

**WEST BENGAL STATE COUNCIL OF SCIENCE & TECHNOLOGY**

Bikash Bhavan • North Block (4th Floor) • Salt Lake • Kolkata - 700 091

Phone : 2334 2969, 2334 4616, 2321 1342 • Fax : 033 2334 4616



পশ্চিমবঙ্গ রাজ্য বিজ্ঞান ও প্রযুক্তি সংসদ

বিকাশ ভবন, উত্তর ব্লক (পঞ্চম তল), বিধাননগর, কোলকাতা-৭০০ ০৯১

দূরভাষ : ২৩৩৪ ২৯৬৯, ২৩৩৪ ৪৬১৬, ২৩২১ ১৩৪২ • ফ্যাক্স : ০৩৩ ২৩৩৪ ৪৬১৬

No. 355/WBSCST/F/0244/08 (Pt-II)

Date: 20.08.15

From:

Parna Chanda  
Administrative Officer

To:

The Registrar  
Geographical Indication  
Intellectual Property Office Building  
G.S.T Road, Guindy, Chennai – 600 032.

GI APPLICATION No.

531

**Sub: Filing of an application for Tulaipanji and Gobindabhog for Geographical Indication Registration**

Sir,

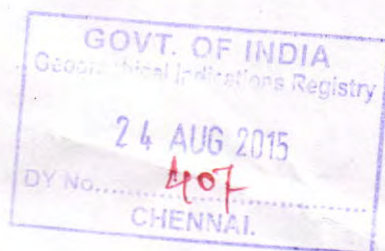
You are aware that Patent Information Centre under West Bengal State Council of Science and Technology (WBSCST), Department of Science and Technology, Government of West Bengal is in the process of promoting the registration of Geographical Indication for the state as well as for national interest and it also renders assistance to the beneficiaries of the state.

In this context, It may kindly be noted that Patent Information Centre (PIC) has already registered three important textile products i.e. sarees viz. Santipore (G.I –138), Baluchari (G.I- 173), Dhanekhali (G.I-174) and three important horticulture products i.e mangoes of West Bengal in Geographical Indications Register viz. Fazli (G.I –113), Lakshmanbhog (G.I- 111), Himsagar (G.I- 112) to protect our state resources. PIC also facilitated the registration of Joynagar Moa, Joynagar (G.I- 382) and filed G.I Mihidana and Sitabhog (G.I-525, G.I-526).

At this juncture, I am directed to forward the application of Tulaipanji and Gobindabhog Rice in the name of Officer on Special Duty and Ex-Officio Director, Directorate of Agriculture, GoWB for Geographical Indication registration. With this application, I enclose Statement of Case, Additional Representation and Affidavit in Non judicial Stamp Paper and a Draft of Rs. 5,000/- for each items ( no. 018266 and 018267 of Central Bank of India dated 19.08.2015 payable at Chennai). It is a collaborative work of Patent Information Centre, WBSCST and Directorate of Agriculture , GoWB.

I would like to request you kindly acknowledge the receipt of the same at the earliest.

Thanking you,



Yours faithfully,

*Parna Chanda*

Parna Chanda



GI APPLICATION No.  
531

सभी स्थानीय शाखाओं पर सममूल्य पर देय.  
PAYABLE AT PAR AT ALL LOCAL BRANCHES

19 082015  
D D M M Y Y Y Y

सेंट्रल बैंक ऑफ इंडिया  
Central Bank of India  
CENTRAL BANK OF INDIA  
SALT LAKE BRANCH 01353  
ISSUING BRANCH  
अल्फा कोड क्र.  
ALPHA CODE NO. S A L T L A

MANIPAL TECHNOLOGIES LTD. / CTS - 2010  
केवल तीन माहों के लिए वैध FOR THREE MONTHS ONLY  
ऑटो OT  
ऑफ OL  
टीएल TL  
ऑसि OC  
टीसि TC

माँगे जानेपर THE REGISTRAR OF GEOGRAPHICAL INDICATION \*\*\*\*\* का उनके आदेशपर  
ON DEMAND PAY OR ORDER

रुपये Five Thousand only \*\*\*\*\*  
RUPEES \*\*\*\*\*

₹ 5000.00  
मूल्य प्राप्त VALUE RECEIVED

अदाकर्ता शाखा 02331-SSB CHENNAI  
DRAWEE BRANCH

P-2745  
ह.न.क्र. प्राधिकृत हस्ताक्षरी

*Autn S. S. Nos.*  
AUTHORISED SIGNATORIES

EM/NCAREGA Prefix:DDI

A 4 1 0 0 1 9 3  
अ.क्र./SR. NO.

Please sign above

⑈018267⑈ 000016000⑈

16

DR. PARITOSH BHATTACHARYYA

OSD & Ex-Officio Director of Agriculture

AGRICULTURE DEPARTMENT  
GOVERNMENT OF WEST BENGAL  
WRITERS' BUILDINGS  
KOLKATA - 700 001

Phone :  
Direct : 2214-5856  
Fax : 2214-5307



सत्यमेव जयते

ডঃ পরিতোষ ভট্টাচার্য

বিশেষ দায়িত্বপ্রাপ্ত ও পদাধিকারবলে কৃষি অধিকর্তা

কৃষি বিভাগ  
পশ্চিমবঙ্গ সরকার  
মহাকরণ  
কলকাতা - ৭০০ ০০১  
দূরভাষ :  
প্রত্যক্ষ : ২২১৪-৫৮৫৬  
ফ্যাক্স : ২২১৪-৫৩০৭

Handwritten signature and date: 24/8/15

Memo / D.O. No. 88/PST

GI APPLICATION No.

531

Date 8/8/15 2015

ব্যক্তিগত স্মারক সংখ্যা

তারিখ ২০

To  
The Senior Scientist,  
Department of Science & Technology,  
& Nodal Officer,  
Patent information Centre,  
West Bengal State Council of Science & Technology,  
Bikash Bhavan,  
North Block, Salt Lake City,  
Kolkata- 700 091.

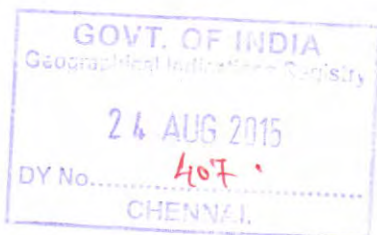
Sub : Submission of Final Documents for the Protection & Registration of Gobindabhog Rice under G.I.Act,1999.

Enclosed please find herewith the following documents for your perusal relating to the above subject viz :

- 1) Affidavit on Non-Judicial Stamp paper of Rs.50.00
- 2) G.I.of Goods (Gobindabhog)
- 3) Additional Representation.
- 4) Statement of case & Historical Information.
- 5) Soft copy in a C.D.

The receipt of the same may please be acknowledged.

Handwritten signature and date: 8/8/15  
(Dr.P.Bhattacharyya)  
OSD & Ex-Officio Director of Agriculture,  
West Bengal.





GI APPLICATION No.  
531





GI APPLICATION No.

531

**THE GEOGRAPHICAL INDICATIONS OF GOODS  
(REGISTRATION & PROTECTION) ACT, 1999**

*(To be filed in triplicate alongwith the Statement of Case accompanied  
by five additional representation of the geographical indication)*

One representation to be fixed within the space and five others to be send separately

**FORM GI-1**

A

**Application for the registration of a Geographical Indication in Part A of  
the Register**

Section 11(1), Rule 23(2)

Fee: Rs. 5,000 (See entry No.1A of the First Schedule)

**B Application for the registration of a Geographical Indication  
in Part A of the Register from a convention country**

Section 11(1), 84(1), rule 23(3)

Fee: Rs. 5,000 (See entry No.1B of the First Schedule)

Application is hereby made by (a) Officer on Special Duty & Ex-Officio Director of  
Agriculture for the registration in Part A of the Register  
of the accompanying geographical indication furnishing the following particulars:

- 1. Name of the Applicant:** Officer on Special Duty & Ex-Officio Director of  
Agriculture, Department of Agriculture, Government of West Bengal
- 2. Address:** Jessop Building, 63 N.S. Road, Kolkata-700 001, West Bengal

**3. List of association of persons/producers/organisation/authority:**

Gobindobhog rice is presently cultivated, mostly on individual efforts in own  
lands, along with some cases of organized cultivation under Farmers' Co-operatives /  
Organizations / Clubs in the native area. It is estimated that more than 1,00,000  
farmers of different categories are engaged in 'Gobindobhog' rice cultivation in the  
state.

Under the RKVY Project, group-cultivation of 'Gobindobhog' rice using pure  
seed has been encouraged by BCKV as well as Agriculture Department, Govt. of  
W.B. since 2009. Some of the representative groups of the growers' community  
including Rural Co-operatives, Farmers' Clubs, Social Organizations, SHGs, Trust,  
etc. associated with the above-mentioned RKVY Project are district-wise caterogized  
as: **Burdwan** (Dharan Samabay Krishi Unnayan Samity Ltd., Shyamsundar Sister  
Nibedita Sangha, Kamarhati Samabay Kishi Unnayan Samity Ltd., Kendur Samabay  
Kishi Unnayan Samity Ltd., Saranga Samabay Kishi Unnayan Samity Ltd., Siksha  
Niketan; Muktipur Farmers' Club, Shyamsundar, Raina-1; Gopalpur Farmers' Club,  
Gopalpur, Khandoghosh; Chetana Farmers' Club, Guir, Kaiyar, Khandoghosh),  
**Nadia** (Nabadoy Farmers' Club, Panchkahania Krishi Unnayan Samity, Duttapulia  
Krishi Unnayan Samity, Nimtala Farmers' Club, Jugal Kishor Krishi Unnyan Samity,  
Ushagram Trust, Association of Nadia Zilla Farmers' Clubs), **Hooghly** (Gurap Palli  
Unnayan Samiti, Bhagya Laxmi Swanirvar Dal), Murshidabad (Beldanga Madda  
Social Welfare Association), **Bankura** (Dalpur Sree Sree Gyanananda Saraswati  
Ashram) and **South 24 Parganas** (Sagar Krishnanagar Swami Vivekananda Youth  
Cultural Society). As per report of Deputy Director of Agriculture (Administration),

Received Rs. 5000 in cash/  
Ch. No. GD/MO on 25-8-2015  
vide entry no. 2735 in the  
register of valuables  
Cashier  
D.O.

1

Lu  
8/8/15

O.S.D. & E.O.  
Director of Agriculture  
Govt. of West Bengal



Burdwan District, lists of farmers / beneficiaries involved in Gobindobhog rice cultivation in the district of Burdwan are enclosed in Annexure.

#### 4. Type of goods: Class 31, Rice

#### 5. Specification:

- (a) Plant: Adaptable to rainfed medium land, long-duration type (140–150 days maturity) and tall in stature (130-140 cm);
- (b) Stem : Stem length (excluding panicle) long (120-125 cm), absence of anthocyanin pigmentation in nodes and internodes;
- (c) Leaf: Long (60-70 cm), narrow (0.8-1.0 cm) and green in colour, ligule split, auricles present, flag leaf attitude semi-erect at early observation and horizontal at late observation;
- (d) Inflorescence: Medium panicle length (25-27 cm) and deflexed curvature of main axis;
- (e) Flower: Bi-sexual flower, six yellow-coloured anthers, and white, feathery stigma;
- (f) Grain and kernel: Lemma and palea of grains straw in colour, grains without awns, low test weight (10.0-10.3 g), short bold type, white kernel (length 3.9-4.1 mm, breadth 1.9-2.1 mm and L/B ratio 2.0-2.1), low amylose content (17.8-18.2 %) and medium-strong aroma.

#### 6. Name of the geographical indication [and particulars]:

Gobindobhog (Bengali: গোবিন্দভোগ) is a rice cultivar from West Bengal, India. It is a short grain, white, aromatic, sticky rice having a sweet buttery flavor. It derives its name from its usage as the principal ingredient in the preparation of the offerings to Govindajiu, the family deity of the Setts of Kolkata. Gobindobhog was traditionally cultivated in the districts of Bardhaman, Hooghly, Nadia and Birbhum. Later it began to be cultivated in Bankura and Purulia. It has many traditional Bengali recipes intended for it specifically.



#### 7. Description of the goods:

Gobindobhog' is traditionally grown in lower gangetic planis and *rahr* region of West Bengal for about 400-500 years. With the historical, agro-ecological and socio-economical processes during the period, the cultivation of 'Gobindobhog' paddy has been concentrated mainly in 4-5 districts along with adjoining 6-7 districts in the native area. Based on available data and survey-related information, it is estimated that more than 1,00,000 farmers cultivate 'Gobindobhog' rice in about 38,000 ha. land every year in the state.

