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Economics and Marketing of Aromatic Rice — A Case Study of Chhattisgarh*

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Abstract

In recent years there has been a serious concern among the farmers, scientists, policymakers and environmentalists regarding the continuous erosion of genetic biodiversity of rice cultivars in Chhattisgarh which has traditionally been known as bowl of scented rices in central India. In view of India's potential competitiveness in aromatic rices in the international market, it is imperative to understand the dynamics of domestic trade in aromatic rice. In this study, marketing and price-spread patterns of aromatic rice in the state of Chhattisgarh have been examined. A few policy interventions have been suggested for promoting aromatic rices in the state.

Introduction

Enough has been written and debated on international trade of rice after introduction of agriculture reforms within the framework of GATT (Pingali, 1995; Chand and Haque, 1996; Shobha Rani *et al.*, 1996; Bhasin, 1996; 2000; Gulati and Sharma, 1997; Gulati *et al.*, 1999; Sankar and Kalirajan, 2001). With the establishment of WTO and agreement on the

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application of sanitary and phyto-sanitary (SPS) measures and technical barriers to trade (TBT), quality and safety aspects have gained increased significance (Marothia, 1997; 2001; Sareen, 1998). New approaches in international trade for rice in general, and aromatic rices in particular, are expected to develop over the next few years. The national governments are required to design policies for food qualities, including rice (non-aromatic and aromatic rices) for both domestic and international trade following WTO measures. In the case of rice, the safety factors include pesticides residue limits, doses of irradiation, and fumigation residues, etc. All these factors affect quality and consumer preferences. The basic issue at the national level is to test the rice quality right from farm to table level.

Studies on domestic trade in aromatic rice have not received considerable attention in India despite the fact that scented rice varieties have competitive international price and the country can earn foreign exchange from them. Chhattisgarh has traditionally been known as the bowl of scented rice in central India, particularly due to several varieties of its aromatic rice (Marothia, 2003). In recent years, there has been a serious concern among the farmers, scientists, policymakers and environmentalists regarding continuous erosion of genetic biodiversity of rice cultivars (Singh *et al.*, 2000; Singh and Singh, 2003). In view of the second phase of WTO and India's potential competitiveness in favour of aromatic rices in the international market, it is imperative to understand the dynamics of domestic trade of aromatic rices. It is important because not much information is available about the local level trade of aromatic rices, as large transactions in aromatic rice take place through hidden channels. Against this background, it is imperative to understand the pattern of domestic trade of aromatic rices at the micro level to address the basic issues of promoting their cultivation, production and export. With the introduction of high-yielding, short-duration, pest- and diseases-resistant varieties, price incentives and research inclinations towards modern varieties of non-aromatic rices to achieve self-reliance, thousands of hectares of area has been directed from aromatic rices to modern varieties. The cultivation of aromatic rice has been reduced largely to home consumption level, that too without much use of chemical fertilizers and pesticides to maintain consumption preference. In this study, the marketing and price-spread patterns of aromatic rices in the state of Chhattisgarh have been examined and few policy interventions have been suggested for promoting aromatic rice with regards to its production and trade in the state.

Methodology

This study was conducted in Nagri block of the Dhamtari district and Bilha block of the Bilaspur district in Chhattisgarh, with the financial support

from International Rice Research Institute (IRRI), Philippines. Nagri block is located in the eastern part of Dhamtari district and is 70-km away from Dhamtari and 135-km away from Raipur. Bilha block is in the southern part of Bilaspur district and is at 15-km from Bilaspur and 105-km from Raipur. It was found that there were nearly 130 traders and about 200 rice mills engaged in processing and trading of rice in the district of Dhamtari, Raipur and Bilaspur. Information on quantity of rice processed and traded, collected from 60 rice mills and 11 traders, has been presented in Table 1. It was found that aromatic rice contributed nearly 2 per cent of the total processed and traded rice in the state. A large proportion (71.82%) of aromatic rice was being marketed outside the state. Keeping in view the area covered under aromatic rices and number of varieties grown, Nagri block of Dhamtari district and Bilha block of Bilaspur were purposively selected for detailed economic analysis. Out of 250 and 178 villages of Nagri and Bilha blocks, 15 and 7 villages, respectively were selected for the study. From these villages 190 aromatic rice growers (131 from Nagri and 59 from Bilha) were selected for collecting information. The primary and secondary data were collected during the crop year 2001-2002.

