EXECUTIVE SUMMARY

In Bihar, although aromatic rices are grown all over the state, they are mainly concentrated in Bhagalpur and Magadh divisions. Bhagalpur has been a traditional aromatic rice growing area, where the varieties, such as : (i) Katarni, (ii) Tulsi Manjari, (iii) Badshahbhog, (iv) Br-9, and; (v) Br – 10 are mostly common. These are photoperiod-sensitive, tall and hence, susceptible to lodging and several diseases and pests. Their yield vary from 2.0 to 2.5 t/ha (Katarni is the most prevalent variety of the region). However, over the period there has occurred a large variation, which has resulted into various types, such as (i) Bhauri katarni, (ii) Deshla katarni, and; (iii) Sabour katarni, (iv) Ghorayiya katarni. In Magadh region, which is the main rice growing tract of Bihar, farmers grow Karibank, Marueya, Mehijawain, Shyamjira, Tulsiphool, Sonachur and Shah Pasand. Over the time, the areas under these varieties have drastically reduced, although farmers still grow Karibank and Marueya, but on a small scale only. The tarai region of West Champaran was, at one time, known for its good quality aromatic rice varieties, that included (i) Lal champaran basmati, (ii) Bhuri champaran basmati, (iii) Kali champaran basmati, (iv) Baharni, (v) Badshahbhog, (vi) Chenaur, (vii) Dewtabhog, (viii) Kesar, (ix) Kamod, (x) Kanakjeera, (xi) Marcha, (xii) Ram Janwain, (xiii) Sonalari, and; (xiv) Tulsi Pasand. Most of these varieties have either already lost, or are at the verge of extinction *(Singh et al. 2000).*

Local varieties have yield potential ranging from 15 to 30 qtls/ha, and are tall possessing short grains. Many of them are highly susceptible to various insect pests and diseases, like: (i) stem borer and (ii) bacterial blight. Since they have excellent cooking quality and aroma, they are still grown by farmers on small scale particularly in case of under mentioned three varieties, (i) Kamini (Katarni), (ii) Mircha, and; (iii) Malida. Each of these three has its own speciality: Katarni for cooked rice, Mircha for Cheura and Malida for its adaptability in low land deep water.

Table No. 1: Local Scented Rice Varieties and Landraces of Bihar

SN.	Location	Scented Rice Varieties/Landraces	Land Type	Important Characteristics
1.	Patna	Basmati-3, Karibank-2, Mohin Dhan, Sagarbhog and Hansraj	Medium and Low lands	Tall, late duration, small to medium fine grain, aromatic and photoperiod sensitive
2.	Bhojpur	Sonachur, Karibank, Basmati, Badshahbhog and Kanakjeera	-DO-	-DO-
3.	Rohtas	Sonachur, Shyamjeera, Basmati-3, Shahpasand and Thulsiphool	-DO-	-DO-
4.	Gaya	Basmati and Kanehonehur	-DO-	-DO-
5.	Aurangabad	Shyamjeera and Mehijawain	-DO-	-DO-
6.	Bhagalpur	Tulsimanjari, Katarnibhog, Badshahbhog and Br-9 & Br – 10	-DO-	-DO-
7.	Munger	Tulsimanjari, Shyamjeera, Karibank, Marueya and Lakhisar	-DO-	-DO-
8.	North Bihar	(i) Badshahbhog, (ii) Badshahpasand, (iii) Baharni, (iv) Basmati03, (v) Br-9, (vi) Br-10, (vii)Bhuri Champaran Basmati, (viii) Chenaur, (ix) Dewtabhog, (x) Hansraj, (xi) Kamod, (xii) Katarnibhog, (xiii) Kali Champaran Basmati, (xiv) Karibank, (xv) Karibank - 2 (xvi) Kanakjeera, (xvii) Kesaurbani, (xviii) Kesar, (xix) Lal Champaran Basmati, (xx) Lakhisar, (xxi) Marcha, (xxii) Marueya, (xxiii) Malbhog, (xxiv) Mehijawain, (xxv) MohinDhan, (xxvi) Ram Jawain, (xxvii) Sagarbhog, (xxviii) Sonalari, (ixxx) Sonachur, (xxx) Shyamjeera, (xxxi) Shahpasand, (xxxii) Tulsipasand, (xxxiii) Tulsimanjari, and; (xxxiv) Tulsiphool.	-DO-	-DO-

All land races of aromatic types grown in Bihar have fine, but short grains and consequently of low export values.

