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Shifting from Agriculture to Agribusiness: The Case of Aromatic Plants

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Abstract

This study has examined the agribusiness opportunities in medicinal and aromatic plants (MAPs), based on the field level information from the state of Uttarakhand. The financial feasibility of important aromatic plants has been studied. It has been found that the returns are substantially higher from these crops than the most profitable commercial crops like sugarcane. The study has identified the constraints that affect the spread of cultivation of MAPs; these include inadequate processing capacities, price risks and non-availability of planting material. It has been suggested that concerted efforts should be made to address these constraints and increase access to the world market.

Introduction

Medicinal and aromatic plants (MAPs) are receiving considerable attention all over the world because of their vast untapped economic potential, especially in the use of herbal medicines. The MAPs offer a wide range of safe and cost-effective, preventive and curative therapies, which are useful in achieving the goal of 'health for all'. As per the estimates of the World Health Organisation, over 80 per cent of the world's population relies on traditional medicines, largely plant-based, for primary health care (WHO, 2002). The international market for herbal products is estimated to be of US$ 62 billion, and it is poised to grow to US$ 5 trillion by the year 2050 (Purohit and Vyas, 2004). The Indian share in the global herbal trade is

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negligible (0.5 per cent) as compared to that of many other countries, including China, where exports based on plants including raw drugs, therapeutics and other MAPs has been estimated to be of around Rs 18,000 crores (Singh, 2005). Despite vast potential, the market for aromatic plants is still in the nascent stage, primarily because of low awareness among farming community, especially about their potential and returns (Purohit, 2004). The economic viability, factors associated with it and production constraints have not been studied adequately. This information will help in encouraging farmers to cultivate MAPs on a large scale. The specific objectives of the present study were: (a) to estimate economics and value addition of aromatic plants cultivation, and (b) to identify production constraints and suggest suitable policies for promotion of aromatic plants.

Economic Potential of MAPs

The MAPs occupy an important place in the socio-cultural, spiritual and health care aspects all over the world. According to the Exim Bank Survey, in view of the suitable environment and availability of rich diversity, the countries which offer maximum potential are: Sri Lanka, Egypt, Caribbean countries, Bangladesh, Mauritius, and Latin American countries. Though India is the leading exporter of medicinal plants in the world in the raw form, it stands 15th in terms of their production. Besides numerous uses of MAPs, they offer (i) higher returns than traditional crops; (ii) fetch better prices in the market; (iii) can be stored for a long time; (iv) low chances of pest attacks and diseases, and (v) can be raised as intercrops, along with traditional crops. Based on the data available from the pharma industry sources, the total domestic potential for crude drugs and oil extracts has been found to be around Rs 3 billion, out of which the requirement of over-the-counter (O.T.C.) products, including cosmetics, is of Rs 1.2 billion; ethical and classical formulations, Rs 1.2 billion; traditional medicines of vaidyas, Rs 400 million; and home remedial formulations, Rs 200 million (Exim Bank, 1997).

Realizing the vast untapped potential of MAPs, the Government of India had launched a scheme for their development during the VIIIth Five-Year Plan. It included production of quality planting material, establishment of herbal gardens as well as regional analytical laboratories. These programmes are being operated in 16 State Agricultural Universities (SAUs) and 3 Regional Research Laboratories (RRLs) of Council of Scientific and Industrial Research (CSIR). The programme for the development of MAPs was continued up to the Xth Plan also with added activities of financing and marketing. Through these efforts, awareness has been created about MAPs along with the development of their production system. However, poor marketing system has been an impediment. Research efforts through the

ICAR-SAU system, and institutions like Central Institute of Medicinal and Aromatic Plants (CIMAP) have helped in evolving agro-techniques for propagation and production of new plant varieties. The seed production programme of high-yielding varieties of aromatic plants is also being taken up by SAUs, and institutes of CSIR and ICAR. The implementing agencies are free to select the aromatic plants for seed production programme, considering their importance, suitability to the region, market demand, farmers' interest for cultivation, etc.

The central as well as state governments provide a variety of financial assistance in the form of loans and subsidies to the farmers engaged in MAPs cultivation through their agencies like National Medicinal Plant Board (NMPB), Agri-Export Zone, National Bank for Agricultural and Rural Development (NABARD), Agricultural and Processed Food Products Export Development Authority (APEDA), National Horticulture Board (NHB), etc. The NMPB has introduced several promotional as well as commercial programmes for the development of MAPs with financial assistance up to 100 per cent.

The Ministry of Agriculture, Government of India, has also undertaken a scheme, named 'Integrated Development of Medicinal and Aromatic Plants', which involves (a) production and distribution of quality planting material with assistance to the implementing agencies @ Rs 40,000 per hectare, and (b) setting up distillation units with financial assistance limited to 75 per cent of the actual cost or Rs 0.75 lakh per unit, whichever is less. The financial support of Rs 1,000 per person for training of progressive farmers has also been made available (Purohit, 2004).