Basic characteristics of sample farmers alongwith the distribution of farmers growing aromatic varieties are given in Table 2. Area coverage of different aromatic rice varieties under different farm-sizes has been presented in Table 3. *Dubraj-deshi*, *Dubraj-Bouna*, *Vishnubhog* and other aromatic varieties (*Ruchibhog*, *Tulsibhog*, *Jawaphool*, *Basmati* and *Tulsimanjari*) are extensively grown and the analysis was confined to these varieties only.

Table 1. Processing and trading of rice in Chhattisgarh : 2001-02

S.No.	Particulars	Quantity (tonnes)	Share (per cent)
1	Processing of rice		
	i. Aromatic rice	13569	1.78
	ii. Non-aromatic rice	745488	98.22
	iii. Total rice	759057	100.00
2	Trading of rice		
	a. Aromatic rice	8294	1.78
	i. Within the state	2337	28.18
	ii. Outside the state	5956	71.82
	b. Non-aromatic rice	456881	98.22
	i. Within the state	151259	33.11
	ii. Outside the state	305622	66.89
	c. Total rice	465176	100.00
	i. Within the state	152897	32.87
	ii. Outside the state	312279	67.13

Table 2. Basic characteristics of sample farms in Chhattisgarh

Farm-size groups	No. of farms	Owned farm area (ha)	Leased in (ha)	Leased out (ha)	Operated area (ha)	Irrigated as operated area, %	No. of aromatic rice growers				Cropping intensity, %
							<i>Dubraj-desi</i>	<i>Dubraj-bouna</i>	<i>Vishnubhog</i>	Others*	
Marginal	16	0.50	0.12	-	0.62	66.07	4	9	3	-	125.81
Small	42	1.29	0.22	0.04	1.47	71.16	12	24	7	2	108.84
Medium	58	2.40	0.28	0.08	2.60	75.00	27	22	13	3	123.85
Large	74	6.00	0.80	0.26	6.54	76.98	40	31	11	8	115.75
All	190	3.38	0.45	0.13	3.70	75.95	83	86	34	13	115.68

*Others – *Basmati*, *Ruchibhog*, *Tulsibhog*, *Jawaphool* and *Tulsimanjari*

Table 3. Percentage area under different aromatic rice varieties by farm-size groups

Particulars	Marginal	Small	Medium	Large	All
<i>Dubraj-deshi</i>	11.48	7.46	7.54	6.43	6.94
<i>Dubraj-bouna</i>	19.67	13.43	9.52	5.48	7.22
<i>Vishnubhog</i>	4.92	4.48	4.76	3.13	3.62
Other aromatic rice	-	0.75	0.80	0.47	0.56
Total aromatic rice	36.07	26.12	22.62	15.51	18.33
Non-aromatic rice	63.93	73.88	77.38	84.49	81.67
Area under total paddy (in ha)	0.61	1.34	2.52	6.38	3.60

Quality characteristics analysis of *Dubraj* accessions was carried out using Standard Evaluation Systems for Rice, developed by IRRI. The quality parameters of *Dubraj-deshi* and *Dubraj-bouna* are given in Table 4.

Results and Discussion

Results and discussion have been divided into four sections. The first section deals with the basic features of sample farms. In the second part, findings pertaining to cost of cultivation, share of inputs in production cost, and productivity levels of different varieties of aromatic rices across farm-size groups have been presented. The third part deals with marketing and processing analysis and in the last part, constraints in production, marketing and processing have been discussed.

Basic Features of Sample Farms

These features provided an insight into the cropping pattern, average farms size/operated area, irrigated area, number of aromatic rice-growers by farm-size, percentage area to aromatic rice by variety in the study area (see Table 3). It can be seen from Table 2 that average farm-size/operated area and percentage of irrigated area were more under large-size than other-size farms. The number of aromatic rice-growers increased with increase in farm-size. It was observed that *Dubraj-bouna* and *Dubraj-deshi* varieties occupied the maximum area. On an average, 18.33 per cent of the total rice area was covered under different varieties of aromatic rices in the study area.