In view of the lower yield of traditional aromatic rice varieties in Bihar declining area under Katarni paddy over the years and most of the good quality aromatic rice varieties either being lost or facing the threat of extinction the study has been undertaken with the objectives noted below:

i. *To assess the potential area of Katarni paddy in the study area.*
ii. *To find out socio-economic characteristics of the farmers, who cultivate Katarni paddy.*
iii. *To study the economics of Katarni paddy in the study area.*
iv. *To identify the marketing channels of Katarni paddy in the study area*
v. *To identify the constraints in raising the area under Katarni paddy in the study area, and;*
vi. *To suggest suitable measures for the development of Katarni paddy in the study area.*

The study entitled **Problems and Prospects of Katarni Paddy Production in Bihar** is mainly based on primary data collected from 30 katarni paddy growing cultivators each from Bhagalpur and Banka districts. 'Multi stage random sampling method' was followed to select respondents.

At the first stage of sampling, the two districts, namely: Bhagalpur and Banka were purposively chosen, as the specific variety of Katarni, to which this study is devoted can be grown only in particular areas of these two districts.

At the second stage of sampling, **one block, in from each district** was selected on the basis of larger the area under Katarni paddy and potential. On this basis, Jagdishpur block and Amarpur block were selected from Bhagalpur and Banka Districts respectively.

At the third stage of sampling, maintaining the harmonious basis of choosing potential villages, in regard to cultivation of Katarni paddy, two villages each from the two selected blocks of the concerned districts were identified. Thus, two villages, namely: Bhawanipur-Deshari and Jagdishpur cluster of villages under Jagdishpur block were selected. Similarly, (i) Tardih-Lakshmipur, and; (ii) Ramchandrapur-Bhadariya villages were selected from Amarpur block of Banka district.

At the fourth stage of sampling, enlistment of Katarni paddy growers in the selected villages was made. In Bhawanipur-Deshari and Jagdishpur cluster of villages under Jagdishpur block of Bhagalpur district, the number of marginal, small, medium and large farmers growing katarni paddy also, were 40, 50, 55 and 21 respectively. Number of katarni paddy growers, who belonged to marginal, small, medium and

large farm size classes of 'Tardih Lakshmipur' and 'Ramchandrapur Bhadaria' villages in Amarpur Block of Banka district were 45, 40, 60 and 18 respectively.

At the fifth stage of sampling, indispensable classification of farmers from out of the enlisted growers was done based on farm size owned by them. All the enlisted growers were broadly kept in four categories: (i) Marginal --- owning land up to 1 hectare, (ii) Small --- 1.01 to 2 hectare, (iii) Medium --- 2.01 to 4 hectare, and; (iv) Large --- > 4 hectare.

At the sixth stage of sampling, 15 farmers from each of the selected villages (if required number of Katarni paddy growers was not found in a particular village, then cluster of adjoining villages was also considered) were selected for detail study. The selection of farmers was done on probability proportion method. Further, with the view to maintain discreet selection of respondents, due emphasis was given on social composition of the enlisted growers.

In this way, the selection of sample can be illustrated as below: 2 districts x 1 block each (=02) x 2 villages each (04) x 15 farmers = 60 Katarni paddy growers.

Simple tabular and percentage methods have been followed to analyze the data and interpretation of observed facts. Reference year of the primary data collection is 2010-11. However, the secondary data are pertained to the latest one available in the Department of Agriculture, Government of Bihar, Bhagalpur & Banka districts.

I

Bhagalpur district is situated between 25°07′ to 25°30′ N latitude and 86°37′ to 87°30′ E longitude in the basin at a height of 141 feet above sea level. The district is surrounded by Munger and Khagaria in West, Purnea and Katihar in north, Banka in south and Sahibganj (Jharkhand) in east. The district is divided centrally across from west to east by the river Ganga. On the northern part lie the Naugachia sub-division and the other two sub-divisions, Bhagalpur sadar and Kahalgaon lies on the southern bank. The district was spread over 2.54 lakh square hectares and divided

into 16 blocks and 242 gram panchayats. The city of Bhagalpur is the headquarters of Bhagalpur division as also of the district and sadar sub-division. The district had 1519 revenue villages. Out of it, 923 villages (60.76%) are inhabitated and 596 (39.24%) un-inhabitated.

However, as per the Census 2011, Series –II, the population of Bhagalpur district was 3,032,226 which accounted for 2.92 per cent of the state's total population. Sex ratio of the district was distressing (879 female/1000 male). The population density was found 1180/sq km. The literacy rates of male and female were 72.30 and 56.50 per cent respectively. It revealed that the gender gap in literacy was 15.80.

