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Economic Analysis of Moringa (*Moringa pterygosperma*) Production in Tamil Nadu

V David Chella Baskar and Y Radha
Andhra Pradesh Water Management Project, Bapatla 522 101, Andhra Pradesh

ABSTRACT

Moringa (*Moringa pterygosperma*) is a multipurpose tree with five years of economic value. The per hectare human labour utilization for moringa cultivation over a period of five years was 463.21 man days, while the cattle labour and tractor power utilization were 55.52 cattle pair days and 18.45 hrs respectively. The land preparation activity, which involved digging of pits and preparation of basins was the important labour intensive operation during first year with 39.42 per cent share of the total establishment cost of Rs. 21248/ha of moringa production. The human labour employed for irrigation and harvesting was found increasing from second year. The expenditure incurred on fertilizer application took major share of maintenance cost of moringa orchard during second, third and fourth years, while harvesting took the major share during fifth year. The total cost and gross income recorded over a period of five years were Rs. 94169 and Rs.250500/ha respectively, with a benefit-cost ratio of 2.41 and pay back period of 1.47 years, proving that moringa cultivation was economically viable.

Key words : Benefit-cost ratio, Maintenance cost, Pay back period.

Moringa (*Moringa pterygosperma*) is a rich mineral packed multi-purpose tree, whose leaves, flowers and fruits are used extensively for culinary and medicinal purposes. It is the most important vegetable crop of Tamil Nadu. Tamil Nadu state has been witnessing a steady growth in production and marketing of moringa. The export quantity of moringa in Tamil Nadu has been increasing steadily from 750 tonnes in 1990-91 to 982 tonnes in 2003-04 (David Chella Baskar, 2007). Realising the importance of moringa production in Tamil Nadu state, a research study has been undertaken to analyse the economics of moringa production in Tamil Nadu state.

MATERIAL AND METHODS

Tirunelveli district, having the highest area under moringa production in Tamil Nadu state at first stage and two taluks viz., Nanguneri and Kalakad, having the highest area under moringa in Tirunelveli district at second stage, were purposively selected for the present study. Similarly, two villages each, having the highest area under moringa cultivation viz., Palayarpuram and Kurgattur in Nanguneri Taluk and Kolumadai and Gopalasamudram in Kalakad Taluk were purposively selected at later stage for the present study. Finally, from each of the four selected villages, ten farmers under moringa cultivation, thus making the total sample to forty farmers, were selected randomly for analysing the economics of moringa cultivation in Tamil Nadu state. The data for analysis pertained to the year 2005-06. Conventional tabular analysis was used to study the human labour employment, costs and returns. The economic viability of moringa orchard was analysed using cash-flow analysis.

RESULTS AND DISCUSSION

The age-wise classification of moringa orchards of selected sample farmers is presented in Table 1.

Of the total sample of 40 farmers, two farmers (5.0%) possess the moringa orchard of <1 year old, seven farmers (17.50%) possess 1-2 year aged orchard, eight farmers (20.00%) possess 2-3 year old orchard, while a sample of 18 farmers (45.00%) possess 3-4 year old orchard and five farmers (12.5%) possess >4 year old orchard.

Human labour employment

The moringa orchard starts bearing from nine months and employs more human labour with increase in the age of the orchard till fifth year. The year-wise and operation-wise labour utilization in moringa cultivation is depicted in Table 2.

It is inferred from Table 2 that land preparation, which involved digging of pits and preparation of basins was the important labour intensive operation during first year and consumed 77.39 mandays/ha, accounting for 59.42 per cent of total labour employed during first year. The other operations that employ human labour include

Table 1. Age-wise classification of moringa orchards of selected farmers

Age (Yrs.)	No. of Farmers	Per cent to Total
Up to 1	2	5.00
1-2	7	17.50
2-3	8	20.00
3-4	18	45.00
>4	5	12.50
Total	**40**	**100.0**

planting, manuring, fertilizer application, intercultivation, irrigation, plant protection and harvesting. From second year onwards, harvesting followed by irrigation demanded more human labour.

Thus it could be inferred that the per hectare human labour employment for moringa cultivation over a period of five years was 463.21 mandays, while the cattle labour and tractor power employed were 55.52 cattle paired days and 18.45 hrs respectively. The human labour employed for irrigation and harvesting were found increasing from second year.

Establishment cost

The establishment cost of moringa orchard (Table 3) included the expenditure incurred on activities viz., land preparation, planting, manuring, fertilizer application, plant protection, intercultivation and irrigation during first year i.e., up to the period, at which the orchard starts bearing.