Share of Inputs and Productivity Levels

The share of input expenditure in the cost of cultivation, productivity levels and returns to investment are shown in Table 5. The cultivation of aromatic rice was found to be highly labour-intensive. Integrated use of

Table 4. Quality characteristics of *Dubraj* accessions

S.No.	Quality attributes	<i>Dubraj-deshi</i>	<i>Dubraj-bouna</i>
1	Paddy (mm)		
	(i) Length	8.35	8.65
	(ii) Width	2.35	2.50
	(iii) Length-width ratio	3.55	3.46
2	Brown rice (mm)		
	(i) Length	6.25	6.15
	(ii) Width	2.10	2.10
	(iii) Length-width ratio	2.98	2.93
3	Milled rice (mm)		
	(i) Length	5.75	5.55
	(ii) Width	2.05	2.05
	(iii) Length-width ratio	2.80	2.70
4	Hulling (%)	78.80	78.90
5	Milling (%)	72.86	71.74
6	Head rice recovery (%)	56.97	42.61
7	Kernel length after cooking (mm)	8.80	8.60
8	Kernel width after cooking (mm)	2.85	2.80
9	Lengthwise elongation (%)	53.04	54.95
10	Breadthwise expansion (%)	39.02	36.58
11	Elongation ratio	1.53	1.55
12	Elongation index	1.10	1.13
13	Alkali value (GT)	2.70	2.50
14	Grain type *	Medium	Medium

*Grain type was classified as per the classification provided in *Standard Evaluation System for Rice*, IRRI Project, 1996, Manila, Philippines.

fertilizers and FYM shared the next highest expenditure, followed by seed and plant protection measures. It was interesting to note that farmers were not very keen to use insecticides and pesticides unless there was a serious attack of pests and diseases. The high doses of chemical fertilizers and insecticides reduce the aroma quality of the rices significantly in the opinion of growers. Yield levels of *Vishnubhog* in all the categories of farms were higher than those of *Dubraj-deshi*. However, yield levels of other aromatic rice varieties were high on large farms as compared to those in *Dubraj-deshi* and *Dubraj-bouna*. Flat rates (Rs 80/ha) for canal irrigation prevailed in the study area, irrespective of the number of irrigations. Irrigation changes were not included in the cost of production due to flat rates. The yield levels of *Dubraj-deshi* and other aromatic rices were much lower on small than other farm categories. Lower yields were attributed by the farmers to low waterholding capacity of soils on their farms. The per rupee return to investment was higher for *Vishnubhog* than *Dubraj-bouna* and other aromatic rices. It was, in fact, due to higher market price of *Vishnubhog*.

Table 5. Per cent share of inputs in total cost and profitability of aromatic rice in Chhattisgarh : 2001-02

Particulars	Farm-size groups											
	Marginal				Small				Medium			
	Dubraj- <i>deshi</i>	Dubraj- <i>bouna</i>	Vishnu- <i>bhog</i>	Others	Dubraj- <i>deshi</i>	Dubraj- <i>bouna</i>	Vishnu- <i>bhog</i>	Others	Dubraj- <i>deshi</i>	Dubraj- <i>bouna</i>	Vishnu- <i>bhog</i>	Others
Seed	9.56	6.42	11.39	-	11.57	6.75	8.37	5.88	9.42	7.46	9.21	12.93
FYM	8.80	6.99	9.89	-	6.22	5.01	2.93	11.48	8.41	6.66	6.32	5.82
Fertilizers	16.73	22.14	12.08	-	14.32	14.11	14.97	12.14	13.43	14.02	18.48	9.25
Insecticide/Pesticides	1.90	3.27	2.24	-	1.81	4.62	3.92	7.81	1.93	5.98	1.42	4.42
Bullock labour	18.13	17.76	15.66	-	15.42	15.18	17.74	15.50	11.91	11.01	18.67	10.47
Machinery power	3.19	7.48	2.24	-	7.18	8.09	4.51	4.30	11.11	9.97	4.94	9.72
Family labour	25.64	13.61	24.92	-	9.73	21.53	16.41	36.00	11.54	6.04	19.18	12.15
Hired labour	16.76	22.33	21.58	-	33.75	24.71	31.14	6.89	32.25	38.86	21.79	35.24
Total cost (Rs/ha)	11483	11800	12359	-	10815	11913	10597	12010	11067	10074	8800	9272
Yield (q/ha)	27.45	24.63	23.75	-	17.66	20.16	26.95	13.79	22.80	23.72	23.72	18.17
Gross returns (Rs/ha)	27450	19704	25531	-	17665	16128	28971	13790	22799	18976	25499	18186
Net returns (Rs/ha)	15966	7903	13135	-	6850	4214	18374	1779	11732	8901	16699	8914
Input output ratio	1:2.39	1:1.67	1:2.06	-	1:1.63	1:1.35	1:2.73	1:1.14	1:2.06	1:1.88	1:2.90	1:1.96

Contd.