The indigenous aromatic rice cultivar, 'Gobindobhog' was evaluated in open field with three replications at 'C' Block Farm, BCKV, Kalyani, Nadia, West Bengal during *kharif* (wet) seasons of 2010-13, following conventional agronomic practices. DUS descriptors following the 'PPV&FRA DUS Test Guidelines for Rice' were used to characterize the



morphological and related traits of 'Gobindobhog' rice, which is unique in its plant as well as grain characteristics.

**Plant characters**

Plant characters as per DUS guidelines of PPV&FRA

Sl. No.	Characteristics	Code / Value	Description
1	Coleoptile: colour	2	Green
2	Basal leaf sheath colour	1	Green
3	Leaf : Intensity of green colour	5	Medium
4	Leaf : anthocyanin colouration	1	Absent
5	Leaf : distribution of anthocyanin colouration		
6	Leaf sheath : anthocyanin colouration	1	Absent
7	Leaf sheath: intensity of anthocyanin colouration		
8	Leaf: pubescence of blade surface	5	Medium
9	Leaf : Auricles	9	Present
10	Leaf : anthocyanin colorations of auricles	1	Colourless
11	Leaf : collar	9	Present
12	Leaf : anthocyanin colouration of collar	1	Absent
13	Leaf : ligule	9	Present
14	Leaf: shape of ligules	3	Split
15	Leaf: colour of ligule	1	Green
16	Leaf : length of blade	7	Long (66.77 cm)
17	Leaf : width of blade	3	Narrow (0.93 mm)
18	Culm : attitude (for floating rice only)		
19	Culm : attitude	1	erect
20	Time of heading (50% of plants with panicles)	7	Late (114 days)
21	Flag leaf attitude of blade (early observation)	3	Semi-erect
22	Spikelet : density of pubescence of lemma	5	Medium

23	Male sterility	1	Absent
24	Lemma: anthocyanin colouration of keel	1	Absent
25	Lemma: anthocyanin of area below apex	1	Absent
26	Lemma: anthocyanin colouration of apex	5	Medium
27	Spikelet : colour of stigma	1	White
28	Stem: thickness	5	Medium (0.48 cm)
29	Stem: length (excluding panicle)	7	Long (124.1 cm)
30	Stem: anthocyanin coloration of nodes	1	Absent
31	Stem : intensity of anthocyanin colouration of nodes		
32	Stem : anthocyanin colouration of internodes	1	Absent
33	Panicle: length of main axis	5	Medium (25.2 cm)
34	Flag leaf: attitude of blade (late observation)	5	Horizontal
35	Panicle: curvature of main axis	5	deflexed
36	Panicle: number per plant	3	Few (10.67)
37	Spikelet: colour of tip of lemma	2	Yellowish
38	Lemma & Palea : Colour	1	Straw
39	Panicle: awns	1	Absent
40	Panicle: colour of awns (late observation)		
41	Panicle: length of largest awn		
42	Panicle: distribution of awns		
43	Panicle : presence of secondary branching	9	Present
44	Panicle : secondary branches	2	Strong
45	Panicle : attitude of branches	7	Semi-erect to spreading
46	Panicle: exertion	7	Well exerted
47	Time of Maturity	7	Late



			(143 days)
48	Leaf : senescence	7	late
49	Sterile lemma: colour	2	Gold
50	Grains: weight of 1000 fully developed grains	1	Very low (10.17 g)
51	Grain : length	1	Very short (6.1 mm)
52	Grain : width	2	Narrow (2.2 mm)
53	Grain : phenol reaction of lemma		
54	Decorticated grain: length	1	Very short (3.97 mm)
55	Decorticated grain: width	1	Very narrow (1.95 mm)
56	Decorticated grain shape	2	Short bold
57	Decorticated grain: colour	1	White
58	Endosperm: presence of amylose	9	Present
59	Endosperm: content of amylose	3	Low (17.9 %)
60	Varieties with endosperm of amylose absent only-polished grain : exertion of white core		
61	Gelatinization temperature through alkali spreading value	3	Medium (Alkali score 3.7)
62	Decorticated grain : aroma	9	Present (Medium-strong)

Source: Ghosh *et al.* (2014)

### **Grain characters**

The grain quality characters of 'Gobindobhog' rice were determined at 'Aromatic Rice Laboratory', Department of Agronomy, BCKV, Mohanpur, Nadia, West Bengal under RKVY Project on Bengal Aromatic Rice during 2010-12. 100 g clean paddy sample at 13-14% moisture content was passed successively through Rice Sheller (Indosaw, India), Rice Polisher (Indosaw, India) and Rice Grader (Indosaw, India) to obtain brown rice, milled rice and head rice, respectively. The length and breadth of kernel were measured by 'Annadarpan / E-Vision System (C-DAC, India), while the lengths of cooked rice kernels were recorded by placing them on graph paper (mm). Standard methods were followed to determine amylose content (Juliano, 1971), protein content (Sadasivam and Manickam, 1996), alkali value or gelatinization temperature (Little *et al.*, 1958) and aroma (Nagaraju *et al.*, 1991).

Grain quality characters of 'Gobindobhog' rice

Character	Value	
	Average	Range
Hulling (%)	77.8	76–79
Milling (%)	71.7	70–73
Head rice (%)	62.4	60–63
Kernel length (mm)	3.97	3.9–4.1
Kernel breadth (mm)	1.95	1.9–2.0
L/B ratio	2.04	2.0–2.1
Kernel type	Short bold	Short bold
Kernel colour	White	White
Amylose (%)	17.9	17.8–18.2
Protein (%)	7.2	7.1–7.4
Fat (%)	1.05	1.0–1.1
Alkali Value / Gelatinization Temperature	3.7	3.6–4.0 (Intermediate)
Kernel length after cooking (mm)	7.4	6.9–7.2
Elongation ratio	1.77	1.7–1.8
Aroma	2.56	2.4–2.7 (Medium-strong)

Source: Adapted from Ghosh *et. al.* (2012); Banerjee (2011) and other related works

Mean hulling, milling and head rice recovery of 'Gobindobhog' rice are 77.8, 71.7 and 62.4%, respectively. The average kernel length, breadth and L/B ratio of milled rice are 3.97 mm, 1.95 mm and 2.04, respectively. Based on kernel size parameters, it is categorized as short bold (SB) type grain. The milled rice of 'Gobindobhog' contain low-intermediate (17.9%) amylose, 7.2% protein, intermediate gelatinization temperature (alkali spreading value 3.7), medium (1.77) elongation ratio and medium-strong (2.56) aroma.



### 8. Geographical area of production and map:

As per District Gazetteers of 19<sup>th</sup> and 20<sup>th</sup> Century, 'Gobindobhog' is traditionally cultivated as *aman* (winter) rice in the presently-known South Bengal region, but mostly in the districts of Burdwan, Bankura, Hooghly, Nadia, Birbhum, Murshidabad, North 24 Parganas and Howrah. The geo-physical and demographic description of the native districts of 'Gobindobhog' rice during 1872 and 2011 are given hereunder.

#### Geo-physical and demographic description of native districts of 'Gobindobhog' rice during 1872 and 2011

District	1872 / 1909*			2011		
	Location	Area (sq. miles)	Population (No.)	Location	Area (sq. km)	Population (No.)
Burdwan	22°46'–23°53'N 86°52'–88°39'E	3525	20,34,745	22°56'–23°53'N 86°48'–88°25'E	7028	7,723,663
Bankura	23°37'–22°54'N 87°33'–86°51'E	1346	5,26,772	23°38'–22°38'N 87°45'–86°36'E	6871	3,596,292
Nadia	24°11'–22°52'N 89°24'–88°10'E	3414	1,812,795	22°53'–24°11'N 88°09'–88°48'E	3900	5,168,488
Hooghly	22°13'–23°40' N 89°24'–88°10' E	1482	1,488,556	23°01'–22°39'N 88°30'–87°30' E	3149	5,520,389
Howrah	22°13'–22°47' N 87°51'–88°22' E	510	850,514	22°48'–22°12' N 88°23'–87°20'E	1467	4,841,638
Birbhum	24°9'–23°33'N 88°6'–87°9'E	1344	696,943	23°32'–24°35'N 88°1'–87°5'E	4545	3,502,387
Mushidabard	23°43'–24°52'N 87°39'–88°16'E	2462	1,353,626	24°50'–23°43'N 88°46'–87°49'E	5341	7,102,430
North 24 Parganas	22°57'–21°55'N 88°20'–88°6'E	2536	2,210,047	22°15'–22°11' N 89°5'–88°20'E	4094	10,082,852

\*Howrah

[Source: Hunter (1875, 1876a, 1876b, 1877a and 1877b), O'Malley (1909) and Govt.of India (2011)]

#### **Bankura**

According to Hunter (1877b), "Bankura, the western-most District of the Bardwan-Division, is situated between 23°37' and 22°54' north latitude, and between 87°33' and 86°51' east longitude. According to the Census of 1872, it contains a total population of 526,772 souls, and an area, after recent transfers to and from the neighbouring Districts of Bardwan and Manbhum, of 1346 square miles."

Banerji (1968) stated that "The most plausible explanation of the town as also the district assuming their present names may perhaps be found in the very widespread practice of the *Dharma* cult in this region—the object of veneration being commonly known by the name of Bankura Ray although there are other local names of the deity..... One of the earliest references to Bankura Ray is also found in the *Chandi Mangal*, a long devotional verse written by Mukundaram Chakravarty probably between 1594 and 1600 A.D.

The two principal rivers of Bankura district are the Damodar and Dhalkisor or Dwarekeswar, called lower down in its course the Rupnarayan."



**Birbhum**

Hunter (1877b) mentioned that “Birbhum (Beerbhom), the northern-most District of the Bardwan Division, is situated between 24<sup>0</sup>9’ and 23<sup>0</sup>33’ north latitude, and between 88<sup>0</sup>6’ and 87<sup>0</sup>9’ east longitude. It contains an area, after recent transfers to and from the neighbouring districts of Bardwan and Murshidabad and the Santal Parganas of 1344 square miles as returned to me by the Bombay Commissioner in 1874, and a total population, as ascertained to the Census of 1872, of 696,943 souls.”

“From historical records, it is fairly clear that the district included in Rarh was mainly under different Hindu rulers, locally called *Bir Rajas*. It is quite possible, therefore, that the district was named Birbhum to indicate simply the territory of the *Bir Rajas*” (Majumdar, 1975).

No important or navigable river flows through Birbhum. The largest stream is the Ajai, which, however, nowhere intersects the District, the principal streams floating through Birbhum District are as follow: the Mor or Maureksha river, the Bakeswar river, the Kopai or Kopa or Sal Nadi, the Dwarka Nadi, etc.

**Burdwan**

According to Peterson (1910), “The district of Burdwan, one of the western districts of the Bardwan Division, is situated between 22<sup>0</sup>56’ and 23<sup>0</sup>53’ north latitude, and between 86<sup>0</sup>52’ and 88<sup>0</sup>39’ east longitude. It contains an area of 2,689 square miles as ascertained by the latest survey, and a population, according to the census of 1901, of 1,532,475 persons ..... The name *Bardhamana* is the vernacular is a corruption of the Sanskrit *Vardhamana* (the present participle passive of the verb *Vardh*) and implies the ‘increasing or prosperous.” Chaudhuri *et. al.* (1994) mentioned the other view that “the word ‘Barddhamana’ might have been named after the 24<sup>th</sup> Jaina Tirthankara or Barddhamanasvami. According to *Kalpasutra* of the Jainas, Mahavira spent sometime in Astikagrama which was formerly known as Barddhamana.”

“The river system in Barddhaman includes the Bhagirathi-Hugli in the east, the Ajay and its tributaries in the north and the Dwarakeswar, the Damodar and its branches in the south-west. Besides, there are innumerable old beds of rivers all over the area” (Chaudhuri *et. al.*, 1994).

**Hooghly**

Hunter (1876a) described that “The district of Hugli (including the magistracy of Howrah) forms the south-eastern portion of the Bardwan Division, and is situated between 22<sup>0</sup>13’0” and 23<sup>0</sup>14’0” north latitude and between 87<sup>0</sup>48’0” and 88<sup>0</sup>34’0” east longitude. It contains a total population of 1,488,556 souls, as ascertained by the Census of 1872; and total area, after recent transfers to the neighbouring Districts of Midnapur and Bardwan, of 1482 ½ square miles.”

“The place-name ‘Hooghly’ has had a geographical connotation only since the middle of the 16<sup>th</sup> century. With the advent of the Portuguese and, subsequently, of other European traders into this part of the country, many of the erstwhile obscure villages on the west bank of the Bhagirathi were transformed into urban areas forming, in course of time, the principal towns of the present-day district..... The district of Hooghly, as we know it today, came into existence in 1795” (Banerji, 1972).