Methodology

To examine the economics of these aromatic plants, simple cost accounting method was followed. The financial feasibility was worked out by comparing costs and returns at different stages of economic life. The prices used in the analysis were triennium averages for the period 2004-06, and the summary measures captured were net present value (NPV), benefit cost ratio (BCR), pay back period (PBP) and internal rate of return (IRR). The necessary data for the study were collected from U. S. Nagar and Dehradun (Uttarakhand) during the year 2005-06. Since all the three plants were perennial crops, data for the previous years were also collected on recall basis. For selection of farmers, a list of farmers growing aromatic plants was obtained from Herbal Research Development Institute (HRDI) of Gopeshwar and Dehradun. The size of the sample was of 41 growers, which included 16 for lemongrass, 12 for citronella and 13 for patchouli.

The primary data were collected through personal interview using a pre-tested questionnaire, while the secondary data were collected from the publications of government and other agencies. The general description of selected aromatic crops is given below.

Lemongrass (*Cymbopogon flexuosus*): It is a tall, perennial and aromatic grass. The leaves are long, soft, prolific and chocolate to violet in colour. It is found in Cameron Island cluster, Brazil, China, Thailand, Sri Lanka and Indonesia. In India, it is distributed in Kerala, Tamil Nadu, Karnataka, Assam, Western Uttar Pradesh, Maharashtra, Chhattisgarh, Madhya Pradesh and plains of Uttarakhand. The important varieties are: *Pragati, Praman, Sugandhi, Kaveri, Krishna,* RLL-16, GRL, OD-19, SD-16 and CKP-15. Its medicinal properties and uses are: (i) processed oil has antibacterial properties and is used as mosquito repellent; (ii) in toothache, headache, stomach ache; (iii) as flavouring agent; (iv) in herbal 'lemon tea', and (v) in perfumery. The planting materials are seeds and slips and planting time is July-August or February-March. The preferred time is February-March for a higher yield.

Citronella (*Cymbopogon winterianus jowitt)*: It is a perennial grass, 1.5 – 2.0 m high. It is distributed in India (Assam, West Bengal, Uttar Pradesh, Maharashtra, Karnataka, Kerala, Tamil Nadu, Goa and Madhya Pradesh and in the plains of Uttarakhand), China, Indonesia, Sri Lanka and Taiwan. The important varieties are: *Manjusha, Mandakini*, Bio-13, etc. Its medicinal uses are: (i) processed oil has antibacterial properties; (ii) as a mosquito repellent; (iii) in fever and cough; (iv) as a flavouring agent; and (v) in perfumery. The planting materials are seeds and slips and it is planted in July-August or February-March (Muni, 1995).

Patchouli (*Pogostemon cablin*): Patchouli is an erect, branched, pubescent herb, 0.5-1.0 m high. The leaves are ovate to oblong-ovate, coarse, simple or doubly crenate-serrate, on both surfaces, more or less densely tormentose. The stem is densely tormentose and swollen on the nodes. In India, it is geographically distributed in Bangalore and coastal areas of south India, Bengal and Assam and has been recently introduced in Uttar Pradesh and Uttarakhand. The crop is endemic to Malaysia, Indonesia and Singapore and has been extended across Paruguay, Penang, East and West Indies, the subtropical Himalayas and the Deccan Peninsula. The important varieties are: *Johore, Singapore and Indonesian*. Its medicinal uses are: (i) as a flavouring ingredient in major food products, including alcoholic and non-alcoholic beverages; (ii) in perfumery industry; (iii) as an ingredient in insect-repellent preparations; (iv) as antibacterial agent; and (iv) its fresh leaves are used in drugs to treat nausea, diarrhoea, cold and headache. Planting

materials are slips and hardened tissue culture plants. It is planted during August to October, preferably.

Economics of Aromatic Plants

(a) Costs and Returns

The per hectare annual costs and returns of lemongrass, citronella and patchouli were calculated at current prices and have been presented in Tables 1, 2 and 3, respectively. The economic life of lemongrass and citronella was five years and of patchouli, three years. The per hectare cost of cultivation of lemongrass, citronella and patchouli herbage has been found maximum during the initial year, but declined substantially in subsequent years due to the absence of cost of planting material. The fixed cost was approximately Rs 11,000, which ranged between Rs 10,000 and Rs 12,000 in all the three crops. The processing cost has been directly related to yield; it was lowest during the first year and increased subsequently, due to increasing distillation cost. The net returns obtained from the herbage and oil were negative during the first year due to high initial cost involved in that year. The net returns became positive in subsequent years. A comparison of net returns from

Table 1. Costs, returns and profitability from lemongrass cultivation at 2004-06 prices