Table 5. Per cent share of inputs in total cost and profitability of aromatic rice in Chhattisgarh : 2001-02 — *Contd*

Particulars	Farm-size groups						
	Large			All			
	Dubraj- <i>deshi</i>	Dubraj- <i>bouna</i>	Vishnu- <i>bhog</i>	Others	Dubraj- <i>deshi</i>	Dubraj- <i>bouna</i>	Vishnu- <i>bhog</i>
Seed	19.99	5.45	9.94	10.04	9.98	6.27	9.63
FYM	7.99	7.54	2.88	8.49	7.95	6.83	4.00
Fertilizers	10.60	15.73	16.42	13.55	11.78	15.26	16.68
Insecticides/ Pesticides	2.03	1.87	2.68	2.73	1.98	3.54	2.46
Bullock labour	7.23	5.92	16.73	2.24	9.39	9.47	17.31
Machinery power	15.66	17.21	7.25	20.72	13.47	13.13	6.21
Family labour	4.71	3.65	10.98	0.33	7.36	7.91	14.11
Hired labour	41.78	42.63	33.13	41.90	38.09	37.53	29.60
Total cost (Rs/ha)	10594	9864	9721	12815	10574	10433	9620
Yield (q/ha)	25.25	23.68	27.09	27.15	23.65	23.46	26.10
Gross returns (Rs/ha)	25254	18944	29121	27153	23652	18768	28054
Net returns (Rs/ha)	14660	9079	19400	14338	13077	8334	18433
Input output ratio	1:2.38	1:1.92	1:3.00	1:2.11	1:2.24	1:1.80	1:2.92
							1:1.97

Marketed Surplus, Marketing and Processing Cost Structure

The pattern of marketed surplus for *Dubraj-deshi*, *Dubraj-bouna*, *Vishnunbhog* and other aromatic rices was more or less same and hence an aggregate picture has been given in Table 6. The sample farmers had primarily grown aromatic rices for their home consumption. After retaining the quantity for seed purpose, the remaining quantity of the produce was marketed. It was interesting to note that large and marginal farmers marketed about 51.89 per cent and 31.39 per cent, respectively of their produce. The large farmers could sell a sizeable surplus due to higher production whereas, marginal farmers marketed the produce due to need of money. It was observed that marginal farmers generally sold out sizable quantity of the produce and even purchased non-aromatic rice to meet their consumption requirements.

Two main marketing channels were prevalent in the study area (Table 7). In channel-I, the traders/shopkeepers have traditionally been in touch with the farmers during harvesting season to purchase their produce at the farm gate. Over the years, the share of produce marketed through this

Table 6. Marketed surplus of aromatic rice in selected farm-size groups in Chhattisgarh

Farm-size groups	Production (q)	Food consumption (q)	Seed (q)	Marketed surplus (q)
Marginal	90.80 (100.00)	54.40 (59.91)	7.90 (8.70)	28.50 (31.39)
Small	293.99 (100.00)	228.40 (77.69)	26.90 (9.15)	38.69 (13.16)
Medium	756.19 (100.00)	579.28 (76.60)	47.47 (6.28)	129.47 (17.12)
Large	1833.63 (100.00)	772.85 (42.15)	109.35 (5.96)	951.43 (51.89)
All	2974.61 (100.00)	1634.90 (54.96)	191.62 (6.44)	1148.09 (38.60)

Note: Figures within the brackets indicate the percentages of the total production.

Table 7. Share of produce sold by farmers through different channels
(per cent)

Channels	Farm size				
	Marginal	Small	Medium	Large	All
Channel-I	26.32	14.73	9.27	18.02	17.13
Channel-II	73.68	85.27	90.73	81.98	82.87

channel has been reducing due to emergence of rice mills and networking of commission agents associated with rice mills. The sample farmers sold almost 82 per cent of their produce to either commission agents or directly to the rice mills. Marketing cost of different varieties of aromatic rices under both channels are given in Table 8. The marketing cost for all the varieties was found slightly lower in channel-I than channel II.