The river system of Hooghly district comprises two major groups: the Damodar group and the Bhagirathi group, including other rivers like Saraswati or Kunti, Ghia, Kana Damodar, Kausiki, Behula, Kantul, etc.



STAFFER  
531 --

### **Howrah**

As per O'Malley (1909), "The district of Howrah is situated in the south-east of Burdwan Division between 22°13' and 22°47' north latitude and between 87°51' and 88°22' east longitude, with an area of 510 square miles and a population of 850, 514 persons."

Banerji (1972) opined that "the name of the district as also of its headquarters town originated, by the process of epenthesis and vocalic harmony, from Harirah, the early 18<sup>th</sup> century village, which was situated in or around the present city of Howrah." The district was transferred from the Burdwan Division to the Presidency Division in 1963.

The principal rivers of the district are Bhagirathi, and its tributary, the Saraswati; the Damodar and its two branches, the Kana Damodar (or Kausiki) and the Old Damodar, and the Rupnarayan.

### **Murshidabad**

According to Gastrell (1860), "The district of Moorshedabad lies between the parallels of 23°39' and 24°46', North Latitude, and Meridians of 87°40' and 88°45' East Longitude. It comprises an area of 2,634.45 square miles." Later, Hunter (1876b) reported that "Murshidabad district was until 1875, a portion of the Division or commissionership of Rajshahi; but in that year it was transferred to the Presidency Division, of which it now forms the north-western corner. The total population, as ascertained by the Census of 1872, is 1,353,626 souls"

The district got its present name from the Nawab Murshid Quli Khan of Sube Bangla in the early eighteenth century and its present shape in the latter half of the eighteenth century, the earliest evidences of history in the district date back to the pre-historic days perhaps as early as circa 1500 B.C.

The principal rivers of the district are Bhagirathi, and its tributary, the Jalangi, etc.

### **Nadia**

As per Garrett (1910), "The district of Nadia forms the north-eastern portion of the Presidency Division, and lies between north latitude 24°11' and 22°53', and east longitude 89°22' and 88°9'. It extends over an area of 2,793 square miles, and has a population, according to the census of 1901, of 1,667,497 persons. It takes its name from the town of Nadia or Nabadwip, situated at present on the west bank of the Bhagirathi.

The whole district is a net work of moribund rivers and streams, but the Bhagirathi, the Jalangi and the Mathabhanga are the three which have been for more than a century, and still are distinctively known as 'Nadia Rivers'."

### **North 24 Parganas**

Hunter (1875) mentioned that "The district of the 24-Parganas lies between 22°57'32" and 21°55'20" north latitude, and 88°20'51 and 88°6'45" east longitude. It contains a total area, as returned by the Surveyor General in 1871, of 2536 square miles, exclusive of the Sunderbans, but inclusive of the area of Calcutta, which is 7.80 square miles, and of its suburbs, which amount to 23.17 square miles. The population of the District, according to census of 1872, which takes the area of 2788 square miles, is 2,210,047 souls, exclusive of the towns of Calcutta, but inclusive of its suburbs".

According to De (1994), "The nomenclature 24-Parganas has been in vogue since 15 July 1757 when Mir Jafar whom the East India Company had just established as Nawab of Bengal ceded to the Company the rights of 24 *mahals*.

The rivers of the district are mostly headless distributaries of the Ganga. Except for a limited period during the flood season, even the mighty delta-builders Jalangi, Mathabhanga



and Ichamati, received no supply from the Ganga. They now merely serve to receive local drainage and carry it off into tidal waters.”

The present form of the district came into existence on 1<sup>st</sup> March, 1986 with bifurcation of erstwhile 24 Parganas into North 24 Parganas and South 24 Parganas.

### 8. Proof of origin [ Historical records]

The state of West Bengal has precious wealth of genetic diversity in aromatic rice (Singh *et al.*, 2000; Shobharani and Krishnaiah, 2001 and Deb, 2005). It is estimated that about 3, 00,000 tonnes of such premium rices are produced every year in the state (Bhattacharya, 2003), which have different end-uses like cooked table rice, dessert (*payash*), *polao*, *biryani*, etc.

#### *Ancient Cultivation and Archeological Evidence of Rice in Bengal*

Rice (*Oryza sativa*) is a principal food crop of Bengal and India as a whole since the dawn of civilization. It is basically a gift of culture of ancient-Austriya peoples' group and the rice-based food habit is common from rich to poor people in Bengal.

'Pandurajar Dhibi' is an important archeological site (23<sup>o</sup>35' N latitude and 87<sup>o</sup>39' E longitude) beside the river 'Ajoy' in Aushgram I block of Burdwan district in West Bengal. During 1962, the excavation of 'Pandurajar Dhibi' was started, where some rice husk-mixed earthen pots were found in first dwelling layer of the site. Based on scientific tests, the experts opined that the ancient people within 'Pandurajar Dhibi' area knew the rice cultivation during 2000 B.C. (Ghosh, 2005)

#### *Documentation of Rice in 'Mangalkabya's and Ancient Manuscripts (Punthi) in Bengal*

The ancient cultivation of paddy in Bengal indicated its various uses in traditional culture and social life of the people. The use of paddy seed or grain with *dubya* grass (*Cynodon dactylon*) during blessings to the kings, youngers, etc. in social functions, festivals, etc. was mentioned in the Folio 462 of 'Kavikankanera Chandi' written by Kavikankan Mukudaram during 16<sup>th</sup> century (Punthi No. G 5388, 1797 A.D., The Asiatic Society, Kolkata or Sen, 1963).

“দুর্নীথানা দিমা নুপে কৈল আসিবাদ।।”

[কবি কঙ্কণের চন্দী, শ্লোক ৪৬২, পৃষ্ঠা নং ৫৩৮৮, দি এশিয়াটিক সোসাইটি, কলকাতা]

Lord Shiba, was worshipped as the 'God of Agriculture' by the people of lower castes in Bengal as mentioned in 'Shibamangal' or 'Shibayan' written by Rameswar during 18<sup>th</sup> century.

“হর্ষ হৈয়া হর ধন্য দেখে অবিপ্রাম।

কালিন্দীর কূলে যেন নবঘনশ্যাম।।

হাকুতির পুত্র যেন নির্ধন্যার ধন।

ধন্য দেখা রহিলেন পাসরা পরিজন।।”

[‘শিবায়ন’, অষ্টাদশ শতাব্দী, রামেশ্বর ভট্টাচার্য, ১২৯৩ সাল]

[Lord Shiba grew paddy in the bank of river Kalindi and pleased to see the fields of full-grown crop as the symbol of sustenance of life.]



Rice, the staple food of the people in Bengal, was considered as the basic need for sustenance of life as mentioned during the conversation of 'Devi Annada' and Iswari Patni in the 'Annadamangal' during 18<sup>th</sup> century in Bengal.

“প্রণমিয়া পাটুনী কহিছে যোড় হাতে

আমার সন্তান যেন থাকে দুধে ভাতে।”

[‘অন্নদামঙ্গলকাব্য’, অষ্টাদশ শতাব্দী]

[Iswari Patni prayed to 'Devi Annada' for milk and rice for his children.]

### **Documentation of Aromatic Rice in Ancient Manuscripts (Punthi), Old Literatures and Books in Bengal**

The small and medium grained scented rice varieties of Bengal belonged to non-Basmati type aromatic rice group. The word, 'Gandhashila' paddy is probably the earliest document, for the group or variety of scented rice of Bengal, found in the Folio 207 of 'Banik Khanda' (Trader Chapter) of 'Chandikabya' written by Kabikankan Mukundram during 16<sup>th</sup> century (Punthi No. 1908, Bangiya Sahitya Parishad, 1250 Bangabda / 1844 A.D. or Sen. 1975).

“দ্বন্দ্বলপূলে বেদশ্যাম মতি গন্ধশিলা ধান”

দুর্বা পুষ্প ফল ঘৃতিদধি”

[কবিকঙ্কন বিরচিত 'চন্দীমঙ্গল', বণিকখণ্ড, ২০৭, সুকুমার সেন, ১৯৭৫] [Annexure I]

The old glory of aromatic rice was well documented in 'Naisadha Charita' (chapter 16/68) where the description of rice served to guests in the marriage ceremony of 'Dayamanti' were mentioned as:

“পরিবেশিত অন্ন হইতে ধূম উঠিতেছে, তাহার প্রত্যেকটি কণা অভঙ্গ, একটি হইতে আর একটি

নিষ্কৃত (করবরে ভাত), সে অন্ন সুন্দর, সুমৃদু ও শুস্কবর্ণ, সর এবং নীরভম্বা” [নৈষদচরিত (১৬/৬৮)]

[‘বঙ্গালীর ইতিহাস: আদি পর্ব’, নীহারজ্ঞান রায়, ১৯৫২]

[The rice served to the guests was white, slender, well-boiled, warm, flaky, delicious along with pleasant aroma.]

“দুগ্ধ ও অন্নপক্ক পায়সও উচ্চকোটির লোকদের এবং সামাজিক ভোজে অন্যতম প্রিয় ভক্ষ্য ছিল।”

[নৈষদচরিত (১৬/৭০)]

[‘বঙ্গালীর ইতিহাস: আদি পর্ব’ নীহারজ্ঞান রায়]

[Milk and dessert (payash) were the common and popular food items in the social functions of the rich family.]

### **Origin and History of 'Gobindobhog' Rice in Bengal**

Among 35-40 traditional scented rice landraces in West Bengal, 'Gobindobhog', one small-grained aromatic rice, is very popular in domestic market for its excellent quality features along with much potentiality for international trade.

#### **History of Name of 'Gobindobhog' rice**

The name of 'Gobindobhog' bears a popular and reliable history-based social story before establishment of Kolkata city (1690 A.D.) as described by Bhattacharya (2000). He narrated as:

“সরস্বতী মজে গেলে সপ্তগ্রামের পতনের পর গঙ্গতীরে যখন হুগলী বন্দরের অভ্যুত্থান ঘটলো তখন সপ্তগ্রামের অনেক বাঙ্গালী বণিক পরিবার ব্যবসার খাতিরে হুগলীতে এসে বসবাস করলেন। সে সময় শিবপুরের কাছে বেতড় পর্যন্ত সরস্বতী দিয়ে বড় বড় জাহাজ আসতে পারত তারপর আর ক্ষীণ সরস্বতী দিয়ে উত্তর দিয়ে সপ্তগ্রামে পৌঁছিতে পারতো না। জাহাজগুলোকে গঙ্গা-ভাগীরথী বেয়ে ঘুরপথে প্রথমে ত্রিবেণী পরে সরস্বতী তীরে সপ্তগ্রামে যেতে হত। এজন্য কিছু কিছু বাঙ্গালী বণিক অধিক লাভের আশায় বেতড়ে চলে এলেন। তাদের উত্তর পুরুষের মধ্যে চারঘর বসাক ও একঘর শেঠ পরিবার গঙ্গা পেরিয়ে বেতড়ের অপর পারে এসে জঙ্গল পরিষ্কার করে গোবিন্দপুর গ্রাম পত্তন করলেন (বর্তমান গড়ের মাঠ অঞ্চল)। এরা এখানে তাদের উপাস্য দেবতা গোবিন্দের মন্দির প্রতিষ্ঠা করেন এবং এ অঞ্চলে উৎকৃষ্ট ধানের প্রবর্তন করেন। সেই সুগন্ধি সরু চাল গোবিন্দের ভোগে ব্যবহৃত হত। এখনো সেই চালের নাম গোবিন্দভোগ চাল। তারা উত্তরে সুতানুটি গ্রাম (বর্তমান বাগবাজার অঞ্চল) থেকে সুতা কিনে বিদেশী বণিকদের কাপড় বেচতে আরম্ভ করলেন। পরবর্তীকালের বাণিজ্য নগরী কলকাতার প্রথম সূচনা দেখা গেল।”

The socio-historical story could be supported by the description of *bhog*, characterized by its quality and pleasant aroma, offered to 'Lord Krishna and Radha' during the visit of 'Chaintanyadeva' in the peoples' house as mentioned in 'Chaitanyacharitamrita' written by Krishnadas Kabiraj during 17<sup>th</sup> century (Punthi No. 262, *Bangiya Sahitya Parshad*, Kolkata: Sen, 1963).



