



# Characterisation of Katarni Rice for its Geographical Indication in Bihar, India

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## ABSTRACT

Katarni Rice is the most prevalent, ceremonial and finest quality scented rice of Bihar. It is famous for its aromatic flavour, palatability and Chura (beaten rice) making qualities of Geographical area of production of Katarni Rice includes districts of Munger, Banka and South Bhagalpur of Zone IIIA of Bihar. The unique features of Katarni rice are developed only when it is grown in its territory areas. It has an immense scope of trading in local as well as export market. But, the available Katarni rice is poor yielder (25-30 t/ha) and farmers are tending towards the cultivation of non-aromatic high yielding rice varieties. Hence, in order to save this landrace from extinction and promote and protect the interest of Katarni growers, attempts were made to get its geographical indication (GI). With the objective of providing an exclusive right to the farmers for growing this premium quality rice and getting a remunerative price through its marketing, an application for getting the tag of geographical indication was submitted by a Katarni growers' association. Bihar Agricultural University, Sabour as a technical facilitator for this application, served to characterize and document this rice landrace on the basis of morphological, biochemical and genetical traits. The present study deals with purification, documentation, and characterization of Katarni rice which helped in getting the GI tag in 2018 from the office of Intellectual Properties Rights, New Delhi, India.

**Keywords:** Aromatic Rice, Geographical Indication, Intellectual Property Rights, Katarni rice



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## INTRODUCTION

Katarni Rice is the most prevalent, ceremonial and finest quality scented rice of Bihar. It is famous for its aromatic flavour, palatability, and Chura (beaten rice) making qualities. The geographical area of production of Katarni Rice includes districts of Zone IIIA of Bihar comprising of the south alluvial Gangetic plane of Munger, Banka and South Bhagalpur. The unique aroma in the Katarni grain is developed only when it is grown in few blocks namely Jagdishpur, Sanhaura, Sahkund and Sultanjan in Bhagalpur District; Tarapur and Asharganj in Munger District and Amarpur, Shambhuganj, Rajaun, Barahat, Chanan and Katoria in Banka District.

The farmers in this tract are growing this special rice since long mainly in the surrounding catchment areas of tributary rivers of Ganga like Chanan in Banka district. Katarni rice is tall and photosensitive and prone to lodging due to its weak culm and hence low yielder (Sinha *et al.*, 2015).

This landrace flowers in the temperature range of 30-28°C (day) and 20-18°C (night) with 10-12 hrs day period and grain filling occurs in hazy sunshine in 8-10 hrs day period. The freshly harvested paddy of Katarni is used in the worship during MakarSankranti. At the stage just before maturity when the spikelets are green, panicles are plucked from the standing plant during the 2<sup>nd</sup> or 3<sup>rd</sup> week of November and the

beaten to make Green Chura or Poha. This processed product has also strong aroma and as per the local rituals, it is widely eaten after mixing with dahi (curd) in the Makar Sankranti festival during January. The small-sized translucent grain of Katarni rice gives strong aroma and after cooking it becomes fluffy in texture. It doesn't lose its fluffiness even 4-5 hrs of cooking and the cooked rice retain the water even after 10-12 hrs. Due to its pleasant aroma other characteristics as mentioned above, it has a great demand both in the state and country.

Consumers all over the world prefer aromatic rice due to its flavour, palatability and popcorn like essence before and after cooking. Long grained Basmati is premium quality aromatic rice but high demand in the domestic and international market and acute shortage result in its high price. Beside basmati rice, several aromatic short-grained rice landraces are grown in specialized pockets of the states like Bihar, Orissa, Madhya Pradesh, West Bengal, Chhattisgarh and Uttar Pradesh. These landraces are grown by a small group of farmers of a particular area, mainly for their own consumption and certain religious rituals (Agnihotri and Palni, 2007; Bhagawat *et al.*, 2008). These aromatic landraces have been reported to be superior in quality, fineness, aroma, taste and nutritional contents than Basmati rice and have wider adaptability to local conditions. Additionally, these landraces possess high genetic diversity and different alleles for various agronomically important traits (McCouch *et al.*, 1997). The distinctive fragrance in Basmati and Jasmine rice is

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due to the presence of a volatile compound 2-acetyl-1-pyrroline (2-ACP) (Bourgis *et al.*, 2008) which is also found in non-basmati aromatic rice land races.