The marketing and processing cost, monetary gains and producers' share in consumer rupee in channel-I are given in Tables 9a, 9b and 9c, respectively. Of the total marketing and processing cost in channel-I, 89 per cent was paid to farmers, and nearly 8 per cent was incurred on local taxes and packaging. Sixty per cent recovery of rice was observed for all the varieties in channel-I, which accounted for more than 91 per cent of the total value. The producers' share in the consumer rupee accounted for nearly 62 per cent (Table 9c). In channel-II, only processing cost was important because the agents directly purchased produce from the farmers and delivered it to rice millers (Tables 10a & b). The fixed cost followed by expenses on miscellaneous items, gunny bags, electric charges, wages and salaries constituted the major items of processing cost.

The recovery of rice in channel-II was found 61 per cent. It was difficult to trace out the onward transactions of the processed aromatic rices in channel-II, due to their hidden trade prevalent in this area since decades.

Production, Marketing and Processing Constraints

Continuous decrease in cultivated area, compulsion to use insecticides and pesticides due to severe attack of insects/pests, low productivity, adherence to traditional method of cultivation and non-availability of quality seeds due to increasing erosion of genetic diversity of aromatic rices were the major constraints identified by the sample farmers in enhancing area and productivity of aromatic rices (Tables 11 a,b & c).

In the opinion of farmers, the functioning of regulated market was not conducive for aromatic rices. Low price and small number of buyers (practically oligopsony network of market) for aromatic rices were also considered important marketing constraints by the farmers. In the view of rice millers, limited availability of financial support from the financial institutions, transporting of processed rice to other states, and locational disadvantage of processing units were among the important constraints. It was important to note that government policies, particularly with respect to levy, were considered favourable by the mill owners. It was primarily due to the fact that aromatic rice milling was out of the levy net. For promoting

Table 8. Marketing cost of different varieties of aromatic rice in marketing Channels I and II

(Rs/q)

Particulars	Varieties									
	<i>Dubraj-desi</i>		<i>Dubraj-bouna</i>		<i>Vishnubhog</i>		Others		All aromatic rices	
	Channel-I	Channel-II	Channel-I	Channel-II	Channel-I	Channel-II	Channel-I	Channel-II	Channel-I	Channel-II
Transporting	4.89 (53.79)	4.50 (43.86)	10.89 (70.39)	10.17 (62.98)	-	3.68 (38.33)	5.00 (58.83)	4.85 (45.63)	8.06 (65.10)	6.61 (52.80)
Loading/ unloading	2.67 (29.37)	2.15 (20.96)	2.98 (19.28)	2.00 (12.38)	-	2.13 (22.19)	2.00 (23.52)	2.00 (18.81)	2.75 (22.23)	2.20 (17.57)
Weighing	1.00 (11.00)	1.00 (9.75)	1.00 (6.46)	1.00 (6.19)	-	1.00 (10.42)	1.00 (11.77)	1.00 (9.41)	1.00 (8.07)	1.00 (7.99)
Commission	-	2.00 (19.49)	-	2.40 (14.86)	-	2.20 (22.42)	-	2.19 (20.60)	-	2.13 (17.01)
Others	0.53 (5.83)	0.61 (5.94)	0.60 (3.88)	0.58 (3.60)	-	0.59 (6.14)	0.50 (5.89)	0.59 (5.55)	0.57 (4.60)	0.58 (4.63)
Total	9.09	10.26	15.47	16.15	-	9.60	8.50	10.63	12.38	12.52

Note: Figures within the brackets indicate percentages of the total marketing cost.

Table 9a. Marketing and processing cost of aromatic rice in channel-I in Chhattisgarh

Particulars	Value	
	Rs/q	Percentage
Price paid to farmers	1133.00	89.15
Transporting	2.00	0.16
Loading/unloading	11.00	0.86
Milling	2.33	0.08
Cleaning	15.00	1.18
Others *	105.00	8.27
Total	2.52	0.20
	1270.85	100.00

*Others – Local taxes, packaging, etc.