“কৃষ্ণে ভোগ লাগাএগছ,-অনুমান করি ।  
 উপরে দেখিয়ে যাতে তুলসী-মঞ্জরী ॥  
 ভাগ্যবান তুমি, সফল তোমার উদযোগ ।  
 রাধাকৃষ্ণে লাগাএগছ এতাদৃশ ভোগ ॥  
 অম্বের সৌরভা, বর্ণ-অতি মনোরম ।  
 রাধাকৃষ্ণে সান্ধাৎ ইহা করিয়াছেন ভোজন ॥  
 তোমার বহুত ভাগ্য কত প্রশংসিব ।  
 আমি-ভাগ্যবান, ইহার অবশেষ পাব ॥”

[‘চৈতন্যচরিতামৃত’, পঞ্চদশ পরিচ্ছেদ, সুকুমার সেন, ১৯৬৩]

#### *Documentation in District Gazetteers and Books during 19<sup>th</sup> – 20<sup>th</sup> Century*

The earliest record for cultivation of ‘Gobindobhog’ rice in *Rahr* and Gangetic Bengal area during 19<sup>th</sup> century was documented by W.W. Hunter (1877b) in his book, ‘A Statistical Account of Bengal: Districts of Bardwan, Bankura and Birbhum, Vol. IV’. He mentioned as: “Both the *aus* and *aman* rice are divided into numerous varieties and the collector returns the following sixty-six descriptions of rice as growing in Birbhum district”, of which, ‘Gobindobhog’ rice was included as 58<sup>th</sup> accession in the name of ‘Gobindobhog’.

Mukherji (1901) reported in ‘Handbook of Indian Agriculture’ that “The varieties of rice recognized in Bengal alone are innumerable. Dr. Watt, as Reporter of Economic Products, had occasion to examine four thousand varieties of Bengal rice at one time.” Mukherji mentioned in this book as: “Of *aman* paddies suited for ordinary paddy land (not *bil* land), the following Burdwan varieties may be mentioned as noted for special virtues: Gobindobhog, Khash-khani, Bansmati, Benaphuli, Kamini and Badshabhog, are fine and scented varieties, which are highly prized”.

Banerji (1972) discussed about rice cultivation including some principal varieties of Hooghly districts in the ‘West Bengal District Gazetteers, Hooghly’ that “*Aman*, the principal rice crop, is sown in May and June, transplanted on the onset of the rains, and harvested, on high lands, between November and January, and on lower grounds, by February. The principal varieties of fine *aman* rice are Rupsal, Sital, Dudhkalma, Kanakchur, Saban, Dadkhani, Ramsal and Gobindobhog.” The document can be supported by the earlier information like “A considerable quantity of the finer kinds of table rice is cultivated in Hugli, principally for the Calcutta market” (Hunter, 1876a).

#### *Documentation in Survey-based Study*

A WWF-India survey conducted in six districts of southern West Bengal during 1994, followed by another survey in 15 districts of West Bengal and some areas in adjacent states (*viz.* Jharkhand, Odisha, Assam and Tripura) resulted in a record of 416 folk rice varieties, which were maintained at *Vrihi* Farm, Bankura, West Bengal since 1998. Deb (2005) documented the morphological characteristics of these varieties including ‘Gobindobhog’, the variety collected from Purulia district of the state.



Das and Sasmal (2006) reported a collection of 126 local rice varieties from 12 districts of West Bengal, of which, 'Gobindobhog' was collected from low lands (upto 30 cm water) of Burdwan district and its plant, grain and kernel characteristics were documented in a Compendium entitled, 'Rice: Its conservation and evaluation – West Bengal perspective'.

In 2011, the State Department of Agriculture took an initiative for purifying the seeds of some scented rice varieties in farmers' fields and in state run farms of Burdwan and Birbhum districts through a monitoring team constituted by the Directorate of Agriculture, Govt. of West Bengal. Some selected farmers were given demonstration centres for seed production and area expansion of some selected aromatic rice varieties including Gobindobhog under the assistance of the Department. It helps to fetch good market price and to harness export potential as well.

Ghosh *et. al.* (2013) conducted a base-line survey on production and marketing status of 'Gobindobhog' rice in 6 blocks (Chakdah, Haringhata, Ranaghat I, Ranaghat II, Santipur and Krishnagar I) of Nadia district. Most of the farmers (about 83.1%) used to transplant 'Gobindobhog' seedlings of 25-30 days' old during the period from 2<sup>nd</sup> fortnight of July to 1<sup>st</sup> fortnight of August and they follow nutrient, weed and water management practices with the expectations of getting high returns, compared to other common rice varieties. Average grain yield of 'Gobindobhog' rice in the district was 2.21 t / ha and about 58.7% farmers sold their paddy at an average selling price of Rs. 1116.00 per 60 kg bag.

*Documentation in Compendium, Ph. D. Thesis, Research Papers, Popular Articles and Leaflets*

Short-grained aromatic cultivars have tremendous export possibility and it caters the domestic demand in the local markets as well as the markets of other states in the country. The cultivars *viz.* Randhunipagal in Red Lateritic Zone, khas (Gobindabhog / Badshabhog) in Central Alluvial Zone, Tulaipanji and Kalonunia in North Bengal etc. are well known varieties in the state of West Bengal. At Rice Research Station (RRS), Chinsurah (W.B.), at least 35 indigenous aromatic rice varieties (IARVs) are being maintained and characterized through trials in different agro-climatic zones of the state since last 10 years. Among them, 14 varieties have been characterized and documented relating to agro-morphic, physico-chemical, milling and cooking quality traits. Likewise, 40 such IARVs are being maintained and characterized at Biodiversity Conservation Farm of Agricultural Training Centre (ATC), Fulia, Nadia, and are being distributed among the farmers. However, some important publications relating to Gobindobhog are as follows:

*a) Compendium*

The RKVY Project on 'Promotion of Bengal Aromatic Rice through Improved Production and Processing System' of Bidhan Chandra Krishi Viswavidyalaya (BCKV) in collaboration with Uttar Banga Krishi Viswavidyalaya (UBKV) and Bose Institute published a Compendium entitled, 'Gobindobhog and Tulaipanji: Status, Research and Scope for Export' during 2012 based on decade-long research activities at University level.

*b) Ph. D. Thesis*

The Ph.D. work entitled, "Improvement of production and storage system for Gobindobhog rice in West Bengal" was done by Mr. Dibyendu Mahata under supervision of Dr. Mrityunjay Ghosh, Associate Professor during 2010-12 and it was submitted to the Department of Agronomy, BCKV, Mohanpur, Nadia, West Bengal during July, 2014.



c) *Research papers*

1. Mondal, D., Ghosh, M., Banerjee, S., Mahata, D., Bhattacharya, A., Mukherjee, S. and Biswas, P. K. (2013). Effect of mustard cake and inorganic fertilizers on yield and quality of Gobindobhog rice during *kharif* season. *Journal of Interacademia* **17**(1): 111-115.
2. Ghosh, M., Mazumdar, D., Biswas, A., Goswami, K. K., Banerjee, S., Mondal, R. and Roy, S. (2013). Analysis of production and marketing status of Gobindobhog rice in Nadia district of West Bengal. *Oryza* **50**(3): 291-296.
3. Bhowmick, M. K., Dhara, M. C., Jana, T. K. and Kundu, C. (2012). Standardization of planting time and fertilizer schedule for enhancing productivity of aromatic rice during *kharif* season in West Bengal, India. *Extended Summaries*. International Symposium on "100 years of rice science and looking beyond", Jan. 09-12, 2012, T. N. A. U., Coimbatore, Tamil Nadu. pp. 428-429. (ISBN: 819080802-8).
4. Banerjee, S., Ghosh, M., Pal, S. K., Mazumdar, D. and Mahata, D. (2013). Effect of organic nutrient management practices on yield and economics of scented rice Gobindobhog. *Oryza* **50**(4): 365-369.

d) *Popular articles*

1. Yadav, M., Paul, A., Bhowmick, K., Adhikari, B., Bhowmick, M. K. and Santra, C. K. (2014). Indigenous aromatic rice: Quality seed production and area expansion in West Bengal. *SATSA Mukhapatra - Annual Technical Issue* Vol. **18**: 72-93.
2. Ghosh, M., Patra, B. C., Biswas, A., Karmakar, K. and Panja, B. N. (2011). *Banglar Sugandhi Dhan 'Gobindobhog': Unnata utpadan o prakriyakaran paddhati* (in Bengali). *Saar Samachar*. pp. 43-45.
3. Ghosh, M., Mukharjee, S., Patra, B. C., Biswas, A., Mazumdar, D., Goswami, K. K., Mondal, R. and Roy, S. (2012). *Gobindobhog-er utpadan theke Bipanan shrinkhal o roptanir sambabhana* (in Bengali). *Saar Samachar*. pp. 36-40.

e) *Leaflets*

Nayban, G., Baidya, D. and Roysharma, J. 2012. *Sugandhi dhan – Unnata chas padhyati*. Leaflet (in Bengali) published by Department of Agriculture, Government of West Bengal, Kolkata.

Under the RKVY Project on Bengal Aromatic Rice of BCKV, West Bengal, another leaflet, titled, 'Production and processing of Gobindobhog rice' was published during 2009 for dissemination of advanced technology to the farming community, which was further modified and updated during 2013.

f) *Newsletter*

A special issue of BCKV Newsletter (Vol. 5, No. 3, July-Sept., 2011) was published on account of recommendation for the export of 'Gobindobhog' rice by the Parliament of India (98<sup>th</sup> Report on 'Export of Foodgrains-Premium non-Basmati Rice and Wheat) based on a proposal submitted under RKVY Project on 'Bengal Aromatic Rice'.

**9. Method of Production:**

Better crop management ensures higher seed yield with enhanced quality. Timely field operations help in proper utilization of inputs. Healthy nursery, number of seedlings hill<sup>1</sup>, proper spacing, depth of transplanting, timely transplanting and harvesting are crucial to good productivity and quality of Gobindobhog rice.



### ***Time of sowing / planting***

Being an indigenous photo-sensitive crop, 'Gobindobhog' is cultivated during *aman* (*kharif*) season for hundreds of years in Bengal. As per Hunter (1877) for Bardwan district, also applicable for the entire native area, "The *Aman* or *Haimantik* rice is the cold-weather crop, and, indeed, forms of the great harvest of the year. It is sown in *Ashar* or *Sraban*, corresponding to June and July, and reaped at the end of *Agrahayan* and beginning of *Paush*.

The optimum sowing time of 'Gobindobhog' rice is from middle of *Aasahr* to the first week of *Shravana* month in Bengali calendar, *i.e.* from 3<sup>rd</sup> week of June to 2<sup>nd</sup> week of July during *kharif* season. The survey-based study in Nadia district (Ghosh *et al.*, 2013) indicated that "Farmers generally started their sowing operations with the onset of south-west monsoon.....most of the farmers sowed their seeds during 2<sup>nd</sup> fortnight of June (63.2%) and 1<sup>st</sup> fortnight of July (24.9%)." Bhowmick *et al.* (2012) reported planting of Gobindobhog rice at an optimum time in first week of August.

### ***Land suitability***

'Gobindobhog', an indigenous rice of the region, has been adopted to grow in medium to upland during *kharif* season. The variety produces tall-statured plants with lodging tendency at hard dough or near-maturity stage, which makes the variety unsuitable in low-land situation.

### ***Seed rate***

The recommended seed rate of 'Gobindobhog' rice is very low (20 kg/ha) because of its small seed size (short-bold type, mean test weight 10 g) to transplant 3-4 seedlings/hill in 1 ha of main field. However, 10 kg of seed is needed for covering a hectare of land by following single plant transplanting method, which is good for growth and greater biomass (Yadav *et al.*, 2014)..

### ***Seed treatment***

Genetically pure, free from weed seed, healthy and truthfully labelled seed is to be procured from authentic sources. Before sowing, seed lot is to be dipped in saline water solution (165 g common salt in a litre of water) for 10 minutes and 2 litres of such solution would be required for 1.0 kg of seed. Floating chaffy seeds are to be discarded and heavier seeds which settle at the bottom need to be selected. Seeds are to be taken out from the salt solution and washed thrice in plain water. Thereafter, seeds are to be soaked overnight in 1 litre of raw cattle urine, followed by draining the urine and keeping the seeds in a gunny bag in moist condition for germination. The practice has been followed since 2002 at ATC, Fulia. Folk seeds are resistant to diseases and insect pests. Seeds may also be treated with *Trichoderma viride* (Yadav *et al.*, 2014).

### ***Nursery raising and seed sowing***

Peterson (1910) described the sowing of paddy seed in 'Bengal District Gazetteer, Burdwan'as: "For the nursery a plot of ground is chosen either in a corner of the field itself or in a place where water is available. It is heavily manured with well-rotted dung and ashes after careful ploughing. For sowing advantage is taken of a slight rain, or the moisture necessary for the purpose is obtained by artificial irrigation. A maund of seed is sown broadcast on a bigha of nursery land. Sometimes a little more. The field must not be watered after sowing, for this causes the soil to sink and cake, which greatly interferes with the proper germination of the seed."