Land preparation is an important activity during first year of moringa production and occupied the lion's share of 39.42 per cent of total establishment cost followed by planting (19.30%), fertilizer application (15.78%), manuring (12.64%), irrigation (6.38%), etc.

Cost of cultivation

The analysis of total cost of cultivation at the end of fifth year, as depicted in Table 4, revealed that among the variable costs, the expenditure incurred on fertilizer application took the major share (17.93 per cent) followed by harvesting, manuring, plant protection, irrigation, etc. It could also be observed that the amount spent on manuring and fertilizer application were found decreasing from third year, while the expenditure incurred on harvesting and irrigation were found increasing with the advancement of the age of moringa orchard. Among the fixed costs, rental value of owned land took the major share of 14 per cent of the total cost of cultivation.

Yield and returns

The year-wise yield and returns realized in moringa cultivation are presented in Table 5. The results revealed that the yields were found increasing from 5 t ha^{-1} during first year to 24 t ha^{-1} during 4th year and decreased to 20.5t/ha during 5th year and were found in conformity with the results of Vandana *et.al.* (1996), who estimated that the yield of guava orchard increased from second year and started declining from fifth year onwards.

Though there is variation in prices of the produce of different orchards, the average price was considered at Rs.3000 t^{-1}. The total cost and gross returns realised over a period of five years were Rs. 94170 and Rs.250500 ha^{-1} respectively.

Economic viability of moringa orchard

It could be inferred from Table 6 that the moringa orchard, when maintained for a period of five years, was found economically viable with a higher Benefit-Cost Ratio of 2.41, Net Present Worth of Rs.99376 / ha, Internal Rate of Return of 235 and a lower Pay Back Period of 1.47 years. These results are in agreement with the results of Gupta and George (1974), who analysed the economic viability of santra gardens in Nagpur and proved beneficial.

CONCLUSIONS

Moringa, an important vegetable crop of Tamil Nadu can be cultivated as a perennial crop with good economic returns up to a period of five years. The per hectare yield of moringa was increasing from 5 tonnes during first year to 24 tonnes during fourth year and declined to 20.5 tonnes during fifth year. The benefit-cost ratio over a period of five years was 2.41, while the pay back period was worked out to 1.47 years for moringa orchard.

Table 2. Year-wise and operation-wise labour utilisation in moringa cultivation

S.No.	Parti-culars	I Year			II Year		III Year		IV Year		V Year		Total		
		HL	CL	TP	HL	CL	HL	CL	HL	CL	HL	CL	HL	CL	TP
1	Land Preparation	77.39 (59.42)	36.99 (85.23)	10.63 (57.61)									77.39 (16.72)	36.99 (66.62)	10.63 (57.62)
2	Planting	8.61 (6.61)											8.61 (1.86)		
3	Manuring	2.41 (1.85)			4.32 (5.63)		3.58 (4.76)		3.76 (4.86)		4.17 (4.03)		18.24 (3.94)		
4	Fertilizer application	6.84 (5.25)			7.52 (9.79)		6.70 (8.91)		6.89 (8.90)		6.50 (6.28)		34.45 (7.43)		
5	Inter-cultivation	4.57 (3.51)	6.41 (14.77)	7.82 (42.39)	8.24 (10.73)	4.20 (100.00)	8.90 (11.83)	3.82 (100.00)	7.84 (10.13)	4.10 (100.00)	10.02 (0.68)	0.38 (100.00)	39.57 (8.54)	18.53 (33.38)	7.82 (42.38)
6	Irrigation	15.71 (12.06)			15.16 (19.74)		15.34 (20.40)		17.15 (22.15)		22.27 (21.51)		85.63 (18.48)		
7	Plant protection	5.36 (4.12)			15.33 (19.97)		10.40 (13.83)		8.28 (10.69)		3.70 (3.57)		43.07 (9.30)		
8	Harvesting	9.36 (7.19)			26.21 (34.14)		30.29 (40.27)		33.50 (43.27)		56.89 (54.94)		156.25 (33.73)		
	Total	130.25 (100.00)	43.40 (100.00)	18.45 (100.00)	76.78 (100.00)	4.20 (100.00)	75.21 (100.00)	3.82 (100.00)	77.42 (100.00)	4.10 (100.00)	103.55 (100.00)	0.38 (100.00)	463.21 (100.00)	55.52 (100.00)	18.45 (100.00)

Note:
HL= Human labour (Mandays / ha); CL= Cattle labour (Cattle pair days / ha); TP = Tractor power (No. of hours / ha)
Figures in parentheses indicate per cent to total.