The data classification of workers reveals that 48.39 per cent were agricultural workers followed by 19.63 per cent cultivators. 7.43 per cent workers were engaged in household industries and 24.55 per cent constituted other workers. The work participation rate in the district was 35.37 per cent with only 21.34 per cent in case of female. Data on sector wise employment pattern revealed that 68.10 per cent workforce was employed in primary sector followed by 24.50 per cent in tertiary sector and only 7.40 per cent in secondary sector.

While changes in land utilization pattern were very slow and marginal throughout the state, however, there had been a marginal increase in the non-agricultural use of geographical area across the state. As regards the pattern of land utilization in the district of Bhagalpur, out of the total geographical area, net sown area was 1.53 lakh hectares i.e., 61.91 per cent. While forest coverage had remained at 0.10 per cent, permanent pasture land was 0.90 per cent. Current fallow land came to 20.87 per cent. Cultivable waste land (3.30%) and land under non-agricultural uses (18.33%).

The cropping intensity was 124.42 per cent only, which was slightly less than the state figure of 132.78 per cent.

Irrigation happens to be one of the major inputs of agricultural development. Though, several measures have been taken to enhance the scope of irrigation ever since India became independent, however, things have not undergone

metamorphosis change so far. Consequently, various sources of irrigation were taken recourse depending also on the status of the farmers. Notwithstanding these efforts, Bhagalpur lagged behind in terms of irrigational base and irrigational intensity compared to the state average.

II

Banka district is situated in centre of 24°30′ to 25°08′ N latitudes and 86°30′ to 87°12′ E longitudes in the basin at a height of 43 metres from the mean sea level. The district is surrounded by Dumka & Deoghar districts of Jharkhand in south, Bhagalpur in north, Godda (Jharkhand) in east and Jamui & Munger in West. The district is spread over 3.05 lakh hectares and divided into 11 blocks and 185 gram panchayats. It had 2114 revenue villages. Out of it, 1682 villages (79.56%) were inhabitated and 432 (20.44%) un-inhabitated.

However, the Census 2011, Series – II report reveals that the population of Banka district was 20,29,339, which accounted for 1.96 per cent of the state's total population. Sex ratio of the district was distressing (907 females/1000 male). The population density was 672/sq km. The literacy rates of male and female were 69.80 and 49.40 per cent respectively. It revealed that the gender gap in literacy was 20.40 per cent.

The number of total workers in the district was 6.39 lakh, which accounted for 39.74 per cent of the total population. The data on classification of workers reveals that 51.71 per cent were agricultural labourers followed by 33.74 per cent cultivators, 4.62 per cent workers engaged in household industries and 9.93 per cent constituted other workers. The work participation rate in the district was 39.70 per cent with only 28.16 per cent in case of female.

The district had hot summer and moderate in winter season. As per available normals, the maximum temperature of the district was 43° Celsius in the month of May/June and minimum temperature fell up to 8.8° Celsius in the month of

December/January. The minimum and maximum percentages of the humidity were 28.8 and 77.6 respectively.

While changes in land utilization pattern were very slow and marginal throughout the state, however, there had been a marginal increase in the non-agricultural use of geographical area across the state. As regards the pattern of land utilization in the district of Banka, out of the total geographical area, net sown area was 1.52 lac hectares i.e., 49.86 per cent. While forest coverage had remained at 14.18 per cent, permanent pasture land was 0.56 per cent. Current fallow land came to 1.25 per cent, cultivable waste land (2.61%) and land under non-agricultural use (13.35%).

The cropping intensity was 106.00 per cent only, which was much lower than the state figure of 132.78 per cent.

Irrigation happens to be one of the major inputs of agricultural development. Though there have been several measures taken to enhance the scope of irrigation ever since India became independent, however, things had not undergone metamorphosis change so far. Consequently, various sources of irrigation were taken recourse to depending also on the status of the farmers. Notwithstanding these efforts, Banka lagged behind in terms of irrigational base and irrigational intensity compared to the state average. As per latest data, out of the net sown area, only 83.72 per cent of land had the scope of irrigation and the rest either remained rainfed or faced the worst. The data on source wise distribution of irrigated area revealed that canal (70.57%) was the major source followed by bore well, open well (5.67%), tank (2.34%) and others (2.68%).