Table 9b. Total gains from aromatic rice after processing in channel-I

Particulars	Recovery (%)	Value (Rs/q)	Percentage
Rice	60	1680	91.60
Broken rice	10	80	4.36
Husk	23	46	2.51
Bran	7	28	1.53
Total	100	1834	100.00

Table 9c. Marketing and processing cost and price-spread of aromatic rice in channel-I in Chhattisgarh

Particulars	Value	
	Rs/q	Percentage
Producer's share	1133.00	61.77
Marketing cost	12.38	0.67
Processing cost	137.85	7.52
Trader's profit	550.77	30.04
Price paid by consumer	1834.00	100.00

domestic trade, free movement of rice, liberal financial support and development of infrastructural facilities were the prerequisites.

The farmers of Chhattisgarh were seriously concerned with the erosion of aromatic rice diversity in their surrounding environment. They did not have any solution to arrest the continuous disappearance of aromatic rice varieties. Very small quantity of a particular aromatic rice can be produced on tiny farm sizes. It was very difficult many a times to even retain the produce for seeds. Due to non-replacement of seeds for years together,

Table 10a. Processing cost of aromatic rice in channel-II

Particulars	Value	
	Rs/q	Percentage
(A) Raw material cost	1125.00	96.54
(B) Processing cost		
i. Handling charges	0.54	0.05
ii. Salaries to staff	2.62	0.22
iii. Wages	4.02	0.34
iv. Local taxes	0.02	0.00
v. License fees	0.10	0.01
vi. Electricity charges	5.58	0.48
vii. Lubrication oil	0.28	0.02
viii. Repairs & maintenance	1.68	0.14
ix. Gunny bags	6.15	0.53
x. Miscellaneous costs	5.66	0.49
Total processing cost	26.65	2.29
(C) Interest on fixed capital	13.62	1.17
(D) Total cost (A+B+C)	1165.27	100.00

Table 10b. Recovery in channel-II

Particulars	Percentage
Rice	61.09
Broken rice	9.17
Bran	7.19
Husk	22.66
Total	100.00

seed quality was also getting deteriorated. As a result, in the past 20 years several valuable aromatic varieties of rices have either disappeared or are on the verge of disappearance. Table 12 provides a list of the varieties which have disappeared in the study area, as perceived by the sample farmers.

Conclusions and Policy Interventions

Cultivation of aromatic rice is labour-intensive with low application of chemical fertilizers and plant protection materials. The quality of seeds is the important contributor to the cost. The yield levels of aromatic rices categories included in this study are quite low but due to high market prices, the returns to farmers are generally much higher in aromatic than non-aromatic rices. A large proportion of the produce is retained for home consumption and seeds. The remaining produce is marketed through two

Table 11a. Major constraints in production of aromatic rice in Chhattisgarh

Particulars	Percentage of farmers' response
1. Area in aromatic rice	
Increase	2.63
Decrease	97.37
Reasons	
Low production	81.58
Attack of insect/pest	60.00
High cost of cultivation	19.47
Sensitive to chemical use	8.95
Adulteration problems	10.00
Poor resistance to pests and diseases	15.26
Lack of technical information	4.74
Lodging problems	7.37
2. Availability of quality seed	
Available	43.68
Not Available	56.31
3. Control measures to pest and diseases	
Traditional method	54.21
Use of insecticides/pesticide	100.00
4. Shortage of labour	
Yes	54.74
No	-
6. Non-availability of irrigation water throughout the crop season	
Yes	33.68
No	66.32

primary marketing channels. The producer share in consumer's rupee in channel-I has been found approximately 62 per cent, whereas in channel-II, it could not be worked out due to its non-tracibility beyond rice mill. Susceptible to pests/ diseases, low productivity, non-availability of quality seeds, low price, small number of powerful and well connected buyers, non-responsive attitude of regulated markets towards aromatic rices have been identified as major constraints to farmers. Financial constraints, and movement-restrictions on aromatic rices across states have been recorded as the important constraints to rice millers. In the opinion of selected farmers, several aromatic rice varieties have disappeared during the past 10 years in their areas.

