

## ECONOMIC ANALYSIS OF PALMAROSA CULTIVATION IN INDIA

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### ABSTRACT

*Cymbopogon martinii*, commonly known as palmarosa, is an essential oil-bearing crop cultivated by the farmers for production of oil used in perfumery, cosmetics and flavour industries. The study on the economics of palmarosa cultivation has shown that the major portion of operational cost was shared by human labour, distillation charges and preparation of nursery. Total variable cost was found to be ₹ 47926 per hectare per year. The gross returns were found to be ₹ 124000 per hectare per year. The net returns over variable cost were ₹ 76074 per hectare. The benefit–cost ratio was found to be 2.59 indicating a higher profit to the farmers. The independent variables like human labour, planting material and distillation charges were positive indicating significant impact on the returns from the crop. There is need for effective market intelligence system to ensure remunerative price of the produce to the farmers.

**Key words:** Cost of cultivation, Economic analysis, Marketing

### INTRODUCTION

The *Cymbopogon martinii*, commonly known as palmarosa, is an essential oil-bearing crop. The essential oil of palmarosa, obtained from the floral shoots and above ground parts of *motia* variety of *Cymbopogon martinii* is the source of natural geraniol valued in perfumery, cosmetics and flavor industries (Anonymous 2004). Geraniol is also used in high grade perfumes and as a starting material for the synthesis of aroma chemicals (Anonymous, 2004 and Kumar. *et. al.* 2012). To work out the economic analysis of menthol mint (Kumar *et. al.* 2011) and economics of menthol mint, tulsi and vetiver (Suresh *et. al.* 2012). The cultivation of this crop is receiving attention of the farmers due to the continued efforts in R&D being made by CSIR-Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP) under the rural development programme and simultaneously due to increasing demand of the oil in the domestic as well as world market.

The improved varieties of palmarosa and agro-technologies for their cultivation developed by CSIR-CIMAP have been made available to a very

large number of farmers in different parts of the country. This crop can be grown in marginal and underutilized land ensuring better returns to the farmers comparative to other crops. This crop may have great scope for cultivation in new areas for employment generation, wasteland utilization and rural development owing to the increasing demand of palmarosa oil in various cosmetics, perfumery and flavour industries.

### MATERIALS AND METHODS

The primary data were collected from the farmers during the CSIR-CIMAP farmers' fair held on 31<sup>st</sup> January, 2013 at Lucknow. For this, 30 farmers were selected purposively who were cultivating palmarosa crop. To study the economics of palmarosa, simple cost accounting method was followed. The price of the oil used in the analysis was the average sale price in a particular year. The secondary data was collected from different sources like Monthly Statistics of Foreign Trade of India: Export, Government of India publication (GOI, 2012) CSIR-CIMAP Farm Bulletin, etc. The Cobb-Douglas production function was fitted well to evaluate the resource-use efficiency in the production of

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palmarosa crop cultivated by the selected farmers (Kumar *et. al.* 2011 and Suresh *et. al.* 2012).

$$Y = aX_1^{b1} \cdot X_2^{b2} \cdot X_3^{b3} \cdot X_4^{b4} \cdot X_5^{b5} \cdot X_6^{b6} \quad \text{--- (1)}$$

Where,

Y= Yield of palmarosa oil value (₹/ha)

X<sub>1</sub>= Human labour value (₹/ha)

X<sub>2</sub>= Machine & tractor hours value (₹/ha)

X<sub>3</sub>= Seed/ planting material value (₹/ha)

X<sub>4</sub>= Manure & fertilizer value (₹/ha)

X<sub>5</sub>= Irrigation value (₹/ha)

X<sub>6</sub>= Distillation charges (₹/ha)

## RESULTS AND DISCUSSION

**India's export of palmarosa oil:** The year-wise data on export of palmarosa oil from India during 1991 to 2012 are presented in Table 1. The data indicated that the export of palmarosa oil, which was about 2.5 ton valued at over 9 lakhs in 1990-91, reached up to 30 ton during the year 2002-03 and thereafter increased to 47 ton valued at approx. 11 crores during the year 2011-12. It is observed that there has been about 20-fold increase in export (by volume) over a period 22 years. This was due to the increasing demand of the natural oils in the world market as well as domestic market. This trend has given encouragement to the farmers for