The area for nursery bed is selected in medium lands, preferably having irrigation facilities, and 200-300 kg well-decomposed cow dung manure or farmyard manure (FYM) is applied before first ploughing.

The average seedbed area, *i.e.* about 700-1000 m<sup>2</sup> for 1 ha main field is prepared by repeated ploughings followed by laddering to level the land. Then the area is divided into nursery beds of convenient size, usually 5-7 m length × 1-1.5 m in width, along with mud bunds around the borders keeping irrigation or drainage channels out side. About 500-600 g each of urea, single super phosphate and muriate of potash is applied in the nursery beds before sowing of seeds.

Soaked or pre-germinated seeds of 'Gobindobhog' are sown by uniform broadcast method in the nursery beds. The beds are kept wet without allowing standing water for first 3-5 days, thereafter the water level is maintained at 1-3 cm as per age of the seedlings.

However, Yadav *et al.* (2014) discussed modern practice of nursery raising of seedlings in detail. An area of one-tenth of the main field is enough to raise healthy seedlings. The field should be ploughed twice or thrice under dry condition along with incorporation of 500 kg well decomposed farm yard manure (FYM) in an area of 1000 m<sup>2</sup>. Thorough puddling should be done, followed by leveling. Thereafter, the field is to be divided in convenient size of beds to have a better control on irrigation and drainage. Sprouted seeds are to be broadcasted uniformly in each bed. The beds are to be kept wet and water should not be allowed to stagnate during the day time to avoid injury to the germinating seeds and tender young seedlings. Irrigation is to be preferably given in evening to avoid any damage from standing water in day time as water gets heated up in noon hours. Hand weeding should be given at 10 days after sowing (DAS). Prior to transplanting in main field, seedling root dipping is to be done in *Azospirillum* (1.5 kg ha<sup>-1</sup>) solution for 30 minutes. Seedlings can also be raised with minimum cost and labour. A nursery bed of 320 sqft. area may be divided into eight plots so that each plot has an area of 40 sqft. (4 ft x 10 ft) and each one is to be demarcated with mud bund without any ploughing. After through moistening, each bed is to be layered with vermicompost or cattle manure of one and half inch thickness. Sprouted seeds weighing 1.25 kg are to be sprinkled over each plot, followed by covering the seeds with wood ash to protect them from birds. Seedlings having 2-3 leaves become ready in about 12 days for single plant transplanting with thin layer of water or with adequate soil moisture.

#### **Main field preparation**

Mukherji (1901) described the land preparation of winter rice in Bengal as: "The paddy fields should undergo regular cultivation after the commencement of the rains, ploughing being done in puddle. The object of this is to bury the grasses and weeds. Two ploughings and two cross-ploughings, followed by one laddering in each case, are enough for the field to receive seedlings."

The main field of 'Gobindobhog' rice is generally ploughed by power-tiller or country plough to a depth of 12-15 cm for 2-3 times at 3-4 days interval including final ploughing in standing water or puddled condition followed by planking to level the land.

Hunter (1877b) made a list of various agricultural implements used for ordinary agriculture, particularly for land preparation of rice in Bardwan district as: "(i) *nangal*, or plough; (ii) *mai*, or harrow, made of bambos and dragged over the field by a pair of bullocks, to break the clods or level the soil; (iii) *kodali* or spade;"

However, main field should be prepared with the use of green manure and the green manure crop should be trampled at 10 days prior to transplanting to allow proper decomposition. *Azolla* can be released to grow in the field having shallow water.



## ***Crop establishment methods***

### ***Normal transplanting***

As per traditional practices, “.....the transplanting can be commenced when the regular rainy season just sets in, *i.e.*, about the first week of July or earlier” (Mukherji, 1915).

Peterson (1910) described the transplanting of paddy seedlings in ‘Bengal District Gazetteer, Burdwan’ as: “The seedlings are ready for transplantation when they are about a foot high. After they have been taken out their roots are well washed. They are then made into bundles, each bundles containing as many plants as can be grasped with both hands and kept floating in water..... One bigha of land will require 60 to 70 bundles of seedlings, and this is the produce of about two kathas of nursery..... The usual time for transplanting is the end of June and the beginning of July, but very much depends in this respect on the period and amount of rainfall. The seedlings are planted in the soft earth at a distance of nine to fifteen inches apart, four to five being placed together.”

A base-line survey conducted in Nadia district during 2010 (Ghosh *et al.*, 2013) revealed that “major (83.1%) transplanting operations were done during the period between 2<sup>nd</sup> fortnight of July and 1<sup>st</sup> fortnight of August. The planting of ‘Gobindobhog’ during the month of August indicated that there was jute as per-wet season crop in the land, which would be harvested during 1<sup>st</sup> week of August..... Random planting was the general practice in all the 6 blocks of study, with the exception of some farmers in Santipur and Chakdah blocks (*i.e.* 17.6% of the district), who planted their seedlings in rows. Mean spacing across the blocks was about 19.4 cm between the rows. Most of the ‘Gobindobhog’ growers planted either 22-28 days (44.1%) or 29-35 days (49.0%) old seedlings in the field, with a district average of about 27.7 days”.

According to Yadav *et al.* (2014), two-three seedlings of 25-30 days’ old (with 4-5 leaves) are to be transplanted in each hill at a spacing of 20 cm × 20 cm (8'' x 8'') and depth of 2-3 cm. The gaps should be filled up as early as possible (within a week) wherever seedlings have died. Wide spacing of 25 cm x 25 cm is needed for single plant transplanting as followed in system of rice intensification (SRI).

### ***Direct seeding***

Some reports show that there is better aroma in direct-sown crop than in transplanted ones. Owing to paucity of labour, plastic drum seeder can be used for seeding pre-germinated seeds on puddled soil in main field under medium and upland situations; but sowing should be completed before onset of monsoon in areas where monsoon is well defined and predictable (Yadav *et al.*, 2014).

### ***Nutrient management***

‘Gobindobhog’ rice is grown under traditional organic nutrient management system for more than 200 years, which slowly comes under limited chemical fertilizer-based farming or integrated nutrient management system during the period of last 30-40 years.

As per Peterson (1910), “Manuring is not practiced in its cultivation, but in some places the more intelligent cultivators used 20 baskets of cowdung or a mound of oil-cake per bigha just before transplanting the seedlings.” Similar opinion of Mukherji (1915) was recorded as: “*Aman* land is seldom manured, but manuring with oil-cakes, at three maunds per acre, would generally give a better yield, and perhaps pay for the outlay by the increased out-turn.” In the context, Peterson (1910) mentioned that “Cowdung is considered the



manure, and the Bengali term of manure is synonymous in which it is held by the popular rural saying, 'sar satya Lakshmi' – cowdung is the real Lakshmi (goddess of fortune)."

Generally, 4-5 t / ha. of well-decomposed cow dung or farmyard manure (FYM), depending on availability, is incorporated in the soil before the first land preparation. Based on soil fertility status under varied land situations in different blocks of native districts, 40-50 kg.N, 20-25 kg. P<sub>2</sub>O<sub>5</sub> and 20-25 kg. K<sub>2</sub>O / ha. is applied; wherein entire phosphate, one-fourth nitrogen and three-fourth potash are given as basal, half nitrogen at 3 weeks after transplanting (WAT) as first top dressing, and rest one-fourth nitrogen and one-fourth potash at 6 WAT as second top dressing (Plate 19).

Ghosh *et. al.* (2013) reported about the nutrient management practices for 'Gobindobhog' rice in the farmers' fields of Nadia district as: "63.2% farmers used chemical fertilizers, 11.5% gave organic manures and 16.1% followed integrated nutrient management. Among organic sources, FYM, vermi-compost, mustard cake, etc. were generally used, while common fertilizers were urea, di-ammonium phosphate, single super phosphate, muriate of potash etc. Most of the farmers applied plant nutrients in split doses either as basal + 1 top dressing (25.7%) or basal + 2 top dressings (24.5%)."

In organic practice, 5 t FYM ha<sup>-1</sup>, 2.5-3.0 t vermicompost ha<sup>-1</sup>, green manuring / green leaf manuring with *dhaincha* (*Sesbania aculeata*), 10 kg blue green algae (BGA) ha<sup>-1</sup> or 5 t *Azolla* ha<sup>-1</sup> should be applied / incorporated as organic manures in main field (Bhowmick and Dhara, 2010a). For growing rice organically, green manuring or *Azolla* incorporation prior to puddling is an important practice. It is to be followed by incorporation of twigs of *Glyricidia* or *Cleistanthus collinus* (a tree found in Paschim Medinipur and Purulia districts) as green leaf manure at the time of initial land preparation. Application of FYM at recommended dose along with mustard cake / neem cake @ 90 kg ha<sup>-1</sup>, rock phosphate @ 150 kg ha<sup>-1</sup>, N-fixing bacteria (*Azospirillum*) @ 5.0 kg ha<sup>-1</sup> and phosphate solubilizing bacteria (PSB) @ 3.5-5.0 kg ha<sup>-1</sup>, 30 kg molasses, 30 kg rice dust are to be applied at the time of initial land preparation. Besides, liquid manure is to be applied thrice in main field. Rock phosphate and PSB may be discontinued after two years. This practice has been followed at the ATC, Fulia for last 11 years (Paul, 2011).

Usually IARVs are not suitable to accept chemical fertilizers although farmers are using for getting more grain yield. It was observed that chemical fertilizers could reduce plant's resistance to disease and pest as evident in some parts of Burdwan district where monoculture of Gobindobhog and Badshabhog goes on with chemical fertilizers. This is not quite common in South and North 24 Parganas and other districts of the state. However, the recommended fertilizer doses for soils having low, medium and high fertility status are 50:25:25, 40:20:20 and 30:15:15 kg of N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O ha<sup>-1</sup>, of which one-fourth of total N, full dose of P<sub>2</sub>O<sub>5</sub> and three-fourth of total K<sub>2</sub>O is to be applied as basal, half of total N at active tillering (21 DAT) as first top dressing and the rest one-fourth N and one-fourth K<sub>2</sub>O at panicle initiation (42 DAT) as second top dressing. There should not have any standing water in the field at the time of fertilizer application; otherwise, it should be drained out. Irrigation should be given at least 24 h after top dressing. Along with this, adequate amount of organic matter should be incorporated. If organic manures are adequately used, about 25% of recommended fertilizer dose can be curtailed (Yadav *et al.*, 2014). Bhowmick *et al.* (2012) advocated either sole application of 100% N through organic sources or combined application



of 50% RFD (i.e. 25.0:12.5:12.5 kg N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O ha<sup>-1</sup>) along with 50% N through FYM for Gobindobhog rice cultivation during *kharif* season in West Bengal.

Beyond the recommended N-dose, excess application of nitrogenous fertilizers may cause more vegetative growth and taller plants, making the crop more prone to lodging that adversely affects yield along with inferior cooking and eating qualities. But potassium fertilizers favourably influence cooking and eating qualities of aromatic rice. Application of P<sub>2</sub>O<sub>5</sub> at higher rate may produce lower quality grain (Yadav *et al.*, 2014).

Zinc application favourably influences the rice grain quality parameters. Foliar spray of 0.5% ZnSO<sub>4</sub>.7H<sub>2</sub>O + 0.25% lime solution can be done twice – the first one with 375 l solution ha<sup>-1</sup> at 25-30 DAT and the second one with 750 l solution ha<sup>-1</sup> at 45-50 DAT (Bhowmick and Dhara, 2010b). Borax (10.5% B) should be applied at 10 kg ha<sup>-1</sup> for terai, Gangetic alluvium and red lateritic soils, whereas dolomite at 1-2 t ha<sup>-1</sup> once in three years for hill and terai soils, and gypsum at 3 q ha<sup>-1</sup> for coastal soils should be added. Moderate application of sulphur to a deficient soil increased aroma, softness, whiteness, stickiness and glossiness of boiled rice. Generally, 20 kg S ha<sup>-1</sup> is recommended as basal application. Alternatively, single super phosphate (16% P<sub>2</sub>O<sub>5</sub>, 12.5% S and 19.5% Ca) should be used as phosphatic fertilizer which also contains S (Bhowmick and Dhara, 2010b).

#### **Intercultural operations**

To ensure a good plant population, the missing hills should be filled within a week after transplanting, but not late as this can cause non-uniformity in maturity time and thus, contaminate the seeds. Any extra plants / stand above the number recommended should be thinned or removed at two weeks after sowing to reduce plant competition for light, nutrients and water (Asea *et al.*, 2010). Cutting of the upper portion of leaf blades of top 5-6 leaves by 10-15 cm (pruning or lopping) at 45-55 DAT is suggested to reduce stem borer problem as well as to prevent lodging without adversely affecting the grain quality and yield (Angrish, 1991; Sardana, 2003).