Based on the findings of this study and relevant review of literature, the following policy interventions are suggested:

1. To arrest increasing erosion of diversity in aromatic rices, a comprehensive policy may be prepared. Causes of disappearance of

Table 11b. Marketing constraints in aromatic rice in Chhattisgarh

Particulars	Percentage of farmers response		
	Yes	No	Don't know
Do you get remunerative price of your product?	32.63	67.37	-
Do you face problems regarding transportation?	16.32	81.05	2.63
Does small marketable quantity create any problem in selling your product?	17.37	80.53	2.10
Are there sufficient No. of buyers of your product?	56.32	43.16	0.52
Do you depend on middle-men for disposal/sale of your produce?	12.63	80.00	7.37
Are you satisfied with the present method of sale & purchase of produce prevailing in <i>Mandi</i> ?	52.63	47.37	-
Is there any kind of malpractices prevailing in the <i>Mandi</i> for the marketing of aromatic rice?	40.00	60.00	-
Other constraints, if any*	8.95	83.16	7.89

*Difficult to sell old paddy of aromatic rice in *Mandi*, and it needed separate arrangement for purchase of aromatic rice.

Table 11c. Constraints confronted by rice millers in Chhattisgarh

Particulars	Percentage of rice millers response
1. Availability of raw material	
Yes	100.00
No	-
2. Power supply	
Problem of low voltage & cut-offs	56.25
No problem of power supply	43.75
3. Location of processing unit	
Location advantage	68.75
Location disadvantage	31.25
4. Government policies	
Favourable	56.25
Not favourable	43.75
5. Financial regulation*	
Limited (less than required)	75.00
6. Problems in marketing of main product **	25.00
7. Problems in marketing of by-products	0.00
8. Problems of high cost on levy & transport	12.50

*With respect to availability.

**Transporting produce outside the state.

Table 12. Opinion of farmers regarding disappearance of aromatic rice varieties

S.No.	Aggregate		
	Name of varieties disappeared in the past		
	10 Years	15 Years	20 Years
1	<i>Rajabhog</i>	<i>Chini-kapoor</i>	<i>Kapoorsar</i>
2	<i>Siyaram</i>	<i>Jhiniparag</i>	<i>Soth</i>
3	<i>Kewachh</i>	<i>Tilkasturi</i>	<i>Mokhlaphool</i>
4	<i>Garrakat</i>	<i>Mogramahak</i>	<i>Kasturi</i>
5	<i>Badsabhog</i>	<i>Alchi alcha</i>	<i>Dokramechha</i>
6	<i>Sambarmati</i>	<i>Bhasmpatri</i>	<i>Chikkut</i>
7	<i>Madhuri</i>	<i>Kalikumud</i>	<i>Kalimunchh</i>
8	<i>Chinnour</i>	<i>Tulsimala</i>	<i>Tulsiprasad</i>
9	<i>Tulsi-manjari</i>	<i>Luchai</i>	<i>Bhataphool</i>
10	-	<i>Elaichy</i>	<i>Tendu-phool</i>
11	-	-	<i>Shukla bhata</i>
12	-	-	<i>Baspatri</i>
13	-	-	<i>Lookthimachhi</i>
14	-	-	<i>Harun dubraj</i>

Source: Field survey 2001-2002 of 190 farmers in both the chosen blocks.

various varieties, measures for their conservation and methods for utilization of available germplasm for breeding new varieties retaining aroma quality may be inventorized. Multi-location trials with fairly long-term perspectives may be conducted to understand the bio physical-socio economic and cultural dimensions of aromatic rices. *In-situ* and *ex-situ* experiments may be conducted to assess wide replicability of available aromatic varieties in different parts of Chhattisgarh. Horizontal and vertical research linkages need be established at the national and international levels to understand the cross-cutting issues of aromatic rices cultivation, marketing, processing and quality dimensions. To ensure against biopiracy, registration of all aromatic varieties must be done at an early date with Natural Bureau of Plant and Genetic Resources.

2. In the context of changing world agricultural scenario, India may have edge over other countries in the aromatic rices. To promote export of aromatic rices, reform measures need to be effectively linked with domestic trade. Unfortunately not much research has been done in domestic trade of aromatic rices and as a result, even crude estimates are not available to assess the extent and pattern of domestic trade. Research organizations in the state and central government should commission a series of studies in different agro-climatic zones dominated with aromatic rices cultivation to assess domestic trade.

3. An integrated approach is needed to bring all stakeholders in cultivation, trade, research and management of aromatic rices under one umbrella to develop meaningful strategies to improve/maintain quality dimensions and to take advantage of trade opportunities. The comparative advantages of trade opportunities spelt out in WTO agreement have to be analyzed with their impact on domestic and international trade of aromatic rices. Such an analysis may shape the future of aromatic rices in Chhattisgarh and other parts of the country.

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