Geographical Indications of Goods conveys an assurance of quality and distinctiveness which is essentially attributable to the fact of its origin in that defined geographical locality, region or country. It is a name or sign used on certain products which correspond to a specific geographical location or origin (e.g. a town, region, or country). The use of a geographical indication may act as a certification that the product possesses certain qualities, is made according to traditional methods, or enjoys a certain reputation, due to its geographical origin (Vinayan, 2017).

Although, registrations for GIs are not necessary, however, the organizations or companies who register their geographical indications obtain numerous benefits of the registration. It provides an exclusive right to authorized users to exploit or use the GIs' products in the course of trade by conferring legal protection that can allow them to issue infringements in case of any dispute. It can prevent unauthorized use of a Registered Geographical Indication by others which in turn boost exports. The GI promotes economic prosperity of producers of goods produced in a geographical territory.

There is a vast scope for increasing export by promoting the group of non-basmati aromatic rice, like Katarni in Bihar. In view of the uniqueness of Katarni rice linked with a specific geographical territory, GI tag for Katarni Rice was felt to protect the interest of various stakeholders including farmers of this region. For this, the application for GI was submitted by a registered association of Katarni rice producers namely 'Bhagalpuri Katarni Rice Utpadak Sangh' and documentation of the specifications and descriptions of Katarni rice along with the details relating to linkage of the geographical area which can explain how the GI serves to designate the Katarni as originating from this territory was started. Bihar Agricultural University, Sabour, Bhagalpur served as a technical facilitator for characterizing the Katarni rice. The present paper deals with the characterisation of Katarni rice on the basis of morphological and biochemical traits which was required in the GI application of Katarni rice filled by the association of its producers.

## MATERIALS AND METHODS

### Morphological traits

Morphological data were taken on Days to 50% flowering,

**Table 1:** Coding and site of collection of 10 Katarni paddy samples

Sample No.	Site of Collection	Nature of Location	Sample No.	Site of Collection	Nature of Location
1	Bikramganj, Bihar	Non -GI Area	6	Tarapur, Munger, Bihar	GI Area
2	Asharganj, Munger, Bihar	GI Area	7	Jagdishpur, Bihar	GI Area
3	Kishanganj, Bihar	Non -GI Area	8	Rice farm, Sabour	Non -GI Area
4	BPSAC, Purnea, Bihar	Non -GI Area	9	RRSS, Tiloundha, Rajoun, Banka	GI Area
5	DevanandLauna, Munger, Bihar	Non -GI Area	10	KVK, Banka	Non -GI Area

Plant height (cm), Tillers/hill, Panicle length (cm), Flag leaf length (cm), Flag leaf width (cm), Panicles per meter square, Test weight (1000 grain weight in gm), Kernel length (mm), Kernel breadth (mm), Kernel Length/breadth ratio and Head Rice Recovery. For comparison, Katarni was evaluated along with two varieties Badshah Bhog and Kala Namak. The data from five randomly selected plants were taken and averaged.

### Analysis of Biochemical parameters

KOH sensory test for aroma was conducted by taking 0.8 g of fresh leaf sample in a test tube containing 10 ml of 1.7% KOH. Aroma was evaluated and scored at 0 to 3 (0 – No aroma, 1 – Slight aroma, 2 – Moderate aroma, 3 – Strong aroma) scale by smelling the treated leaf samples through a panel of 5 judges. The same test was done with the rice grains. Grain flour was soaked in 1.7% KOH solution for about 15 minutes and later scored at 0-3 scale.