#### **Weed management**

So far as quality seed production is concerned, weed management both in nursery and main field are equally important. Water level should be maintained to avoid weeds in nursery bed. For main field, continuous 3-4 cm standing water for a week from 3 DAT and two rounds of hand weeding at 20 and 40 DAT can check the weed problem in case of conventional transplanting, whereas in SRI, use of cono / rotary weeder for mechanical incorporation of weeds for 3-4 times at 10 days interval starting from 10-15 DAT is recommended. Initial weeding and incorporation in the rice field is necessary to delay further weed growth. In any case, weeds should never be allowed to produce seeds in rice field. Keeping *Azolla* in the main field suppresses weed growth. At least 3 weedings are important to have good crop.

Hunter (1877) reported the use of *bida*, weeder with iron teeth, dragged over the field to clear it of weeds in Bardwan district during 19<sup>th</sup> century.

The field of 'Gobindobhog' rice is kept weed-free by two hand weedings, one at 3 WAT and another at 6 WAT. The base-line survey for 'Gobindobhog' rice during 2010 revealed that "About 93.5% farmers in Nadia district weeded their plots manually and rest of the farmers kept their fields unweeded.....none of the farmers included in the study, in the district adopted the mechanical or chemical methods of weed control. First weeding was done between 21.5 days (Chakdah) and 24.8 days after transplanting (Krishnagar I), with the district average of 22.6 days. The second weeding was done between 42.2 days and 45.7 DAT" (Ghosh *et al.*, 2013).



### Water Management

Mukherji (1901) described “The most favourable climatic conditions for the rice crop are: (i) premonitory showers in May, facilitating final preparation of land and sowing in seed-beds; (ii) heavy showers during June and in July, facilitating *nigarh* and weeding operations; (iii) heavy rains in September, when the *aman* is coming into ear; (iv) casual but heavy showers in October, about once a week, especially during the first fortnight.”

As per Peterson (1910), “Being a crop of the rainy season *aman* rice does not generally require artificial irrigation, but in October and November, just when the plants begin to blossom, it is sometimes necessary.”

‘Gobindobhog’ rice can tolerate short-season drought during the cropping season to some extent. However, irrigations are given, where facilities available, as per need and age of the crop.

Ghosh *et al.* (2013) reported for ‘Gobindobhog’ paddy in Nadia district that “All the farmers in the study irrigated the fields mainly through shallow tube-well depending on distribution pattern and amount of rainfall during the cropping season. Thus, it indicated that the growers did not want to raise ‘Gobindobhog’ paddy as a pure rainfed crop in their areas because of their expectations of high returns compared to other common rice varieties cultivated for domestic consumption.”

Continuous submergence of 3-4 cm water for a week from 3 DAT helps in the establishment of seedlings and development of better root system, besides controlling weeds. Later on, irrigation may be applied on alternate days or one day after the disappearance of ponded water. In case of limited supply of irrigation water, the field may be kept saturated only by repeated irrigations. The crop should not suffer from any water stress, particularly during tillering and anthesis stages. Water stress at the first stage diminishes tillering, whereas the process of fertilization is affected at the second stage, which ultimately curtails the size of the sink. Irrigation may be stopped about a fortnight before harvesting of the crop. Draining the field makes the crop mature faster and helps to achieve uniform maturity in the crop. Even diminishing soil moisture at the time of grain filling is reported to favour the aroma formation (Rohilla *et al.*, 2000).

### Plant protection

Necessary prophylactic measures, balanced nutrition and clean cultivation can help reduce losses (Singh, 2000). Major insects, which infest ‘Gobindobhog’ rice, include: (i) yellow stem borer (*Scirpophaga incertulas*) at tillering phase and (ii) gundhi bug (*Letocorisa acuta*) at milk stage of the crop. The spraying of insecticides like Carbofuran 3 G @ 25 kg. or Foret 10 G @ 10 kg. / ha. is recommended to control yellow stem borer, while Chloriopyriphos 20 EC @ 2 ml. / litre of water is recommended against gundhi bug. Pheromone traps with 5 mg lure may be installed at one week after sowing in nursery (2 traps ha<sup>-1</sup>) and at 20 DAT in main field (5-8 traps ha<sup>-1</sup> for pest monitoring and 20 traps ha<sup>-1</sup> for mass trapping) to control yellow stem borer male moths (Katti *et al.*, 2009). Chinsurah light trap or any other light trap with 200 watts mercury lamps for 2 h can also be used in the evening. Inundative release of egg parasitoid *Trichogramma japonicum* and *T. chilonis* @ 1,00,000 adults ha<sup>-1</sup> at 10 days interval for 5-6 times starting from 15 DAT or the day of pest appearance in evening hours for controlling yellow stem borer and leaf folder, respectively (Anon., 2003; Katti *et al.*, 2009). The egg cards (*Tricho* cards) containing 1,000 parasitized eggs are to be stapled to the underside of the leaves at 100 points ha<sup>-1</sup> uniformly distributed across the field. Infestation of insects and diseases becomes less in SRI and double transplanting methods of rice cultivation. Application of conventional pesticides is not



necessary if the farmers follow organic farming schedules (Paul, 2009).

'Gobindobhog' rice is less infested by disease(s) due to having some tolerance or resistance, but common diseases include: (i) blast (*Pycularia oryzae*), (ii) brown spot (*Helmenthosporium oryzae*) and (iii) sheath blight (*Rhizoctonia solani*). Seed treatment by Carbendazim 50 WP @ 2 g / ha. of seed as a prophylactic measure is recommended to prevent blast and brown spot diseases in the field. *Trichoderma viride* 3.0 g l<sup>-1</sup> can be sprayed for 2-3 times starting from 20 DAT at an interval of 15 days to prevent different diseases. Otherwise, chemical measures need to be taken.

#### **Harvesting and threshing**

Ascertaining optimum harvest time is very essential. Harvesting should be done when the panicles are ripe (about 80-85% grains mature) and the straw has just turned yellow, usually 30-35 days after flowering of the crop.. Delayed harvesting leads to over ripening, grain shedding / shattering and fissure formation in rice. Early harvesting also leads to grain yield losses due to higher percentage of under-developed green kernels and low head rice recovery (HRR). Harvesting is traditionally done by sickles *i.e* *kaste*. or *kachi* (Hunter, 1877b) preferably during morning hours. The harvested plants are kept in the field for sun drying for about 2-3 days, then these are tied in bundles and carried to the yards of the farmers' houses, where threshing is done by pedal thresher or beating the plants on bamboo-made platform. The grains obtained after threshing are cleaned by winnowing and then stored in paddy storage structures (*marai* or *gola*) or in gunny bags.

#### **Storage**

According to O'Malley (1909), "After threshing the paddy is winnowed and stored in thatched granaries with split bamboo walls (*marai*)". There is a system of long-term storage of 'Gobindobhog' paddy particularly by the big farmers and rice millers for better quality of cooked rice and more market price. The practice can be supported by Mukherji (1904), wherein it was mentioned as:

“নূতন চাউল জলে অল্পক্ষণ সিদ্ধ করিলেই গলিয়া যায় এবং এই চাউলের ভাতে ও ফোনে কিছু আসে হয়। পুরাতন চাউল সিদ্ধ হইতে বিলম্ব হয়. এবং ইহার ভাত বেশ বরবরে হয়। নূতন চাউল সহজে পরিপাক করা যায় না বলিয়া নূতন চাউল অপেক্ষা পুরাতন চাউল মতঃর্থা চাউল এক বছরের পুরাতন হইলে ব্যবহার ও বিক্রয় করা ভাল।”

['সরল কৃষি বিজ্ঞান', নিতা সোপাল মুখার্জি, ১৯০৪, পৃ. ১৫]

According to Mahata (2014), "Earthen pot, among five storage containers, performed best for Gobindobhog paddy with greater head rice recovery (62.1%), amylose (18.15%), protein (7.35%) and aroma (score 2.13) after 6-month storage period compared to jute-made gunny bag, polythene bag, markin cloth bag and galvanized iron (G.I.) bin in West Bengal." Drying helps seeds maintain their ability to germinate and their vigor for a longer period. Drying also controls mold growth and the activity of other organisms that reduce the quality of stored grain. Drying reduces seed discoloration, which lowers the market value of the seed. Seeds can be safely stored when they have been dried to a moisture content of 13%.

#### **Area Expansion under Gobindobhog rice cultivation**

Farmers are traditionally using their own-saved seeds for Gobindobhog rice cultivation in small pockets in a scattered way. Some of them are also quite aware of the



importance of quality seeds and they do select good seeds from their field for planting in the next season. But most of them put emphasis on yield rather than quality. Other than the initiative taken by the Department of Agriculture, Government of W.B. under the aegis of *Rastriya Krishi Vikash Yojana* (RKVY), there was no such organized effort for seed production and area expansion of IARVs including Gobindobhog earlier in the state. Seed production programme for some particular aromatic rice varieties including Gobindobhog has been taken up at Government Farms like RRS (Chinsurah, Hooghly) and ATC (Fulia), and selected farmers' fields of some selected districts. Farmers of Burdwan, Hooghly and North 24 Parganas having experience in Gobindobhog rice cultivation were involved in the programme for producing truthfully labeled (TL) pure seeds under the supervision of Seed Certification Experts of the State Seed Certification Agency. However, the likely obstacles for expansion of area under IARVs are: (a) non-availability of quality seed, (b) weak marketing network, (c) lack of variety-specific husking facility in production domains, and (d) lack of organized promotional activity on a broader perspective.

#### 10. Uniqueness:

The indigenous aromatic rice cultivar, 'Gobindobhog' was evaluated in open field with three replications at 'C' Block Farm, BCKV, Kalyani, Nadia, West Bengal during *kharif* (wet) seasons of 2010-13, following conventional agronomic practices. DUS descriptors following the 'PPV&FRA DUS Test Guidelines for Rice' were used to characterize the morphological and related traits of 'Gobindobhog' rice, which is unique in its plant as well as grain characteristics.

#### *Plant characters*

Plant characters as per DUS guidelines of PPV&FRA

Sl. No.	Characteristics	Code / Value	Description
1	Coleoptile: colour	2	Green
2	Basal leaf sheath colour	1	Green
3	Leaf : Intensity of green colour	5	Medium
4	Leaf : anthocyanin colouration	1	Absent
5	Leaf : distribution of anthocyanin colouration		
6	Leaf sheath : anthocyanin colouration	1	Absent
7	Leaf sheath: intensity of anthocyanin colouration		
8	Leaf: pubescence of blade surface	5	Medium
9	Leaf : Auricles	9	Present
10	Leaf : anthocyanin colorations of auricles	1	Colourless
11	Leaf : collar	9	Present
12	Leaf : anthocyanin colouration of collar	1	Absent



13	Leaf : ligule	9	Present
14	Leaf: shape of ligules	3	Split
15	Leaf: colour of ligule	1	Green
16	Leaf : length of blade	7	Long (66.77 cm)
17	Leaf : width of blade	3	Narrow (0.93 mm)
18	Culm : attitude (for floating rice only)		
19	Culm : attitude	1	erect
20	Time of heading (50% of plants with panicles)	7	Late (114 days)
21	Flag leaf attitude of blade (early observation)	3	Semi-erect
22	Spikelet : density of pubescence of lemma	5	Medium
23	Male sterility	1	Absent
24	Lemma: anthocyanin colouration of keel	1	Absent
25	Lemma: anthocyanin of area below apex	1	Absent
26	Lemma: anthocyanin colouration of apex	5	Medium
27	Spikelet : colour of stigma	1	White
28	Stem: thickness	5	Medium (0.48 cm)
29	Stem: length (excluding panicle)	7	Long (124.1 cm)
30	Stem: anthocyanin coloration of nodes	1	Absent
31	Stem : intensity of anthocyanin colouration of nodes		
32	Stem : anthocyanin colouration of internodes	1	Absent
33	Panicle: length of main axis	5	Medium (25.2 cm)
34	Flag leaf: attitude of blade (late observation)	5	Horizontal
35	Panicle: curvature of main axis	5	deflexed
36	Panicle: number per plant	3	Few (10.67)