TABLE 1: Export of palmarosa oil from India by quantity and value during 1990 to 2012\*

Year	Quantity (ton)	Value (₹. Lakh)
1990-91	2.58	9.57
1991-92	6.08	23.70
1992-93	3.71	12.42
1993-94	2.56	15.69
1994-95	5.40	35.07
1995-96	12.19	49.01
1996-97	8.52	50.43
1997-98	7.66	46.81
1998-99	13.66	96.00
1999-00	11.01	88.65
2000-01	12.90	82.46
2001-02	14.49	99.31
2002-03	30.66	207.23
2003-04	18.02	108.86
2004-05	12.51	67.78
2005-06	20.58	118.95
2006-07	21.12	183.52
2007-08	40.94	332.37
2008-09	57.17	539.72
2009-10	43.96	459.58
2010-11	37.06	643.23
2011-12	47.41	1135.13

\*Source: Monthly Statistics of the Foreign Trade of India: Export.

cultivation of palmarosa oil for better return over the other crops. It is estimated that about 20-25% of total quantity of the oil produced in India is exported currently as reported by the industry sources. The export is likely to increase as demand of the oil is growing every year. The domestic requirement of palmarosa oil is also substantial which needs to be sustained through production and regularized trade of palmarosa oil.

**Country-wise export of palmarosa oil:** The country-wise export of palmarosa oil during 2011-12 in terms of quantity and value exported are presented in the Table 2. It may be seen from the table that France is the major importer of palmarosa oil from India followed by USA, UK, Germany, Spain, Switzerland, Srilanka and Philippines. This may further increase in future by promoting the cultivation of the palmarosa crop specially in wasteland and underutilized lands without affecting the production of cereals and other food crops.

**Cost of cultivation of palmarosa crop:** The per hectare cost and returns from cultivation of palmarosa crop were calculated at current prices during the year 2012-13 and have been presented in Table 3. The total variable cost was found to be ₹ 47,926 per hectare per year. More than two third portion of the cost of cultivation was shared by human labour (28.97%) followed by distillation charges (26.12%), raising of nursery and seed material (18.54 %). This is due to the fact the palmarosa crop requires comparatively lesser inputs in terms of irrigation, weeding, etc.

**Economics of palmarosa cultivation:** Table 4 shows the economics of cultivation of the crop at farmer's field. The crop planted one hectare area given an average yield about 124 kg of oil under the

TABLE 2: India's exports of palmarosa oil in the major countries (2011-12)

Countries	Quantity (ton)	Value (₹ lakh)
France	16.20	352.34
U S A	12.48	311.72
UK	3.45	50.76
Germany	3.34	67.70
Spain	2.77	67.17
Switzerland	2.55	93.17
Srilanka	1.61	35.80
Philippines	1.08	41.37

Source: Monthly Statistics of the Foreign Trade of India: Export (2011-12)

TABLE 3: Cost structure in cultivation of palmarosa crop (₹/ ha)

Particulars	Amount ( )	%
Human labour (transplanting, inter-culture, irrigation, harvesting, distillation, etc.)	13885	28.97
Machine/Tractor	2457	5.13
Raising of nursery and seed	8887	18.54
FYM & fertilizers	3939	8.22
Irrigation	3960	8.26
Distillation charge	12517	26.12
Interest on working capital	2282	4.76
Total variable cost	47926	100.00

TABLE 4: Economics of palmarosa cultivation

Particulars	Amount
Production of oil (kg./ha)	124
Price (₹ /kg.)	1000
Gross return ( /ha)	124000
Cost of cultivation ( /ha)	47926
Net return over variable cost (/ha)	76074
B-C ratio	2.59

normal conditions. Considering the average sale price of palmarosa oil as ₹ 1,000 per kg during the study period, the gross return were found to be ₹1, 24,000 /ha per year. The net returns over variable cost found to be was ₹ 76,074 / ha per year. Therefore, the benefit–cost (B-C) ratio was found to be 2.59. Thus profitable returns through cultivation of palmarosa may attract large number of farmers to cultivate this crop to enhance their income.