(Rs/ha)

Particulars	Economic life (years)					Average
	1	2	3	4	5	
Variable cost	64,822	18,942	19,325	19,812	20,642	28,709
Material cost	47,971	6,365	6,395	6,624	6,758	14,823
Operational cost	15,425	12,160	12,505	12,752	13,430	13,254
Fixed cost	10,920	11,015	11,469	12,524	12,528	11,691
Processing cost	11,739	16,994	18,774	19,570	17,076	16,831
Total cost of herbage cultivation	75,742	29,957	30,794	32,336	33,170	40,400
Total cost of oil production	87,481	46,951	49,568	51,906	50,246	57,230
Yield of herbage (q/ha)	424	618	647	640	557	577
Yield of oil (kg/ha)	212	309	323	320	279	289
Net returns from herbage cultivation	-33,342	31,843	33,906	31,664	22,530	17,320
Net returns from oil production	-9,465	66,761	69,296	65,854	52,426	48,974
Value addition	23,877	34,918	35,390	34,190	29,896	31,654

Note: Herbage price: Rs 100/q, and oil price: Rs 368/kg

Table 2. Costs, returns and profitability from citronella cultivation at 2004-06 prices

(Rs/ha)

Particulars	Economic life (years)					Average
	1	2	3	4	5	
Variable cost	64,974	18,873	18,976	19,255	19,615	28,338
Material cost	49,069	6,390	6,353	6,462	6,720	14,999
Operational cost	14,475	12,068	12,205	12,370	12,463	12,716
Fixed cost	10,574	10,659	10,982	10,994	11,536	10,949
Processing cost	12,170	16,845	19,333	19,280	17,977	17,121
Total cost of herbage cultivation	75,547	29,533	29,957	30,249	31,150	39,287
Total cost of oil production	87,717	46,377	49,290	49,528	49,127	56,408
Yield of herbage (q/ha)	287	399	435	430	386	387
Yield of oil (kg/ha)	213	293	322	322	289	288
Net returns from herbage cultivation	-45,999	11,517	14,803	14,086	8,633	608
Net returns from oil production	-12,280	57,563	65,020	64,725	53,468	45,699
Value addition	33,719	46,046	50,216	50,638	44,834	45,091

Note: Herbage price: Rs 103/q and oil price: Rs 355/kg

Table 3. Costs, returns and profitability from patchouli cultivation at 2004-06 prices

(Rs/ ha)

Particulars	Economic life (years)			Average
	1	2	3	
Variable cost	41,616	10,417	11,043	21,026
Material cost	31,102	5,131	5,468	13,900
Operational cost	9,599	5,057	5,332	6,663
Fixed cost	11,894	11,894	11,894	11,894
Processing cost	3,042	3,217	3,288	3,182
Total cost of herbage cultivation	53,510	22,311	22,937	32,919
Total cost of oil production	56,552	25,528	26,225	36,101
Yield of herbage (q/ha)	102	108	107	106
Yield of oil (kg/ha)	34	36	36	35
Net returns from herbage cultivation	-14,678	18,805	17,761	7,296
Net returns from oil production	2,461	37,868	37,135	25,821
Value addition	17,139	19,062	19,374	18,525

Note: Herbage price: Rs 380/q and oil price: Rs 1760/kg

herbage and oil production revealed that the net returns were much higher from oil production than herbage production. Thus, farmers got higher returns by selling oil than herbage. The value addition was calculated by subtracting the net returns realized by herbage production from net returns realized by oil production. The value addition has shown the additional returns gained by farmers after processing of herbage.

(b) Financial Feasibility

The financial feasibility was worked out by comparing costs and returns over the economic life in terms of present value, after discounting in the form of pay back period, net present value (NPV), benefit-cost ratio (BCR) and internal rate of return (IRR). The financial feasibility of oil production from lemongrass, citronella and patchouli has been shown in Table 4. The pay back period was almost same, around 4.35 years, in lemongrass and citronella, and lower in Patchouli, 2.69 years. The NPV was positive in all the three crops, which meant that their cultivation was financially feasible. The NPV was found highest in the lemongrass, followed by citronella and patchouli. The BCR was estimated to be around 1.17 for these crops, which indicated that investment of one rupee on cultivation provided a net benefit of Re 0.17 (17 per cent). Thus, their cultivation was financially feasible. The IRR was estimated to be around 20 per cent, which was greater than the prevailing market rate. Hence, investment was found financially feasible.