Amylose content was analyzed using calorimetric iodide. A total of 100 mg of white rice flour from each line was put in 100 ml measuring flask and then mixed with 1 ml of 95% alcohol and 9 ml of NaOH 1 N. The solution was kept at room temperature for 23 hours, then added with distillate water and shaken. 5 ml of solution was taken in a 100 ml measuring flask and 85 ml water was added. It was then distilled with 1 ml of 1N acetate and 2 ml of 2% KI. The value of light absorption of the solution was measured with a spectrophotometer. Amylose content was classified as high (>25%), medium (20.1-25%), low (12.1-20.0%), very low (5.1-12.0%) and waxy (0-5.0%) (Lestari *et al.*, 2011).

For Alkali spread value (ASV), DUS Test Guidelines for rice, published by Indian Institute of Rice Research, Hyderabad was followed. The seeds were kept in 10 ml of 1.7% Potassium hydroxide solution at 27-30°C for 23 hours along with standard varieties as a check. Scoring was done at 1-7 scale as follows: 1- kernel not affected, 2- kernel swollen, 3- kernel swollen, collar incomplete and narrow, 4- kernel swollen, collar complete and wide, 5- kernel split or segmented, collar complete, 6- kernel dispersed merging with collar and 7- all kernels dispersed and intermingled.

### Linkage or relationship between the Geographical area and Katarni Rice

In this aspect, 10 coded paddy samples of Katarni rice, collected from four proposed GI and six Non-GI areas (Table 1) were submitted to NRRI, Cuttack for analysis of different quality parameters.

### Molecular profiling of Katarni rice

Genomic DNA from the individual single plant was extracted from 3 weeks old seedling of all the genotypes using CTAB method (Doyle and Doyle, 1990). Diluted DNA samples were subjected to PCR amplification, using 45 SSR primers in an automated thermal cycler (Applied Biosystems model veriti). PCR reaction was carried out in 12 $\mu$ l reaction volume containing 2 $\mu$ l (100ng) of extracted genomic DNA, 1.2 $\mu$ l 10X PCR buffer, 2.5mM MgCl<sub>2</sub>, 0.1mM of dNTPs, 0.83 $\mu$ M of forward, 0.83 $\mu$ M of reverse primer and 0.35U of Taq DNA Polymerase. Template DNA was initially denatured at 94°C for 4 minutes followed by 35 cycles (30-sec denaturation at 94°C, 40-sec annealing at 55°C, 40 sec of primer extension at 72°C) of PCR amplification, and a final extension of 72°C for 10 min followed by a hold at 4°C. On completion of reaction, 2  $\mu$ l 6X gel loading buffer (Genei) was added.

Katarni rice was also screened with aroma gene specific primers in a multiplex PCR using 4 aroma gene (*badh2*) specific primers namely External Sense Primer (ESP: TTGTTGGAGCTTGCTGATG), Internal Fragrant Antisense Primer (IFAP: CATAGGAGCAGCTGAAATATA TACC), Internal Non-fragrant Sense Primer (INSP: CTGGTAAAAAGATTATGGCTTCA) and External Antisense Primer (EAP: AGTGCTTTACAAAGTCCCGC). The PCR conditions and primers sequence were same as reported by

Bradbury *et al.* 2005& 2005a. These functional makers are designed on the basis of an 8 bp deletion on the 7<sup>th</sup> exon of wild-type *badh2* loci in such a way that it amplified either 257 bp or 355 bp products in aromatic and non-aromatic genotypes, respectively. A common band of 580 bp size was present in both types of genotypes as a positive control.