A glance on the table containing data related to socio-economic features of sample respondents reveals highest number of respondents (growing katarni paddy) to be in the age group of 36-60 years in both Bhagalpur (93.33%) and Banka districts (83.33%).

Social group wise composition of the surveyed respondents reveals that the highest number of katarni paddy growing farmers belonged to OBC group 23 (76.67%) in Bhagalpur and 17 (56.67%) in Banka district.

Data in table further expresses stronger presence of respondents belonging to hindu religion in Bhagalpur district (73.33%) and 100 per cent in Banka district.

Data in table distinctly covers that all of the surveyed katarni paddy growers in both the selected districts were male (100% each).

In regard to main occupation and other activities of the surveyed farmers, table evinces agriculture to be the main source of livelihood for all the surveyed farmers of both the districts i.e., Bhagalpur and Banka 30-30 (100% each).

On overall level, share of the sources of livelihood for the surveyed katarni paddy growers were: (i) Agriculture (as main occupation) 100 per cent, (ii) Business/Trade 8.34 per cent, (iii) Service (Public/Private Sector 10.00 per cent, and; (iv) as Agricultural Labourers 6.66 per cent).

A glance on the table helps us to expound that at an average the surveyed katarni paddy growers of Bhagalpur and Banka, districts both) fell under the broad category of medium land holding. It further furnishes that katarni paddy growing not being a much remunerative exercise, mostly the medium and big farmers preferred to undertake its cultivation.

It is interesting to note that in Bhagalpur 4.54 ha and Banka 25.14 ha of leased in land areas were from irrigated conditions, i.e., higher than unirrigated ones 3.48 ha and 10.71 ha) respectively.

Having groped the reason, most probably responsible for larger gross areas on aggregate level in Banka district 100.93 ha than Bhagalpur 79.16 ha, the revealed factor may be attributed to much higher leased-in area of 35.85 ha actually leased out by the big and prosperous R K caste land owners of the district.

Data in table corroborate that average sizes of leased-in land were higher in cases of marginal farmers on overall level (0.53 ha) in Bhagalpur district, while small farmers (2.10 ha) in Banka district. It is interesting to note that no medium and/large farmer leased out their land in Bhagalpur district, while Banka district witnessed as per normal belief large (1.16 ha) and medium farmers (0.21 ha) to have leased out their cultivable land.

Small and medium farmers of Banka district were clearly ahead in leasing in lands followed by marginal farmers in terms of aggregate total 14.65 ha, 14.48 ha and 6.72 ha respectively. In Bhagalpur district, marginal farmers were ahead 3.67 ha followed by small and medium 3.35 and 1 ha respectively.

In nutshell, due to larger total and average land areas leased out by big farmers of Banka district (majority of them belonging to prosperous R K caste, 3.47 ha, 2.53 ha, 1.16 ha and 0.21 ha) respectively, the sample katarni paddy growers of this district were at more privileged stage having taken larger areas as leased in land.

In Bhagalpur district larger areas under unirrigated conditions were used by the sample respondents for growing cereal mainly paddy 34.25 ha pulses, mustard 7 ha and orchards 3.50 hectares. In case of Banka district, areas under pulse crop masoor (lentil) 12.50 ha, khesadi 7 ha, mustard 8 ha, Tisi 4.92 ha and orchards 5.55 ha under unirrigated land areas were higher. Paddy in Banka district got greater share under irrigated condition 38.13 ha.

A concise look upon data in cropping pattern table crystallizes larger areas under katarni paddy devoted/used in irrigated conditions in Bhagapur and Banka districts both when compared to areas under unirrigated conditions 6.35 ha 10.20 ha and 2.08 ha and 9.15 ha respectively.

As far cultivation of vegetables is concerned, data contained in the table reveals larger areas devoted towards onion (in irrigated condition) only in both the surveyed districts in comparison to brinjal and potato also in Banka district 0.56 ha, 1.00 ha, 0.50 ha, 0.25 ha and 0.65 ha respectively.

Data contained in table captivates towards largest areas under katarni paddy devoted by big large farmers of Bhagalpur and Banka districts both (4.22 ha and 10.00 ha, i.e., 50.06 per cent and 51.68 per cent of the total operational areas of the concerned districts) respectively. Having a glance on data it can also be framed that there is direct and positive relationship between farm size and areas devoted for growing katarni paddy, i.e., with the increase in the farm size, there were increases in land areas used for growing katarni paddy.

