S (^{o} Brix) were also recorded on both planting material. The economics of cropping system was calculated including labour cost, input cost, irrigation, other miscellaneous charges for both planting materials and converted into economics per ha.

3. RESULTS AND DISCUSSION

3.1. Growth and yield of Coconut

The growth and yield performance of coconut as influenced by mix crop of Morinda citrifolia is presented in Table 1. Average functional leaves on the crown increased from 28.40 to 29.20 due to mixed cropping of Morinda citrifolia. Also annual functional leaf production per palm showed same trend and increased from 10.05 to 10.30 leaves / palm due to mix crop of Morinda citrifolia. Mean five year yield data indicated that nut yield increased 8.33 % over pre experimental yield (2004-05 to 2007-08). The yield data revealed that average initial yield of coconut was 13300 nuts/ha which increased to 14387 nuts/ha. due to mixed crop of Morinda citrifolia. Results analogous to these finding were also reported by Nair and Balakrishnan (1976) in coconut mixed crop with cocoa The additional increase in yield of coconut under mix cropping of Morinda could be due to synergistic effect of crop combination.

3.2. Growth and yield of Morinda Citrifolia

The growth and yield performance of Morinda citrifolia as mix crop in coconut is presented in Table 2. Maximum height 338.80 cm. and branches 23.85 were found in seedling than tissue culture plants. This may be due to faster growth of seedlings than tissue culture plants. Average yield of fruits was also recorded maximum (7.87 kg) in seedlings than tissue culture plants (4.45 kg) The juice percentage was almost similar (51-52%) in tissue culture to seedling plants with 7.5% T.S.S. The maximum yield in seedling plants than tissue culture plants could be due to faster growth rate of seedling plants and more production of food material over tissue culture plants. Similarly, more biomass production per plant (3.50 kg) was recorded in seedling plants than tissue culture plants (1.85 kg).

3.3. N, P_2O_5 and k_2O content of soil

The Nitrogen, Phosphorus and potassium content of soil as influenced by mix crop of Morinda citrifolia in coconut is presented in Table 3. It was observed from the data that nitrogen, phosphorus and potassium content (kg/ha) of soil improved slightly at all three depths except k2O at 25-50 cm. depth Varghese et al,. 1978 also reported improvement in soil fertility under mix crop of cocoa in coconut.

3.4. Economics

The economics of production of Morinda citrifolia mix crop in coconut is presented in Table 4. Maximum gross returns were recorded in seedling plants (Rs. 187000) than tissue culture plants (Rs. 174500). The highest B:C ratio was observed in seedling plants (2.48) than tissue culture plants (2.31). Growing of both tissue culture plants and seedling plants improved soil fertility considerably, resulted in increase in yield than pre experimental yield. Thus by utilizing same land, resources like space, light, irrigation facility, Morinda

Citrifolia is a suitable mix crop under cropping system in coconut

4. CONCLUSION

The study indicated that Morinda Citrifolia (Noni) is profitable mix crop in coconut.

Sr. No.	Treatment	Functional Leaves on crown		Annual leaf production / Palm		Yield (nuts)				Percent increase over initial yield
		2004-05 to 2007-08	2008-09 to 2012-13	2004-05 to 2007-08	2008-09 to 2012-13	2004-05 to 2007-08		2008-09 to 2012-13		
						Nuts / Palm	Nuts / Palm	Nuts / Palm	Nuts / Palm	
1	Coconut + Moninda citrifolia	28.40	29.20	10.05	10.30	76	13300	82.33	14387	8.33

Table 1 : Growth and yield performance of coconut as influenced by mix crop of Morinda citrifolia

Sr. No.	Planting materials	Growth observations				Yield				Biomass Production per plant (kg)
		Height (cm)		No. of branches		No. of fruits	Wt of fruits (kg)	Juice Percentage (%)	T.S.S (o Brix)	
		Range	Av.	Range	Av.					
1	Seedling Plants	219-450	338.80	3-42	23.85	315	7.875	52	7.5	3.50
2	Tissue culture	190-452	304.60	3-43	21.40	178	4.450	51	7.5	1.85

Table 2: Growth and Yield performance of Morinda Citrifolia as mix crop in coconut (2012-13)

Sr. No.	Treatment/Planting materials/ Soil depth	0 - 25 cm						25-50 cm					
		Initial			Final			Initial			Final		
		N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
1	Seedling	248	13	283	252	14	289	231	11	243	238	13	239
2	Tissue culture	261	18	318	268	19	321	217	12	228	223	14	225

Sr. No.	Treatment/Planting materials/ Soil depth	50-100 cm					
		Initial			Final		
		N	P_2O_5	K_2O	N	P_2O_5	K_2O

1	**Seedling**	214	9	231	214	10	235
2	**Tissue culture**	238	11	198	239	12	221

Table 3. N, P_2O_5 and k_2O content of soil as influenced by mix crop of Morinda in coconut (kg/ha)

Sr. No.	Crop Combination	Cost of Cultivation Rs.	Gross returns Rs/ha	Net returns Rs/ha	B:C
1	Coconut + Noni Seedlings Plants	75250	187000	111750	2.48
2	Coconut + Tissue culture Plants	75250	174500	99250	2.31

Table 4. Economics of Noni as mix crop in coconut garden

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