### RESULTS AND DISCUSSION

#### Morphological and biochemical traits of Katarni

Morphological data on seven pre-harvest and six post-harvest traits of Katarni and two other rice varieties Badsha bhog and Kala namak has been given in Table 2. It is evident from the table that Katarni rice is closely similar to Badshah bhog and Kala namak on the basis of morphological traits. The days to 50% flowering in Katarni ranged between 125-130 days, plant height ranged between 160-165 cm, panicle length ranged between 22-26 cm, tillers/hill ranged between 12-14cm, Flag leaf length ranged between 28-30 cm and number of panicle/m<sup>2</sup> ranged between 300-320. With respect to quality parameters, L/B ratio in Katarni ranged between 2.70-2.80, 1000 grain weight between 12-13 g and hear rice recovery between 60-63%. The amylose content in Katarni ranged between 21-24% and on the basis of 1.7% KOH sensory test, Katarni was scored 3 (strongly scented). As evident from Table 2, the range morphological features of Badshah bhog and Kala namak were slightly different from Katarni rice.

**Table 2:** Range of morphological and quality traits of Katarni rice

Parameters	Katarni	Badsha h Bhog	Kala Namak
<b>A. Morphological features</b>			
i. Days to 50% flowering	125-130 days	120-125 days	115-120 days
ii. Plant height (cm)	160-165	165-170	165-170
iii. Panicle length (cm)	22-26	24-28	30-32
iv. Tillers/hill	12-14	14-16	12-14
v. Flag leaf length (cm)	28-30	22-24	32-35
vi. Flag leaf width (cm)	1.0-1.25	1.30-1.50	1.45-1.60
vii. Panicle /m <sup>2</sup>	300-320	250-260	220-230
<b>B. Grain Characteristics</b>			
i. L/B ratio	2.70-2.80	1.90-2.00	2.80-2.90
ii. 1000 grain weight	12-13	11-12	19-20
iii. Amylose %	21-24	19-23	19-23
iv. Alkali spreading value	3.8-4.0	3.5-3.7	3.2-3.4
v. Head rice recovery	60-63	57-59	55-58
vi. Aroma obtained in the GI territory	Strongly scented	Scented	Scented

Katarni was also evaluated for yield attributing and grain quality traits in All India Coordinated trial in Kharif 2013 (IET

No. 23881) and state level multilocal trial was conducted in Kharif 2013, 2014 and 2015 for knowing its yield potential at

**Table 3:** Yield attributes of Katarni Paddy in AICRIP trial

Designation	Days of 50% flowering	Plant height (cm)	Panicle/m <sup>2</sup>	Yield (kg/ha)	Remark
Katarni	112	138	271	2560	Katarni showed significantly superior over regional check
Badshahbhog (NC)	112	140	256	2553	
Kalanamak (RC)	109	135	255	2183	
CD at 5%	1.00		15.00	199	
CV %	1.92		14.30	14.73	

Source: AICRIP Report (2013)

different locations. In the trials conducted at all India and state level, the yield potential of Katarni was ranged from 25-30 Qts/ha which was similar to the yield potential of both Badshabhog and Kalanamak (Table 3, 4 and 5). The data on

quality parameters of Katarni rice in AICRIP trial was found to be consistent with the quality testing results as mentioned in Table 2.

**Table 4:** Grain quality characteristics of Katarni rice in AICRIP trial

Grain Traits	Description	Grain Traits	Description
Kernel length	4.67mm	Milling%	65.6
Kernel Breadth	1.74mm	Head Rice	61.5
L/B ratio	2.68	Alkali Value	4.0
Grain Type	Medium Slender	Volume expansion	4.2
Kernel Colour	White	Gel consistency	67mm
1000 grain weight	12.7gm	Amylose Content	23.06%
Hulling%	79%	Aroma in grain	Strongly Scented

**Source:** AICRIP Report (2013)

**Table 5:** Yield attributes of Katarni Paddy

Designation	Days of 50% flowering	Plant height (cm)	Panicle/ m <sup>2</sup>	Yield (kg/ha) (Local Check: RajendaraKasturi)	Yield (kg/ha) (Katarni)
Year 2013	115	150	271	3745	2860
Year 2014	120	145	320	3550	3242
Year 2015	118	150	260	3600	3050

**Note:** Results of State trials (pooled over three locations: Sabour, Purnea and Bikramganj during 2013-15)

For in-depth documentation of Katarni traits, DUS (Distinctness, Uniformity and Stability) test was conducted to record the morphological data right at seedling, vegetative,

booting, flowering, harvest and post-harvest stage. Table 6 depicts the status of Katarni Rice recorded at different stages.