On overall level, under variable cost, maximum expenditure, i.e., in percentage terms, was incurred on labour (both hired and imputed family labour) Rs. 9,070 per hectare (24.68%), and the minimum being in case of transplantation Rs. 1,000/- (2.72%). While the amount paid as wages to labourers was higher in Banka district (Rs. 9,100/-), the transplantation cost was higher in Bhagalpur (Rs. 1,050/-). As the quantum of net returns were quite higher in Bhagalpur district (Rs. 12,986.72) in comparison to that of Banka district (Rs. 9,552.70), so Cost Benefit Ratio (CBR) of Bhagalpur district (1:1.36) was found to be genuinely higher than that of the later district (1:1.26).

Data in table made it crystal clear that labour had remained the major items of expenditure (Rs. 9070/- per ha (24.68%) followed by irrigation (12.24%), harvesting (8.59%), ploughing (8.30%), manure (6.87%), fertilizers (5.96%), seeds (5.17%), transplantation (2.72%) and interest on working capital (1.80%).

Table No. 2: Per hectare Cost of Cultivation of Katarni Paddy.

SN		Particulars	Bhagalpur	Banka	Overall (In %)
Average Area Under the Crop (In ha)			0.281	0.645	0.463
A		**Fixed Cost**			
	i.	Value of Land	3.71Lakh/ha	3.46	---
	ii.	Interest on Fixed Capital	6183.33	5766.66	---
	iii.	Land Revenue Paid	45.28	50.00	47.64 (0.13)
	iv.	Rental Value of Land	8251.50	7757.69	8004.59 (21.77)
B.		**Variable Cost**			
	i.	Ploughing	3100.00	3000.00	3050.00 (8.30)
	ii.	Transplantation	1050.00	950.00	1000.00 (2.72)
	iii.	Seeds (both farm produced & purchased)	1800.00	2000.00	1900.00 (5.17)
	iv.	Fertilizer	2187.50	2193.25	2190.38 (5.96)
	v.	Manure (owned & purchased)	2500.00	2550.00	2525.00 (6.87)
	vi.	Labour (hired & imputed family labour)	9040.00	9100.00	9070.00(24.68)
	vii.	Irrigation	4000.00	5000.00	4500.00 (12.24)
	viii.	Harvesting	3318.00	3000.00	3159.00 (8.59)
	ix.	Interest on working capital	630.00	692.52	661.26 (1.80)
	x.	Depreciation on implements and Farm Buildings	600.00	700.00	650.00 (1.77)
		Total	**28225.50**	**29185.77**	**28705.64**
		Total Cost (A (iii, iv) + B)	**36522.28**	**36993.46**	**36757.87 (100.00)**
C.		**Gross Return** (including price of straw @ Rs. 5000/- per ha)	49509.00	46546.16	48027.58
	i.	Rates (@ Rs./Qtl)	2350.00	2280.25	2315.13
	ii.	Yield rate (Qtl/ha)	18.94	18.22	18.58
D.		**Net Return (In Rs.)**	12986.72	9552.70	11269.71
E.		**Cost of Production (In Rs.)**			
	i.	Per quintal (Rs.)	1928.31	2030.37	1979.34
F.		**Cost Benefit Ratio**	1:1.36	1:1.26	1:1.31

NB: The Calculated Value of Rent is meant for 05 months period from sowing to harvesting of Katarni Paddy (already paid before).

A glance on data in table containing farm size wise areas under Katarni paddy in both the selected districts leads us to crunch for revealing that out of the total operational area owned by different size groups of respondents in Bhagalpur and Banka districts, in physical and percentage terms, large farmers were much ahead (4.22 ha i.e., 50.06% and 10 ha i.e., 51.68%) respectively.

Data in table help in searching thoroughly that in case of marginal farms, on overall level, highest expenditure was incurred in labour Rs. 8750 (26.22%) of the total i.e., fixed cost and variable costs. Gross return (including straw) was found lower in Bhagalpur district (Rs. 44050/-). Besides total cost of production (Rs. 26427.32) being higher, the rate of sale of katarni paddy and yield rate were found lower in Bhagalpur district. Hence, cost benefit ratio was lower (1:1.30) because net return was also calculated quite lower at Rs. 10258.39 than that of Banka district Rs. 12089.90.

Data in table help us in coming home to the fact that like marginal farmers, the surveyed growers belonging to small farm size on overall, level incurred maximum expenditures in labour (24.78%), irrigation (12.74%), ploughing (8.78%), manure (7.36%) and harvesting (6.16%). Gross and net returns were higher in Banka district Rs. 47550/- and Rs. 11541.24 respectively. So, cost benefit ratio was marginally higher in Banka district (1.1:32) than that of Bhagalpur district (1:1.31). On overall level, it was estimated at 1:1.32.