37	Spikelet: colour of tip of lemma	2	Yellowish
38	Lemma & Palea : Colour	1	Straw
39	Panicle: awns	1	Absent
40	Panicle: colour of awns (late observation)		
41	Panicle: length of largest awn		
42	Panicle: distribution of awns		
43	Panicle : presence of secondary branching	9	Present
44	Panicle : secondary branches	2	Strong
45	Panicle : attitude of branches	7	Semi-erect to spreading
46	Panicle: exertion	7	Well exerted
47	Time of Maturity	7	Late (143 days)
48	Leaf : senescence	7	late
49	Sterile lemma: colour	2	Gold
50	Grains: weight of 1000 fully developed grains	1	Very low (10.17 g)
51	Grain : length	1	Very short (6.1 mm)
52	Grain : width	2	Narrow (2.2 mm)
53	Grain : phenol reaction of lemma		
54	Decorticated grain: length	1	Very short (3.97 mm)
55	Decorticated grain: width	1	Very narrow (1.95 mm)
56	Decorticated grain shape	2	Short bold
57	Decorticated grain: colour	1	White
58	Endosperm: presence of amylose	9	Present
59	Endosperm: content of amylose	3	Low (17.9 %)
60	Varieties with endosperm of amylose absent only-polished grain : exertion of white core		
61	Gelatinization temperature through alkali spreading value	3	Medium (Alkali score 3.7)



62	Decorticated grain : aroma	9	Present (Medium-strong)
----	----------------------------	---	----------------------------

Source: Ghosh *et al.* (2014)

### Grain characters

The grain quality characters of 'Gobindobhog' rice were determined at 'Aromatic Rice Laboratory', Department of Agronomy, BCKV, Mohanpur, Nadia, West Bengal under RKVY Project on Bengal Aromatic Rice during 2010-12. 100 g clean paddy sample at 13-14% moisture content was passed successively through Rice Sheller (Indosaw, India), Rice Polisher (Indosaw, India) and Rice Grader (Indosaw, India) to obtain brown rice, milled rice and head rice, respectively. The length and breadth of kernel were measured by 'Annadarpan / E-Vision System (C-DAC, India), while the lengths of cooked rice kernels were recorded by placing them on graph paper (mm). Standard methods were followed to determine amylose content (Juliano, 1971), protein content (Sadasivam and Manickam, 1996), alkali value or gelatinization temperature (Little *et al.*, 1958) and aroma (Nagaraju *et al.*, 1991).

### Grain quality characters of 'Gobindobhog' rice

Character	Value	
	Average	Range
Hulling (%)	77.8	76-79
Milling (%)	71.7	70-73
Head rice (%)	62.4	60-63
Kernel length (mm)	3.97	3.9-4.1
Kernel breadth (mm)	1.95	1.9-2.0
L/B ratio	2.04	2.0-2.1
Kernel type	Short bold	Short bold
Kernel colour	White	White
Amylose (%)	17.9	17.8-18.2
Protein (%)	7.2	7.1-7.4
Fat (%)	1.05	1.0-1.1
Alkali Value / Gelatinization Temperature	3.7	3.6-4.0 (Intermediate)
Kernel length after cooking (mm)	7.4	6.9-7.2



Elongation ratio	1.77	1.7-1.8
Aroma	2.56	2.4-2.7 (Medium-strong)

Source: Adapted from Ghosh *et. al.* (2012); Banerjee (2011) and other related works

Mean hulling, milling and head rice recovery of 'Gobindobhog' rice are 77.8, 71.7 and 62.4%, respectively. The average kernel length, breadth and L/B ratio of milled rice are 3.97 mm, 1.95 mm and 2.04, respectively. Based on kernel size parameters, it is categorized as short bold (SB) type grain. The milled rice of 'Gobindobhog' contain low-intermediate (17.9%) amylose, 7.2% protein, intermediate gelatinization temperature (alkali spreading value 3.7), medium (1.77) elongation ratio and medium-strong (2.56) aroma.

#### **DNA fingerprinting-based Molecular Characterization**

The molecular characterization of 'Gobindobhog' rice was done under technical supervision of Dr. T.K. Ghose at the Division of Plant Biology, Bose Institute, Kolkata, West Bengal during 2006-08. Three-day old seedlings of 'Gobindobhog' along with international check (IR 36) were used for genomic DNA isolation according to the method of Walbot (1988). DNA amplification was carried out by standard PCR method with 23 pairs of SSR markers in a Peltier Thermal Cycler (MJ Research, USA). The PCR products were resolved by native polyacrylamide gel electrophoresis (PAGE) following the protocol given by Sambrook *et.al.*(1989). The length of the amplified DNA bands (SSR alleles) from two rice genotypes was determined with the reference of 50 bp DNA ladders (SibEnzyme Ltd., Russia) by the Molecular Analyst software (BioRad, USA).

The different alleles amplified from the genomic DNA of 'Gobindobhog' rice along with the check were identified on the basis of their length or base pairs (bp) for making genetic characterization of 'Gobindobhog', native aromatic landrace of old alluvial agro-climatic zone of West Bengal.

#### **Details of SSR markers and base pair length of 'Gobindobhog' rice**

SSR Marker	Motif	Rice Chromosome No.	Annealing temperature (°C)	Length of base pair (bp)	
				'Gobindobhog'	IR 36 (International check)
RM 42	(GA)6	8	65	160.88	156.36
RM44	(GA)16	8	55	112.20	112.78
RM72	(TAT)5C(ATT)15)	8	55	161.08	165.65
RM80	(CTT)20	8	65	125.03	121.82
RM112	(GAA)5	2	55	141.02	141.98
RM149	(AT)10	8	59	256.71	246.99



RM152	(GGC)10	8	60	149.87	149.96
RM182	(AT)16	7	59	312.65	296.27
RM207	(GA)25	2	65	129.02	128.48
RM210	(GA)23	8	55	145.32	149.75
RM218	(GA)24	3	55	144.14	155.29
RM223	(GA)25	8	55	154.72	164.34
RM250	(CT)17	2	60	152.71	150.96
RM251	(CT)29	3	55	120.11	119.88
RM282	(GA)15	3	59	128.49	140.39
RM284	(GA)8	8	55	144.96	139.68
RM310	(GT)19	8	55	103.44	107.57
RM337	(CTT)4-19(CTT)8	8	59	158.58	161.29
RM339	(CCT)8(CCT)9CCT 5	8	59	180.75	143.09
RM341	(CTT)20	2	55	95.33	174.97
RM505	(CT)12	7	55	117.42	126.25
RM530	(GA)23	2	59	154.64	168.02
RM569	(CT)16	3	59	174.25	167.61

Source: Adapted from Ghosh and Ghose (2007), Das *et al.* (2012 and 2013)

### Uses

'Gobindobhog' is a non-Basmati type indigenous aromatic rice of West Bengal. It has short-bold type, white kernels with desired cooking quality and pleasant aroma. The raw milled rice of 'Gobindobhog' has different forms of use like:

(a) *Bhog* and *Bhat* (boiled rice): It is soft-textured table rice or intermixed with *dal* (pulses), which is offered to the Hindu God and Goddess, especially to the 'Lord Gobinda' ('Lord Krishna') during *puja* or religious festivals. Sen (1963) mentioned the '*bhog* of Lord Krishna' in 'Chaitanyacharimrita' based on the biography of 'Shree Chaitanyadeva' during the period of 16<sup>th</sup> century.

“প্রথমে পাক করিয়াছেন আচার্য্যাদী ।  
বিস্মু-সমর্পণ কৈল আচার্য্য আপনি ॥  
তিনি ঠাকুর ভোগ বাড়াইল সম করি ।  
কৃষ্ণের ভোগ বাড়াইল যাতু-পারোপরি ॥”



Sankar (2005) mentioned in his book 'Bangalir Khaoyadaoya' that the use of 'Gobindobhog' rice in preparation of 'Bangabhogkhichuri' by the International Society for Krishna Conciousness (ISKCON) Centre, Kolkata.

“ডাবের জল দিয়ে বঙ্গভোগখিচুড়ি তৈরির সময় ব্যবহার হয় ভাজা মুগডাল, ছোলাডাল, নারকেল  
কুচি ও গোবিন্দভোগ চাল।” | 'বাঙ্গালির খাওয়াদাওয়া', শংকর, ২০০৫, পৃ. ১৭৪-১৭৫।

The *bhat* (ordinary boiled rice) is also delicious along with *ghi* (semi-liquid butter) to the Bengalee people, particularly to the vegetarians in the region for a long period.

“মিহি আতপ চালের ভাতের প্রধান উপকরণ - গোলাপসরু বা গোবিন্দভোগ চাল”

['রকমারি নিরামিষ রান্না', রেনুকা দেবী চৌধুরাণী, ১৯৮৮, পৃ. ৭।

(b) *Payesh* (dessert): *Payesh* (dessert), the milk-based food item, is very popular among the people of eastern and northern India. It is specially prepared in social functions like religious festivals (*puja*), birthday, '*bhaiphonta*' (Brothers' day), etc. Sankar (2005) reported in his book 'Bangalir Khaoyadaoya' that the Managers of 'Gobinda' Food-chain at ISKCON Centre, Kolkata described the preparation of '*paramanna*' (dessert) using 'Gobindobhog' rice with milk only, excluding a drop of water.

কলকাতার ইকন সেন্ট্রের 'গোবিন্দা' নামক নিরামিষ খাবার দোকানের পরিচালকেরা জানানেন,  
“জীরা পরিবেশন করেন সুপার ফাইন দেবাদুনা রাইস, পায়সারে গোবিন্দভোগ।..... গোবিন্দভোগ  
চালের গ্রহ পাত্রেসে এক ফোঁটা জল দেওয়া হয় না, ফেবল দুধ।”

['বাঙ্গালির খাওয়াদাওয়া', শংকর, ২০০৫, পৃ. ১৬৮-১৬৯।

(c) *Polao* or *Biriyani*: 'Gobindobhog' rice is also used particularly by the low-income group people for preparation of *polao* or *biriyani* in southern states (*viz.* Karnataka, Tamil Nadu, Kerala, etc.) of the country.

(d) *Pistak* or *Pitha* (Home-made cakes): *Pistak*, made from rice flour, has been mentioned in District Gazetteers of Bardwan (Hunter, 1877) and Murshidabad (Malley, 1914) of West Bengal.

As per O'Malley (1914), "*pitha* includes the following varieties: (i) *puli*; (ii) *soru chakli*, which consists of ground rice made into thin *chapattis*; and (iii) *malpua*, which is composed of ground rice fried in the oil or *ghi*, together with *plantains* and sweetmeats."

(e) *Chira*: The *chira* (parched or flattened rice) of 'Gobindobhog' is not very common, but it is gaining popularity in recent times in the domestic market.



'Gobindobhog' is a potential non-Basmati type small-grained aromatic rice of West Bengal. Based on food habit and consumer preference in different parts of the world, it may be exported to Bangladesh, U.K., Brazil, etc.

**Inspection Body:**

1. Central Monitoring team, Directorate of Agriculture, Government of West Bengal
2. Dr. Mrityunjay Ghosh, Associate Professor, Department of Agronomy, BCKV, Mohanpur, Nadia, West Bengal
3. Patent Information Centre, West Bengal State Council of Science & Technology.

**11. Others:**

**Economics of cultivation**

Grain yields of most of the HYVs are declining in many regions throughout the country including W.B. For example, the average grain yield of MTU 7029 (Swarna), the most popular HYV in the state, has plummeted from 5.00 t ha<sup>-1</sup> to about 3.75 t ha<sup>-1</sup> over the years in most of the farmers' fields. Declining productivity is due to law of diminishing return, imbalance in plant nutrients and soil organic matter, etc. Farmers are applying more chemical fertilizers and other agricultural inputs for augmenting the yield; it ultimately leads to increasing cost of production without any profitable return (Yadav *et al.*, 2014).

**Comparative profit statement for cultivation of non-aromatic (HYV) and traditional aromatic rice varieties in West Bengal**

Items	Non-aromatic			Aromatic		
	Quantity	Selling price (Rs. unit <sup>-1</sup> )	Return (Rs.)	Quantity	Selling price (Rs. unit <sup>-1</sup> )	Return (Rs.)
Rice yield	2.50 t	18000.00	45000.00	1.9 t	30000.00	57000.00
Straw yield	12 kahan	400.00	4800.00	14 kahan	650.00	9100.00
<b>Gross</b>	-	-	<b>49800.00</b>	-	-	<b>66100.00</b>
<b>Net</b>			<b>19822.00</b>			<b>35785.00</b>

Source: Yadav *et al.* (2014)

Consequent upon gradual escalation in the price of critical inputs due to increasing cost of petroleum products along with rising wages of hired labour, the cost involved in the production of HYVs is leaping up day by day while the market price of high-yielding paddy is not increasing at a proportionate rate. In fact, HYVs cannot give substantial yields under all the marginal conditions in farmers' fields. But the aromatic rice variety Gobindobhog can be able to fetch higher prices and thus increase the net profit of the farmer (Yadav *et al.*, 2014).