**Table 6:** Characteristics of Katarni rice based on DUS traits conducted during Kharif 2015 at BAU, Sabour

DUS traits	Status in Katarni	DUS traits	Status in Katarni
Coleoptile: Colour	Colourless	Leaf width(cm)	Narrow (<1cm)
Basal leaf: Sheath colour	Green	Culm: attitude	Erect
Leaf: Intensity of green colour	Light	Flag leaf: attitude (early observation)	Erect
Leaf Sheath: anthocyanin colouration	Absent	Lemma: Anthocyanin colouration of keel	Absent
Leaf auricles	Present	Stem: Thickness	Medium (0.40-0.55 cm)
Leaf: Anthocyanin colouration of auricles	Colourless	Stem: Anthocyanin colouration of nodes	Absent
Leaf: Collar	Present	Panicle: Length of main axis (cm)	Long (26-30 cm)
Leaf: Anthocyanin colouration of collar	Absent	Flag leaf: Attitude of blade (late observation)	Semi-erect
Leaf: Ligule	Present	Panicle: Number per plant	Medium (11-20)
Leaf: Shape of ligule	Split	Panicle: Awns	Absent
Leaf: colour of ligule	White	Panicle: Attitude of branches	Erect to semi-erect
Leaf: length of blade(cm)	Long (>45cm)	Panicle: Exertion	Well exerted

The husk of Katarni is dark brown. Aroma of both cooked and uncooked rice is strongly scented and shape of the apex of Katarni paddy is typically curved giving its appearance similar to the tip of *awl* of a shoemaker.

#### Linkage or relationship between the Geographical area and Katarni Rice

The exquisite aroma of Katarni is claimed to be present only

when it is grown under certain areas of Bhagalpur, Banka, Munger and Jamui districts. It may be due to particular agro-climatic condition, photo insensitiveness and unknown soil factors prevailing in this zone. To establish this fact, a preliminary work to study the linkage or relationship between the Geographical area and Katarni Rice was carried out. The quality analysis result of 10 coded paddy samples of Katarni collected from different GI and non-GI areas have been shown

in Table 7. The analysis results revealed that there are considerable differences of quality parameters of Katarni rice being grown in proposed GI territory and non- GI territory. The dehusked grains of Katarni samples collected from its GI areas (sample no. 2,6,7 and 9) shown medium to the high aroma in 1.7% (w/v) KOH solution while aroma was low when it is grown in non-GI areas (sample no. 1,3,4,5,8 and 10).

**Table 7:** Quality analysis of four Katarni samples collected from GI and Non- GI area

Sample No.	1	2	3	4	5	6	7	8	9	10
Nature of area	Non-GI	GI	Non-GI	Non-GI	Non-GI	GI	GI	Non-GI	GI	Non-GI
Hull (%)	77	77	75	76	77	76	78	77	78	78
Mill (%)	67	63	65	63	68	64	66	66	70	68
HRR (%)	62	58	58	48	64	54	62	63	67	65
Chalkiness	VOP	VOP	VOP	Highly Chalky	VOP	Chalky	VOP	VOP	VOP	VOP
KL (mm)	5	5	5	5	5	5	5	5	5	5
KB (mm)	2	2	2	2	2	2	2	2	2	2
L/B	3	3	3	3	3	3	3	3	3	3
Grain type	MS	MS	MS	MS	MS	MS	MS	MS	MS	MS
WU (ml/100g)	100	180	140	175	95	200	165	133	150	115
VER	4	4	4	4	4	4	4	4	4	4
KLAC (mm)	9	9	9	9	9	10	9	10	9	9
ER	2	2	2	2	2	2	2	2	2	2
AC (%)	21	23	22	21	22	22	22	22	22	23
GC (mm)	59	49	57	60	54	50	58	54	49	47
Aroma	High	Medium	Low	Low	Low	Medium	High	Medium	High	Medium

