Advertised under Rule 41 (1) of Geographical Indications of Goods (Registration & Protection) Rules, 2002 in the Geographical Indications Journal 88 dated 28th July, 2016

G.I. APPLICATION NUMBER – 478

Application Date: 26-03-2014

Application is made by **Mulshi Taluka Ambemohar Samvardhan Sangha,** at Post: Khechare, Taluka: Mulshi, District: Pune, Maharashtra, India for Registration in Part A of the Register of **AMBEMOHAR RICE** under Application No: 478 in respect of Rice falling in Class – 30 is hereby advertised as accepted under Sub-section (1) of Section 13 of Geographical Indications of Goods (Registration and Protection) Act, 1999.

A) Name of the Applicant : Mulshi Taluka Ambemohar Samvardhan Sangha

B) Address : Mulshi Taluka Ambemohar Samvardhan Sangha at Post: Khechare, Taluka: Mulshi, District: Pune, Maharashtra, India

C) Types of Goods : **Class 30** – Rice

D) Specification:

For many centuries, aromatic rice has been preferred for consumption because of its pleasant aroma and unique taste. Scented rice constitutes a small but a special group of rice, considered as of best quality. The Indian subcontinent flourishes with hundreds of indigenous aromatic cultivars and landraces, and the diversity of scented rice of India is highest in the world. Scented rice is further classified as basmati and non-basmati types.

The non-Basmati varieties such as Ambemohar Rice excel like Basmati varieties as far as aroma and other characters are concerned and thus are traded popularly in the market.

The introduction of hybrid rice varieties has further contributed in reduction in area under cultivation of non-basmati scented rice. As a result, most of this valuable wealth has either already vanished or is on a decline. The cultivation of non-basmati scented rice is now confined to limited pockets where farmers grow them either for self-consumption or for special occasions. Since local varieties are a rich source of gene pool (Malik et al. 1994), it is vital to collect, characterize, document, and conserve these varieties.

Ambemohar rice is traditional variety of rice of Maval region in Pune District. Ambemohar rice is especially famous for its sweet taste and aroma. It is white in colour with short grain size. Aroma of this variety is like blossoms of mango, when cooked. This rice is preferred due to its softness and chew ability.

From Ambemohar, pure line selections Ambemohar-157, Ambemohar-159, and Ambemohar-102 were developed and released.

E) Name of the Geographical Indication:

AMBEMOHAR RICE

F) Description of the Goods:

Ambemohar rice is white in color. Grain size is short. Panicle size of the Ambemohar crop is long but the numbers of grains in a panicle are less. Ambemohar rice crop is tall around 6 feet in height. The cultivation period is 140-160 days. Aroma of this variety is like blossoms of mango, when cooked. This rice is preferred due to its softness and chew ability. Taste of this rice variety is sweet. Kernel size is small after cooking.

The grain characteristics of Ambemohar rice are as below:

Av. length (mm):	4.73 ± 0.13;
Av. breadth (mm):	2.37 ± 0.05;
L/B:	2.00;
Av. test weight (g):	13.47 ± 0.23.

Chemical Properties of Ambemohar rice are as below:

Apparent amylase Content ± SD (%):	22.56 ± 0.41;
Gel Length (mm):	39.5;
Alkali Spreading Value (ASV):	4.17.

Cooking characteristics of Ambemohar rice are as below:

Av. Lc ± SD (mm):	8.11 ± 0.44;
Av. Bc ± SD (mm):	2.97 ± 0.09l;
CC:	2.18;
CE:	1.71;
CLF:	1.25;
Lc / Bc:	2.73.

{ Av.- Average; Lc- Length of cooked grain; Bc- Breadth of cooked grain, CC- Coefficient of cooking, CE- Coefficient of elongation, CLE- Coefficient of latitudinal expansion}

A study was carried out to find out the comparative effects of NaCl stress towards germination, plant growth and various biochemical parameters including total proteins, sugars and carbohydrates, starch and proline accumulation in two local highly popular indica scented non-basmati type rice genotypes, namely Ambemohar and Indrayani.

The findings of the study are summarized in the tables below, the control values shall be considered for the under the physico-chemical characteristics of Ambemohar Rice. Relevant values are highlighted herewith.

Table 1. Effect of different concentrations of NaCl on germination and growth parameters at seedling level in rice cultivars

Rice Cultivar	NaCl stress (mM)	Germination percentage Mean ± S.E.	Root length (cm) Mean ± S.E.	Shoot length (cm) Mean ± S.E.	Root/shoot ratio
Indrayani	0 (Control)	100 ± 1.0	14.5 ± 1.2	10.5 ± 2.1	1.38
	50	100 ± 2.2	12.0 ± 1.3	8.1 ± 1.3	1.48
	100	96 ± 1.8	11.5 ± 0.9	7.2 ± 1.0	1.60
	150	88 ± 2.2	6.8 ± 0.6	3.8 ± 0.4	1.79
	200	68 ± 1.7	4.5 ± 0.3	2.2 ± 0.2	2.05
	300	48 ± 1.6	1.8 ± 0.1	0.8 ± 0.1	2.25
Ambemohar	0 (Control)	100 ± 0.8	10.3 ± 1.5	11.0 ± 1.2	0.94
	50	100 ± 1.5	8.2 ± 1.1	7.8 ± 1.1	1.05
	100	100 ± 2.0	8.7 ± 0.8	7.2 ± 0.9	1.21
	150	96 ± 2.5	8.1 ± 0.9	6.1 ± 0.6	1.33
	200	88 ± 1.6	7.5 ± 1.0	3.9 ± 0.4	1.92
	300	68 ± 1.2	4.6 ± 0.3	3.8 ± 0.2	1.21