Economics of MAPs vis-a-vis Other Field Crops

The comparative economics of major field crops in the selected area was worked out considering their cost of production, gross returns and net returns (Table 5). A perusal of this table revealed that the highest net returns (Rs 48,868/ha) were obtained from oil production of lemongrass, followed by citronella and patchouli. Among the competing crops, sugarcane gave the maximum net returns of Rs 35,980 /ha, which was considerably lower than that from the aromatic plants. Therefore, cultivation of aromatic plants is a more profitable business in the plains of Uttarakhand than that of other

Table 4. Financial feasibility of oil production from selected aromatic plants

Sl No.	Investment criteria	Aromatic plants		
		Lemongrass	Citronella	Patchouli
1.	Pay back period, years	4.39	4.30	2.69
2.	Net present value (Rs)	1,21,246	1,05,453	56,207
3.	Benefit cost ratio	1.20	1.17	1.12
4.	Internal rate of return (%)	20.39	19.16	19.74

Table 5. Comparative economics of major crops in the plains of Uttarakhand

(Rs/ha)

Sl No.	Crops	Cost of production	Gross returns	Net returns
1	Sugarcane	48,343	84,323	35,980
2	Fine paddy-wheat	44,216	63,501	19,285
3	Coarse paddy-wheat	42,947	58,853	15,906
4	Fine paddy-mustard-vegetable pea	56,183	81,184	25,002
5	Lentil-coarse paddy	36,154	45,158	9,004
6	Lemongrass oil	57,230	106,205	48,974
7	Citronella oil	56,408	102,107	45,699
8	Patchouli oil	36,101	61,923	25,821

Note: Cost and returns for aromatic plants are the annual averages.

major field crops studied. But, the farmers were not increasing area under aromatic crops due to lack of awareness about their profitability and low risk-bearing capacity. Also, they did not shift from the traditional crops because of high initial cost involved in the cultivation of MAPs.

Major Constraints being Faced by Farmers

The major constraints experienced by the growers of the selected aromatic plants were put under three categories, viz. production, processing, and policy constraints and have been presented in Table 6. These constraints were barriers in cultivating aromatic plants and restricted their area. To identify the constraints, the speculated problems were listed and farmers' opinion on them was sought. The analysis revealed that major problems were: high initial cost in production, poor quality of inputs and delay in their supply, lack of awareness about loan feasibility and incentives, procedural delays in obtaining loan, and high rate of interest. There is no transparency in the trade, particularly on procurement source, price, etc. Beside these, lack of basic infrastructure, organized marketing system and processing facilities, and high processing cost were the important processing constraints (Shrivastava, 2000). The lack of awareness about export market, proliferation of illegal trade and existence of intermediaries between farmers and traders were the major constraints from traders' point of view (Jairath and Agarwal, 2005). A policy should be evolved to establish distillation units near the farms so that small farmers could also avail of the opportunity.

Conclusions

The study has established that returns are much higher from the production of MAPs than traditional crops. The value addition due to oil

Table 6. Constraints being faced by farmers in cultivation of aromatic plants

Sl No.	Constraints	Percentage of farmers
I. Production constraints		
1.	High initial cost of production	100
2.	Poor quality of inputs and delay in their supply	90
3.	Lack of awareness about loan feasibility, incentives and procedural delays in obtaining loan	87
4.	Price fluctuations	87
5.	Inadequate market information	85
6.	Lack of trained labour for cultivation	82
7.	High rate of interest	72
8.	Lack of training programs on cultivation methods and their awareness to farmers	72
9.	Prevalence of insects, pests and diseases	72
II. Processing constraints		
1.	Lack of basic infrastructure and organized marketing system	100
2.	Lack of processing facilities	100
3.	High processing cost incurred by farmers	100
4.	Improper handling of herbage	85
5.	Longer distances between farms and distillation units	85
III. Constraints related to policy, trade, etc.		
1.	Lack of awareness about export market	90
2.	Proliferation of illegal trade, etc.	90
3.	Existence of intermediaries between farmers and traders	35

production has been found to further enhance the profitability of cultivation of aromatic plants. The economic analysis of the production of three aromatic plants, viz. lemongrass, citronella and patchouli has indicated that investment on these crops is financially feasible. The investment in cultivation of aromatic plants has been found profitable. The study has identified constraints being faced by farmers in production, processing and marketing of aromatic produce. Important among these are: high cost of planting material, poor quality of inputs, lack of processing facilities, non-availability of trained labour, lack of awareness about incentives, non-existence of organized marketing system, lack of credit, high price fluctuations, etc. The study has observed that immediate attention should be paid to address these constraints.

Establishment of processing or distillation units with adequate capacity should be encouraged in the production regions of MAPs, so that the quality and quantity of aromatic oil could be maintained and the growers would be able to get a higher price for their produce. Access to technical know-how and institutional credit on priority basis can help promote these processing

units. This activity should be backed with availability of planting material and support on the package of good practices for cultivation of MAPs. Research institutions should play a lead role in this direction. Lastly, the study has observed that efforts towards strengthening of the market information system and management of price risks will go a long way in developing the positive economy of MAPs cultivation.

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