**Estimated resource use efficiency for palmarosa cultivation:** The estimated resource use efficiency in palmarosa production is presented in Table 5. The determination of multiple regressions coefficient's ( $R^2$ ) value was estimated as 0.475 which indicates 47 % of the variations in palmarosa yield was influenced by the explanatory variables included in the model. The independent variables like human labour, seed/planting material and distillation charges were positive indicating significant impact on the returns from palmarosa crop in the study area.

TABLE 5: Estimated production function for palmarosa cultivation

Variables	Regression coefficient's	Standard error
Regression constant	5.134*	0.345
Human labour value (₹/ha)	0.103*	0.048
Machine & tractor hours value (/ha)	0.001	0.033
Seed/ planting material value (/ha)	0.072*	0.034
Manure& fertilizer value (/ha)	-0.027	0.022
Irrigation value (/ha)	0.009	0.019
Distillation charges (/ha)	0.062*	0.030
$R^2$	0.475*	-
N	30	-

\*Significant at 5 per cent level

**Marketing of palmarosa oil:** The important marketing channels involved in the palmarosa oil marketing system were found to be as under:  
Channel-I: Producer- Local buyers- Industry  
Channel - II: Producer -Industry.

It was observed that about 80 percent of palmarosa growers used Channel-I, and only 20 percent used Channel- II to sell their produce. It is, therefore, apparent that local buyers act as middle man in this trade slicing away a major portion of the profit which may have gone to the producer. It is, therefore, imperative to link the producers directly with the user industries to ensure better market price to the producers.

### CONCLUSIONS

Palmarosa being a hardy aromatic crop can be grown under varying agro-climatic conditions and different types of wastelands in different parts of India. The farmers need to be educated about adoption of improved agro-technology and plant varieties for obtaining optimum yield of the oil. It is required to establish sufficient number of distillation units in palmarosa growing areas to ensure timely distillation of the harvested crop besides the up-gradation of post-harvest management for ensuring better quality oil. There is a need for effective market intelligence system so that farmers can sell their

produce at remunerative price to industry directly. The concerned government departments both at state and centre level should fix minimum support price (MSP) of palmarosa oil. Adequate emphasis is also required towards post harvest management including primary processing of the crop for producing good quality oil and also to have proper storage and warehousing facility in the vicinity of cluster where palmarosa cultivation is promoted. The independent variables like human labour, seed/planting material

and distillation charges were positive indicating significant impact on the returns from palmarosa crop in the study area.

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#### **REFERENCES**

- Anonymous (2004). Palmarosa cultivation Farm Bulletin published by CSIR-Central Institute of Medicinal and Aromatic Plants, Lucknow, India. 1-23.
- GOI (2012). Monthly Statistics of the Foreign Trade of India Export (1990-2012). Ministry of Commerce & Industry, Directorate General of Commercial Intelligence & Statistics, Council House Street, Kolkata-700001
- Kumar S., Suresh R., Singh V. and Singh A.K., (2011). Economic analysis of menthol mint cultivation in Uttar Pradesh: A case study of Barabanki district. *Agricultural Economics Research Review*. **24**: 346-350.
- Kumar S., Suresh R., Bansal R.P., and Tomar VKS, (2012). MAPs cultivation in Uttar Pradesh: sustainable mean for crop diversification. *Lucknow Management Association Convention Journal*. **8**: 78-84.
- MAP Companion (2004). Published by CSIR-Central Institute of Medicinal and Aromatic Plants, Lucknow, India, 1-66.
- Suresh R, Kumar S, Singh V, Pravesh R, Tomar VKS and Singh AK (2012). Economics of production to marketing of aromatic crops in Uttar Pradesh: A case study. *Agricultural Economics Research Review*. **25**:157-160.