**Abbreviations :** Hull% : Hulling; Mill% : Milling; HRR :Head Rice Recovery; KL : Kernel length; KB : Kernel Breadth; L/B : Length Breadth ratio; ASV : Alkali spreading value; WU: Water uptake; VER : Volume expansion ratio; KLAC : Kernel length after cooking; ER: Elongation ratio; AC: Apparent amylose content; MS: Medium Slender;; GC: Gel consistency; VOP: very occasionally present

#### PCR amplification of Katarni Rice with Rice SSR markers:

A set of 45 SSR markers distributed throughout the 12 chromosomes of rice genome was used for the molecular profiling of Katarni, Badshah Bhog and Kala Namak. Out of these 45 SSRs, only 8 SSR markers (RM237, RM152,

**Table 8:** PCR amplification pattern of Katarni rice using SSR markers. Black circles denote presence and white circles denote the absence of allele.

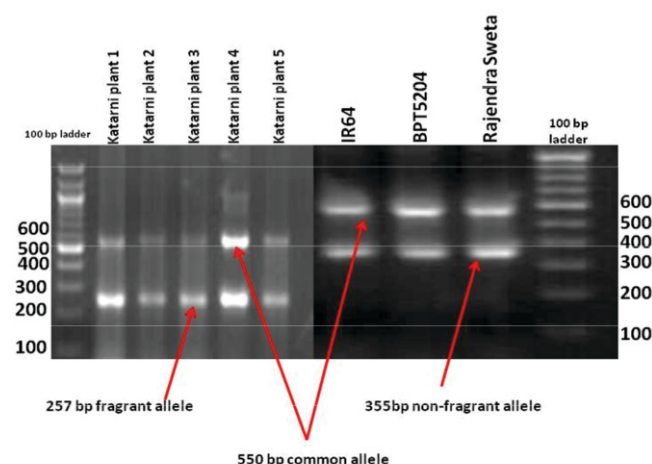
Sl. No.	Marker	Size of Bands (bp)	Katarni	Badshahhog	Kalanamak
1	RM 237	120	●	○	●
		98	○	○	○
		159	○	○	○
2	RM 152	150	●	○	○
		140	○	○	○
		126	○	○	○
3	RM 44	110	○	○	○
		95	○	○	○
4	RM 447	112	○	○	○
		92	○	○	○
5	RM 284	151	○	○	○
		141	○	○	○
		119	○	○	○
6	RM 307	170	○	○	○
		148	○	○	○
		138	○	○	○
7	RM 514	120	○	○	○
		276	○	○	○
		250	○	○	○
8	RM 334	239	○	○	○
		177	○	○	○
		164	○	○	○
		148	○	○	○

PCR amplification of Katarni Rice using the gene-specific primer for aroma (*badh2*) gene in rice

The results supported the facts on the linkage or relationship of the peculiar qualities of Katarni rice with particular areas under agroclimatic Zone IIIA of Bihar which is needed in granting the GI tag for Katarni rice. However, the role of various edaphic and climatic factors for the development of aroma in Katarni rice needs to be studied in order to further validate its linkage with the proposed geographical territory.

RM44, RM447, RM284, RM307, RM514 and RM334) were able to distinguish these three genotypes in PCR. The black circles in Table 8 show the presence and white circles shows the absence of amplification during PCR (gel picture not shown).