Maintaining unchanged scenario, at the overall level, the surveyed farmers (belonging to medium farm size group) evinced highest expenditures to have made in items of labour (24.56%) followed by irrigation (11.04%) and ploughing (8.30%) like that of marginal and small farmers. Cost benefit ratio (CBR) in Bhagalpur district (1:1.35) was higher than that of Banka district (1:1.30). Dwelling upon the reasons for it, some of the factors could be higher rate (sale price) of Rs. 2350/- per qtl and yield rate 19.10 qtls/ha in the former district.

A glance on table containing data on overall level, in percentage terms, elucidates similar scenario/trend of highest expenditures to have been made by large farmers in the heads of labour (25.00%) and irrigation (10.25%) as could be seen in case of marginal, small and medium farmers surveyed. It was followed by harvesting (8.78%), ploughing (8.56%), manure (6.41%), fertilizers (5.39%) and seeds (4.73%). Cost benefit ratio (CBR) in Bhagalpur and Banka districts could be found almost same (1.1:30).

It can also be interpreted that higher share of irrigation expenditure incurred by all farm size classes is one of the reasons for farmers having developed indifferent attitude towards growing katarni paddy in larger areas. So, if irrigation facility is strengthened and expanded in the region, farmers may be encouraged to get the jump on towards growing katarni paddy.

While trying for core to the overall data in the table, it can be leveled with that out of the total production of katarni paddy by the surveyed farmers, highest quantum in percentage terms in both the districts, viz., Bhagalpur and Banka districts were

meant for marketable surplus (67.74% and 65.20%) followed by home consumption (32.26% and 34.80%) respectively. Further, out of the total marketable surplus lower quantum were found to have been retained for further sale/home consumption in both the districts (12.09% and 5.98%) respectively.

Five channels have been dealt here:

Channel – I: Encircles --- Producer --- Consumer
Channel - II: Comprises ---Producer --- Itinerant trader --- Consumer
Channel- III: Producer --- Wholesaler --- Retailer --- Consumer
Channel - IV: Includes Producer --- Retailer --- Consumer, and;
Channel -V: Consisted others (if any).

A glance on the table clearly reveals Channel – III to be the most prominent one for selling maximum quantities of katarni paddy by the surveyed growers of Bhagalpur and Banka districts (59.38% and 54.34%) respectively. The channel of sale through which lowest quantities were sold, was channel – I for both the districts (7.29% and 4.77%) respectively.

In Bhagalpur district, as it is revealed, the marketing margins at channel – II (PITC), channel – III (PWRC) and channel – IV (PRC) could be calculated at Rs. 150/-, Rs. 300/- and Rs. 100/- only respectively. It means that from **Producer and Consumer points of view, Producers–Retailers-Consumer' Channel** is the most advantageous, desirable and effective channel.

In Banka district, almost similar scenario of marketing margins could be seen, except the amount of margin in case of Channel – IV being Rs. 50/- lower than that of Bhagalpur district. It was Rs. 2,150/- per quintal in PRC Channel.

Table No. 3: Quantity Sold by Different Marketing Channels (In qtls)

District	Quantity/Price	Zero Level Producer-Consumers (PC)	One Level Producers-Itinerant-Traders Consumers-(PIC)	Third Level Producers-Whole-sellers--Retailer-Consumer (PWRC)	Fourth Level Producers-Retailer Consumer-(PRC)
Bhagalpur	Qty (In qtls)	7.00 (7.29)	12.00 (12.50)	57.00 (59.38)	20.00 (20.83)
	Selling Price (In Rs./qtls)	2100.00	2250.00	2400.00	2200.00
Banka	Qty (In qtls)	10.50 (4.77)	50.00 (22.72)	119.61 (54.34)	40.00 (18.17)
	Selling Price (In Rs./qtls)	2100.00	2250.00	2400.00	2150.00

NB: *Figures in brackets indicate percentages of the Marketed Surplus of the Districts concerned, i.e., out of the total quantities sold --- estimated at 96 qtls for Bhagalpur and 220.11 qtls for Banka.*

It can thus be concluded that if the number of intermediate traders are reduced, then the growers may earn higher sale price, which is urgently desired with the view to encourage the farmers to undertake cultivation of katarni paddy in more areas.