**Estimated input package for organic cultivation of Gobindobhog rice**

Input	Quantity required ha <sup>-1</sup>	Price rate (Rs.)	Cost involved (Rs. ha <sup>-1</sup> )
Seed ( for single plant transplanting)	14 kg	30.00 kg <sup>-1</sup>	420.00
N-fixing bio-fertilizer ( <i>Azospirillum</i> )	5 kg	60.00 kg <sup>-1</sup>	300.00
Phosphate solubilizing bacteria	2 kg	60.00 kg <sup>-1</sup>	120.00



Rock phosphate (25% of total P <sub>2</sub> O <sub>5</sub> requirement)	40 kg	7.00 kg <sup>-1</sup>	280.00
Earthen jar for liquid manure	15 nos.	200.00 for each	3000.00
Molasses (To increase soil bacteria)	30 kg	40.00 kg <sup>-1</sup>	1200.00
Rice bran ash (source of organic matter and K)	1 t	200.00 t <sup>-1</sup>	200.00
FYM / cattle manure	1 t	3000.00 t <sup>-1</sup>	3000.00
Green manuring seed	30 kg	60.00 kg <sup>-1</sup>	1800.00
<b>Total</b>			<b>10320.00</b>

Source: Yadav *et al.* (2014)

#### Estimated input package for cultivation of Gobindobhog rice variety with good management practices

Input	Quantity required (Kg ha <sup>-1</sup> )	Price rate (Rs. kg <sup>-1</sup> )	Cost involved (Rs. ha <sup>-1</sup> )
Seed (Gobindabhog,.) for single plant transplanting	14	30	420.00
Rock phosphate (25% of total P <sub>2</sub> O <sub>5</sub> requirement)	80	7	560.00
Micronutrient: ZnSO <sub>4</sub> .7H <sub>2</sub> O*	25	50	1250.00
N-fixing bio-fertilizer ( <i>Azospirillum</i> )	5	60	300.00
Phosphate solubilizing bacteria	2	60	120.00
Vermicompost (25% of the total requirement)	250	6	1500.00
Green manuring seed	30	60	1800.00
<b>Total</b>			<b>5950.00</b>

\*ZnSO<sub>4</sub>.7H<sub>2</sub>O to be applied in Zn-deficient soil (based on soil test)

Source: Yadav *et al.* (2014)

An estimated annual turnover of about Rs. 311 crores from Gobindobhog rice cultivation has been reported by District Agriculture Administration in Burdwan Sadar Subdivision of Burdwan district with the involvement of about 76,000 farmers during 2014-15.

#### An estimate of annual turnover for Gobindobhog rice cultivation in Burdwan Sadar Subdivision of Burdwan district, West Bengal during 2014-15

Name of Block	Estimated area (ha)	Estimated no. of farmers involved in cultivation	Annual turnover (Rs. in crores)
Raina-I	10000	20500	95
Raina-II	12000	30000	121.6152
Khandoghosh	7000	15500	70
Burdwan Sadar	1000	4000	7
Bhatar	1000	3000	8.75
Ausgram-I	500	1500	3.744
Ausgram-II	500	1200	4.375



Galsi-II	30	200	0.2875
Memari-I	10	12	0.09
Memari-II	15	100	0.13125
Jamalpur	0	0	0
<b>Total</b>	<b>32055</b>	<b>76012</b>	<b>310.8617</b>

Another base-line survey conducted for 'Gobindobhog' rice in Nadia district (Ghosh *et al.*, 2013) indicated that "With average production cost of Rs. 12,938.30/ha along with income of Rs. 31,374.80/ha, the benefit was estimated about Rs. 15,017.30/ha"

### **Marketing and Trade**

Present marketing scenario of aromatic rice in W.B. reveals that producers, in most cases, sell aromatic paddy in bulk immediately after harvesting or in piecemeal from their household storage. In a few cases, they process the produce with or without parboiling, depending on varieties and consumers' choice. It is primarily due to their immediate financial need. Rural assemblers having disguised unemployment, mostly belonging to farming community by tradition, play the role of processor. They receive credit from the commission agents and function as small paddy processors or household level paddy processing units. Some progressive mill owners of mini rice mills (only for husking of aromatic paddy) purchase the produce directly or through agents from the producers.

Estimated aromatic paddy producers' share in consumers' price in the state is not more than 40-55%. In case of value addition, which includes processing and husking operation as well as packaging, it would be more than 70%. For this, no special skill development is needed as traditionally they possess it.

### **Organic Certification**

Organic certification of 'Gobindobhog' rice-based cropping system under RKVY Project on 'Bengal Aromatic Rice' (BCKV-GBCS) has been started in about 13.1 ha land including 4 locations (University Farm and 3 Farmers' fields) in Nadia district since June (2010). IMO Control Pvt. Ltd., being accredited by APEDA under the Ministry of Commerce and Industries, Government of India is the Organic Certification Agency for BCKV-GBCS programme. The RKVY Project of BCKV has got the Organic License (No. CMS-0089 / 2012 / IMO Control, dated 31.12.2012) due to Organic Status of 3 Farms along with Paddy Processing Centre, especially for 'Gobindobhog' rice.

### **Notification by Rajya Sabha Secretariat**

A Public Notice issued by the Rajya Sabha Secretariat, Standing Committee on Commerce was published in the National Dailies during October, 2010 for inviting views / suggestions / comments from experts / institutions / organizations on the subject of 'Export Promotion Schemes pertaining to Agricultural & Processed Food Products'.

## **12. Scope for Export**

### **Recommendation for export of 'Gobindobhog' by Parliament of India**

'Gobindobhog' is a potential non-Basmati type small-grained aromatic rice of West Bengal. Based on food habit and consumer preference in different parts of the world, it may be exported to Bangladesh, U.K., Brazil, etc.



### *Preparation of 98<sup>th</sup> Report of Standing Committee on Commerce*

A total of 11 meetings of the Standing Committee on Commerce were held during February 14-July 25, 2011 for consideration of the proposals submitted, oral presentations, etc. as well as for finalization of 98<sup>th</sup> Report on "Export of Foodgrains- Premium Non-Basmati Rice & Wheat."

### *Recommendation for Export of 'Gobindobhog' and 'Tulaipanji'*

The Report on "Export of Foodgrains-Premium Non-Basmati Rice & Wheat" prepared by the Standing Committee on Commerce was presented in the Rajya Sabha on August 11, 2011 and subsequently accepted for future course of action on the part of the Government of India.

The salient points mentioned in the Report are as follows:

"The Committee observed that India produces some fine quality non-Basmati varieties also such as Sona Masuri, Matta and Ponni, Gobindobhog and Tulaipanji etc. These varieties are very good quality rice and are bound to be appreciated by international buyers. Further, the Committee observed that from the year 2002-2007, India was exporting some quantities of wheat and non-Basmati rice, which suddenly stopped afterwards. This will cause confusion in the world market and India's absence will pave the way for competing countries to step in." (para 4.3.5, p. 36).

"The Committee feels that there are many States in the country that produce various premium varieties of rice. For export of rice, like any other commodity, foreign buyers have their own parameters in terms of hygiene, quality, use of insecticides and pesticides, etc. Accordingly, the Committee recommends that the Government should come out with a planned policy whereby, all types of premium rice varieties should be considered for testing and research and those varieties that fulfill international norms may be encouraged for export." (point 13, p. 44).

### **Present Status, Future Strategy and G.I. for 'Gobindobhog' Rice**

- i. 'Gobindobhog', a native aromatic rice of lower Gangetic region including Vindya alluvium plains in West Bengal, is cultivated with traditional knowledge and culture for hundreds of years. It is very popular mainly for preparation of '*bhog*', '*table rice*', '*payash*' (dessert), '*polao*', '*biriyani*', '*pitha*' (home-made cakes), '*chira*' (parched or flattened rice), etc. in daily life and social functions in the region.
- ii. It is reported that 'Gobindobhog' rice cultivation is mostly concentrated in Burdwan Sadar Subdivision of Burdwan district in West Bengal; about 76,012 farmers were involved in growing 'Gobindobhog' rice in an estimated area of about 32,055 ha during 2014-15. It is also under cultivation in other districts of South Bengal (*viz.* Bankura, Hooghly, Nadia, Murshidabad, Birbhum, North 24 Parganas, Howrah, etc.).
- iii. 'Gobindobhog', an indigenous non-Basmati type, short-grained aromatic rice, is very popular in the domestic market of West Bengal. Besides, there is a demand for 'Gobindobhog' rice in southern states (*viz.* Karnataka, Tamil Nadu, Kerala, etc.) of the country.

The Department of Agricultural Marketing, Government of West Bengal started a promotional marketing approach through the sale of 'Gobindobhog' rice in New Delhi and other places of the country since, 2012.



- iv. Based on food habit and consumer preferences for aromatic rice in different countries, 'Gobindobhog' is potential for export in Bangladesh, U.K., Brazil, etc.
- v. The process of protection of 'Gobindobhog' paddy by registration as 'Farmer's Variety' under PPV&FR Act, 2001 has been initiated through submission of application by Shyamsundar Sister Nivedita Sangha, Shyamsundar, Burdwan under technical supervision of Bidhan Chandra Krishi Viswavidyalaya West Bengal during 2009 and the Registration Certificate has recently been issued by the PPV&FR Authority, New Delhi.
- vi. The RKVY Project on 'Bengal Aromatic Rice' of BCKV made a proposal for inclusion of 'Gobindobhog', raw milled fine rice, as a 'Commercial Variety' in 'Cereal Grading and Marking Rules, 1966' under 'AGMARK' and submitted the Proposal to the office of Eastern Region, Department of Agriculture and Co-operation, Ministry of Agriculture, Government of India, Kolkata, West Bengal on 20 June, 2014.
- vii. 'Multi-functional Storage-cum- Market Complex' may be developed at or near Seaports (Kolkata, Haldia, etc.), Airports (Dumdum and Bagdogra) for export to Europe, Brazil, U.S.A., etc. and entry points (Bangaon, Gede, etc.) to Bangladesh. In addition, roads and other infra-structural facilities should also be improved.
- viii. Commercial introduction programme of 'Gobindobhog' (premium aromatic rice) to the potential consumers may be taken up through exhibition-cum-demonstration processes in International or Global Trade Fair.
- ix. The Government of West Bengal and / or Government of India may formulate a policy including regulation to mention the 'variety name' of aromatic rice on each packet along with 'trade name', if any to ensure the quality of the produce to the consumers.
- x. Research efforts for enhancement of production and maintaining right quality of 'Gobindobhog' rice along with value-added new products should be strengthened though allocation of sufficient fund to the State Agricultural Universities and Research Institutes.
- xi. A new "Bengal Aromatic Rice Agri Export Zone" may be established in West Bengal.

With the advent of World Trade Organization (WTO) and India becoming a member of it, 'Gobindobhog', an indigenous aromatic rice of South Bengal districts of West Bengal, should be protected under "The Geographical Indications of Goods (Registration and Protection) Act, 1999", which may help in identifying the genuine quality of 'Gobindobhog' rice and protecting it against counterfeit ones.

In addition, the 'Gobindobhog' growers' community can build goodwill as well as fetch premium price for the specific non-Basmati type aromatic rice product of West Bengal.

Above all, the G.I. protection of 'Gobindobhog' rice will increase its market potential in a large extent within India as well as in other potential countries in the present-day WTO regime. As a result, the farming and trading community network will be strengthened toward the betterment of socio-economic status and long-term sustainability.

Along with the Statement of Case in Class (b) 31 in respect of (c) Rice in the name(s) of (d) Dr. Paritosh Bhattacharyya, OSD & Ex-Officio Director of Agriculture, whose address is (e) Department of Agriculture, Government of West Bengal, Jessop Building, 63 N. S. Road, Kolkata-700 001, West Bengal, who claims to represent the interest of the producers of the said goods to which the geographical indication relates and which is in continuous use since **300 YEARS** in respect of the said goods.



2. The application shall include such other particulars called for in rule 32(1) in the Statement of Case

3. All communications relating to this application may be sent to the following address in India:

4. In the case of an application from a convention country the following additional particulars shall also be furnished

a) Designation of the country of origin of the geographical indication

b) Evidence as to the existing protection of the geographical indication in its country of origin, such as the title and the date of the relevant legislative or administrative provisions, the judicial decisions or the date and number of the registration, and copies, of such documentation.

*Paritosh Bhattacharyya*

(SIGNATURE)

**NAME OF THE SIGNATORY: DR. PARITOSH BHATTACHARYYA**

O.S.D. & E.O.  
Director of Agriculture  
Govt. of West Bengal