A multiplex PCR using a set of four primers (Bradbury *et al.*, 2005 and 2005a) were used to compare Katarni with other non-scented rice varieties viz. IR64, BPT5204



**Fig 1:** PCR amplification of Katarni Rice using the gene-specific primer for aroma (*badh2*) gene

and Rajendra Sweta. As expected, Katarni rice samples collected from five different farmers' filed shows amplification of 257bp band which indicate the presence of gene responsible for 2-acetyl pyrroline synthesis in rice for aroma development while the presence of 350bp band in IR64, BPT5204 and Rajendra Sweta indicated the non-fragrant alleles in these cultivars (Fig.1).

Due to low yield potential, the cultivation of Katarni rice is constantly declining in its GI areas which now being replaced by HYV paddy. The farmers involved in Katarni paddy cultivation are not getting remunerative prices due to loss of its reliability and conspicuous fragrance which is being eroded because of mixing of grains of a similar non fragrant 'Sonam' variety (Jha *et al.*, 2013). Moreover, the farmers are bound to use their own impure seeds year after year due to non-availability in the government seed supply chain. Keeping in view these constraints associated with Katarni, the Rice Improvement Group of Bihar Agricultural University, Sabour had taken the responsibility for its purification, documentation and characterization. For the refinement of local Katarni rice, a total of 770 true to type panicles were selected from three different blocks namely Jagdishpur (Bhagalpur; 300 panicles), Tarapur (Munger; 170 panicles) and Barahat (Banka; 300 panicles) in Kharif 2010. The seeds were grown in panicle to a raw method with a spacing of 30 x 30 cm.

On the basis of morphological grain characteristics, 200 true to type grain panicle were selected from each location. In Kharif 2011, the selected panicles of three blocks were planted in different plot size depending upon their seed availability. One of the accessions with 110 days of 50% flowering, 140cm plant height, 28 cm panicle length, 12-22 tiller numbers and yield upto 3.25 t/ha was found to be the most true to type and was taken for further seed multiplication and yield assessment during Kharif, 2012. The results of the present study were dealt with the purified Katarni rice obtained in 2012. The characterisation of Katarni rice based on morphological, biochemical and molecular parameters helped in the documentation of this genotype for getting GI tag.

The aromatic Katarni rice is poor yielder and prone to lodging due to its tall and weak stature (140 to 160 cm in height).

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Katarni is sensitive to photoperiod and its flowering is delayed considerably under long-day treatments. It commonly suffers from the problem of lodging due to its very tall stature. Isolation and exploitation of dwarfness in Katarni capable of enhancing its harvest index without deterioration of its exquisite quality parameters will help in increasing production area and return under its cultivation. The improved, early maturing photo-insensitive Katarni rice cultivars may fit into the multiple cropping system characteristics of progressive agriculture. Keeping in view increasing demand for Katarni Rice, there is a need to develop dwarf and high yielding photo-insensitive varieties combining good grain cooking qualities like traditional basmati rice. At BAU, Sabour a research project has been undertaken to change the architecture of the Katarni rice by incorporating dwarf and early/medium duration trait from an elite high yield variety keeping its exquisite characteristics through marker-assisted backcrossing (MAB).

#### CONCLUSION

The documentation of Katarni rice as described in the present study, the geographical indication tag was granted to this product in April 2018 by the office of Intellectual Properties Rights, Government of India, which will certainly help the consumers and producers to enhance the commercial value of these products. However, due to lack of proper seed supply chain, farmers compelled to use their own produce as seed and the purity of the variety is not maintained. There is an immense scope to take advantage of the new trade opportunities for sustaining the local market and export of Katarni Rice and its processed products. It requires developing as a geographical indicator for this product due to its quality traits like in the case of *Champagne* or *Basmati* rice. GI tag will also be helpful in safeguarding the interest, goodwill and reputation of trade persons and also prevent the unauthorized use of GI tag which can mislead the consumers.

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