It is clearly, evident that from sellers/growers angle, channel-III (PWRC) is the most profitable and encouraging one, as the growers got highest rate (Rs. 2400/- per quintal.

It may also be suggested/opined that if the whole sellers/big businessmen could be directed or advised by the Government/the concerned department to pay a more remunerative price to the growers for their marketable surplus, then the fate of extinction (in the form of declining area under these most rare varieties of highly fragrant katarni paddy grown only in this region of Bihar) can be made brighter.

Gathered data distinctly reveal that distance of farmers' fields and houses from the main market/sale point has caused higher transportation and loading and unloading charges. These were Rs. 12/- each per quintal in case of Banka district compared to Rs. 10/- and Rs. 11.50 respectively in Bhagalpur district. Marketing fee/tax etc. were the same in both the districts.

While farmers not getting more than remunerative prices was highlighted as the most prominent cause of shifting areas under katarni paddy to other crops in both

the districts (100%) non-availability of katarni paddy seed by any government agency was the least intense factor for such trend in Bhagalpur and Banka districts (75% and 80%) respectively.

Table No. 5.1: Reasons for Shifting Cultivation of Katarni Paddy to Other Crops (%)

SN	Reasons	Bhagalpur	Banka
i.	Farmers do not get remunerative price	100.00	100.00
ii.	Long duration crop	90.00	86.67
iii.	Lack of irrigation	80.00	80.00
iv.	Unchecked excavation of sand from river that made irrigation costly	100.00	86.67
v.	Non-availability of katarni paddy seed by any government agency	76.67	80.00

It can thus be educed that if suitable and stringent measures are taken for stopping uncontrolled excavation of sand from river Chandan and original/certified seeds of katarni paddy are made available to farmers by any government agency, then a remarkable increase in areas under katarni paddy in both the districts can be certainly brought.

However, it may be taken as a matter of encouragement that now cultivation will be done by using foreign techniques. Blueprint was being prepared for this. In BAU, Sabour, Bhagalpur also, research is being conducted to save the fragrance of katarni paddy. As stated by the scientists from Philippines, productivity will be doubled by using foreign techniques/technology. This will not only help farmers in being more prosperous, but, Katarni's fragrance will smell in foreign countries also.

As per a rough estimate, about 20,000 qtls of katarni rice is required. To meet this high demand, modification in the variety of katarni paddy (into dwarf variety is desired. As per Vardan's Report by using SRI method of cultivation with the dwarf variety, 79 qtls/ha of yield can be obtained.

Katarni paddy is a specific area based variety of rice. It has high potential with vast untapped opportunities of marketability. In true sense, basmati can not be produced in Bihar despite willingness of the farmers. Agricultural commodities do possess their area specific characteristics. Marketing of any good or service involves already existing feature of competition. Having classified under hard aroma group *(katarni*

rice) is mainly termed as khir & khichadi rice. On the other hand, basmati rice is soft aroma rice, and *it is known as polao rice*.

Actually katarni is ceremonial rice, so there is no option to it particularly on special occasions. Bhagalpur and Banka districts are the main areas for growing katarni paddy. It is worth mentioning that fine scented rice is the strength of Bihar. Patna rice was also the main source of economy in Bihar.

It can be a matter to crave that none of the public or private agencies in Bihar did take any endeavour to produce/develop or did make any effort to promote production of katarni paddy seed. Names of such public/private agencies or departments may be noted as below:

(i).)Bihar Rajya Beez Nigam (BRBN), (ii) Tarai Development Corporation (TDC), (iii) State Food Corporation (SFC), (iv) Food Corporation of India (FCI), (v) Rajendra Agricultural University (RAU), (vi) National Seed Corporation (NSC), and; (vii) Private Companies. Instead, these agencies use to provide or promote production of Hybrid Varieties (HYVs) of all other types of paddy. These didn't take pain of producing preserving traditional seed of katarni paddy.

Some varieties of fine scented rice, namely: (i) kala namak, (ii) adam chini, (iii) Mirzapur (UP) do belong to Varanashi and Gorakhpur regions, while mircha variety belonged to Motihari district of Bihar state. There is 2 to 3 per cent chance of cross pollution. At the same time, the threat of deterioration in quality is also involved in it. It was also embodied that due to exchange of seeds from, in some cases, 'non-real katarni seeds,' the originality of the product is being vanished. Besides the above threat, germs are also being deteriorated. Another one of the challenges before the prospects of katarni paddy production in Bihar is its less demand.