Table 3. Establishment cost of moringa orchard

S. No.	Particulars	Amount (Rs./ha)	Per cent to Total
1	Land Preparation	8377	39.42
2	Planting	4102	19.30
3	Manuring	2684	12.64
4	Fertilizer application	3355	15.78
5	Intercultivation	576	2.72
6	Plant protection	799	3.76
7	Irrigation	1355	6.38
	Total	**21248**	**100.00**

Table 4. Year wise and Item wise cost of cultivation of moringa (Rs/ha)

S. No.	Item/Year	I	II	III	IV	V	Total
I. Variable cost							
1	Land preparation	8377 (31.51)	-	-	-	-	8377 (8.89)
2	Planting	4102 (15.43)	-	-	-	-	4102 (4.34)
3	Manuring	2684 (10.09)	4404 (19.71)	1553 (10.37)	1471 (8.87)	851 (6.21)	10963 (11.64)
4	Fertilizer application	3355 (12.62)	6095 (27.27)	3179 (21.22)	3044 (18.36)	1220 (8.91)	16893 (17.93)
5	Inter cultivation	576 (2.17)	745 (3.33)	775 (5.17)	2116 (12.76)	717 (5.23)	4929 (5.23)
6	Plant protection	799 (3.00)	3641 (16.30)	2030 (13.55)	2147 (12.95)	1334 (9.74)	9951 (10.56)
7	Irrigation	1355 (5.1)	1387 (6.21)	1423 (9.49)	1481 (8.94)	1854 (13.54)	7500 (7.96)
8	Harvesting	655 (2.46)	1834 (8.21)	2120 (14.15)	2345 (14.15)	3981 (29.07)	10935 (11.61)
9	Interest on working capital	1314 (4.94)	1086 (4.86)	665 (4.44)	756 (4.56)	597 (4.34)	4418 (4.69)
10	Sub total	23217 (87.34)	9192 (85.89)	11745 (78.41)	13360 (80.62)	10555 (77.09)	78068 (82.90)
II. *Fixed cost*							
1	Land revenue & cess	45 (0.17)	45 (0.20)	45 (0.30)	45 (0.27)	45 (0.32)	225 (0.24)
2	Depreciation	340 (1.28)	145 (0.65)	220 (1.47)	200 (1.20)	133 (0.97)	1038 (1.10)
3	Rental value of owned land	2675 (10.06)	2675 (11.97)	2675 (17.85)	2675 (16.14)	2675 (49.53)	13375 (14.20)
4	Interest on fixed capital	306 (1.15)	286 (1.28)	294 (1.96)	292 (1.76)	285 (2.08)	1463 (1.55)
5	Sub total	3366 (12.66)	3151 (14.10)	3234 (21.59)	3212 (19.38)	3138 (22.92)	16101 (17.09)
6	Total	26583 (100.00)	22343 (100.00)	14979 (100.00)	16572 (100.00)	13692 (100.00)	94169 (100.00)

Table 5. Yield and returns of moringa orchard.

Year	Yield (t ha^{-1})	Price (Rs. t^{-1})	Gross returns (Rs. ha^{-1})
I	5.0	3000	15000
II	14.0	3000	42000
III	20.0	3000	60000
IV	24.0	3000	72000
V	20.5	3000	61500
Total	**83.5**		**250500**

Table 6. Cash flow analysis of moringa orchard (Rs. /ha)

S.no.	Particulars	Years					
		I	II	III	IV	V	Total
1.	Capital Investment	21248	-	-	-	-	21248
2.	Operation and Maintenance cost	5335	22343	14979	16572	13692	72921
3.	Total cost	26583	22343	14979	16572	13692	94169
4.	Gross returns	15000	42000	60000	72000	61500	250500
5.	Net returns	-11583	19657	45021	55428	47808	156331
6.	Discount factor @12%	0.892	0.796	0.710	0.633	0.565	
7.	Present worth of total cost	23712	17785	10635	10490	7736	70358
8.	Present worth of gross returns	13380	33432	42600	45576	34746	169734
9.	Present worth of Net returns	-10332	15647	31965	35085	27011	99376
10.	Net present worth @ 12%			99376			
11.	BCR @ 12%			2.41			
12.	Internal rate of return			235%			
13.	Pay back period			1.47			

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