If cultivation of katarni paddy is to be preserved and maintained, then some socio-economic studies to popularize its unique and distinguished significance will have to be undertaken. By adoption of SRI method the yield of katarni paddy also can be enhanced to 25 to 30 per cent.

Action Points

i. Katarni paddy should be improved agronomically. *(Attn: IARI, PUSA, MoA, GoI, and Dept. of Agri., Govt. of Bihar).*

*ii.*Causation endeavours may be made by the Agricultural Scientists' and the farmers to maintain the natural and unique fragrance of Katarni Paddy and not to increase its yield only. *(Attn: Dept. of Agril. Extn., Govt. of Bihar & Bihar Agril. Univ., Sabour, Bhagalpur).*

iii. Agronomically developed Seeds need to be innovated. *(Attn: Dept. of Agri., Govt. of Bihar, Patna & BAU, Sabour, Bhagalpur).*

iv. All the public and private agencies (directly or indirectly involved in the production/manufacturing of seeds, should emphasize and ginger its activities towards preserving traditional katarni paddy seeds. These agencies need to include preparing and preservation traditional katarni paddy seeds in their programme. *(Attn: Bihar Rajya Beez Nigam, NSC, & BAU, Sabour, Bhagalpur).*

*v.*Emphasis has to be given on preserving aroma of katarni paddy. For this, "National Bureau of Plants and Genetic Resources, New Delhi" needs to be invited to look into the problem/matter in Bhagalpur and Banka districts of Bihar. *(Attn: BAU, Sabour, Bhagalpur, NBPGR, & IARI, New Delhi).*

vi. Scientific research needs to be conducted to ascertain as to which particular micronutrients are responsible for maintaining aroma in katarni paddy. *(Attn: Dept. of Soil Sciences, Dept. of Agronomy, BAU, Sabour, Bhagalpur).*

vii. By mutation (Gama radiation), genetical improvement, yield increase and quality improvement can be obtained. *(Attn: Dept. of Plant Breeding & Genetics, BAU, Sabour, Bhagalpur).*

viii. With the view to enhance yield of katarni paddy, organic farming should be propagated and encouraged. *(Attn: Agriculture Department, Govt. of Bihar & BAU, Sabour, Bhagalpur).*

ix. With the objective to deter the problem of adulterated seed, nucleus seed has to be maintained. After every 3-4 years, practice of using new seeds needs to be promoted. If the breeder doesn't have nucleus seed, arrangements may be made to bring it from National Bureau of Plant Genetic Research, (NBPGR), New Delhi, so that its originality and quality could be maintained. *(Attn: NBPGR). (Attn: District & Block level officers of the Agril. Dept., Govt. of Bihar).*

*x.*Genetic purity (True to Type) of katarni paddy should be maintained. *(Attn: Deptt. of Genetic Engineering, BAU, Sabour, Bhagalpur).*

xi. Drive to popularize katarni paddy should be launched with the objective to check the decline of area under it. *(Attn: Dte. of Extn., Dept. of Agri., Govt. of Bihar, Patna).*

xii. Threat of eroding natural taste/fragrance of katarni paddy as a result of excessive use of chemical fertilizers needs to be countered by creating awareness among the farmers to cultivate it by using bio-fertilizers or natural manure only. *(Attn: Extn. Agency, Agri. Dept., Govt. of Bihar).*

xiii. Check dams in river Chandan in quite a few numbers should be constructed to uplift and retain water level at a height that could facilitate easy cheaper and assured irrigation. *(Attn: Dept. of Water Resources, Govt. of Bihar).*

xiv. Unchecked excavation of sand from different points of Chandan River in large quantum everyday has caused deepening of river bed. It has been causing outflow of water from such a depth, from where irrigation is too costly and can not be done at required intervals. Sand less bed of river Chandan has lost water retention capacity making farmers indifferent towards cultivation of katarni paddy on a large scale. *(Attn: Bihar State Mineral Development Corporation, Govt. of Bihar & District Mining Officers, Bhagalpur & Banka).*

xv. As Basmati the aromatic rice grown in Northern India has seen phenomenal growth in regard to its processing industries in the past five years (2006-07 to 2010-11), due to the result of more than doubled demand, similarly environment for increase in production of katarni paddy could be created by promoting and carrying out branding exercise. *(Attn: MoA, GoI, Min. of Food & Consumers' Affairs, GoI, Dept. of Agri. GoB, All India Rice Exporters' Association, President & CMD, KRBL (Owner of India Gate Basmati Brand).*

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