Table 2. Effect of different concentrations of NaCl on proline content at seedling level in rice cultivars

	Total proline content in rice cultivars (mg/g fresh weight) Mean ± S.E.	
NaCl stress (mM)	Indrayani	Ambemohar
0 (Control)	70.15 ± 2.3 (100)	77.89 ± 3.9 (100)
50	77.89 ± 1.8 (111)	128.51 ± 6.8 (165)
100	109.87 ± 3.9 (156)	140.20 ± 10.2 (180)
150	124.61 ± 5.7 (178)	214.25 ± 12.7 (275)
200	155.82 ± 8.3 (222)	237.62 ± 13.9 (305)

The values in parentheses shows the increase in proline content by considering proline content in control plants as 100%.

Table 3. Effect of different concentrations of NaCl stress on total proteins content at seedling level in the local cultivar of rice

	Total protein content (mg/g fresh weight) Mean ± S.E.		Total Phenol content (mg/g fresh weight) Mean ± S.E.	
NaCl stress (mM)	Indrayani	Ambemohar	Indrayani	Ambemohar
0 (Control)	461.70 ± 3.9	287.48 ± 5.2	11.58 ± 0.7	19.74 ± 1.2
50	349.42 ± 7.8	424.37 ± 8.9	13.16 ± 1.5	16.45 ± 1.8
100	299.50 ± 5.7	349.40 ± 13.5	16.45 ± 2.3	19.16 ± 2.1
150	249.64 ± 6.6	312.26 ± 12.1	19.74 ± 2.5	22.08 ± 0.5
200	212.13 ± 7.2	249.67 ± 7.3	26.32 ± 2.9	23.01 ± 0.4

Table 4. Effect of different concentrations of NaCl stress on reducing and non-reducing sugars, and starch content in rice cultivars

NaCl stress (mM)	Reducing sugar content (mg/g fresh weight) Mean ± S.E.		Non-reducing sugar content (mg/g fresh weight) Mean ± S.E.		Starch content (mg/g fresh weight) Mean ± S.E.	
	Indrayani	Ambemohar	Indrayani	Ambemohar	Indrayani	Ambemohar
0 (Control)	120.5 ± 4.2	40.17 ± 2.8	124.4 ± 5.9	305.4 ± 12.8	617.2 ± 25.2	283.9 ± 8.7
50	160.7 ± 8.4	50.22 ± 3.2	101.8 ± 3.9	271.4 ± 10.4	345.6 ± 15.6	382.7 ± 9.6
100	200.9 ± 12.5	70.31 ± 3.9	67.86 ± 4.2	124.4 ± 8.7	176.9 ± 12.8	481.4 ± 14.1
150	270.3 ± 10.8	80.35 ± 7.1	33.93 ± 2.8	101.8 ± 5.8	102.9 ± 8.9	580.2 ± 17.5
200	281.2 ± 10.9	90.39 ± 6.2	11.31 ± 0.9	45.24 ± 2.6	49.38 ± 2.4	650.1 ± 16.2

A Test Report of National Agriculture and Food Analysis and Research Institute shows Protein (6.18g/100g), Carbohydrate (81.8g/100g), Fat (0.69 g/100g), Sugar (6.19 g/100g), Iron (1.3 mg/100g), Calcium (3.22 mg/100g) values of Ambemohar rice in comparison with Indrayani rice.

In the study performed by University of Pune and Bhabha Atomic Research Center, genetic relationship among sixteen non-basmati scented rice accessions, five basmati rice accessions and two non-scented rice accessions has been assessed using RAPD and ISSR marker systems. In addition, six Ambemohar accessions were screened for presence of genotype specific band obtained during study. The analysed set varies with respect to aroma, grain shape, grain quality and cultivar type (landrace, selection and variety).

It was found that the genotype specific band was present specifically in all the accessions of Ambemohar Pandhara collected from various localities and Ambemohar 157, representing diversity in Ambemohar with respect to this locus. Ambemohar 157 is a pure line selection from the Maval tract of Pune district where Ambemohar landrace was popularly grown for the past several hundred years. Thus, the genotype specific band OPF-05600 could be used as a band specific to Ambemohar varieties from Wadgaon-Maval tract of Pune district in India.

G) Geographical area of Production and Map as shown in page no: 24

Area under cultivation:

Ambemohar rice is mainly cultivated in Maval region of Pune district. Maval region is towards the west of Pune area. It is hilly terrain and part of the Sahyadri range/western ghats.

H) Proof of Origin (Historical records):

Since the time of civilization, thousands of locally adapted aromatic rice genotypes have evolved as a consequence of natural and human selection. These landraces are the genetic reservoirs of useful genes. Despite the encroachment of high yielding varieties, landraces like “Ambemohar” have survived the onslaught of high yielding varieties owing to its characteristic aroma, taste and stability of yield in the niche areas.

Many farmers in Maval region of Pune district are cultivating Ambemohar rice for many generations. This region is towards the west of Pune area. It is hilly terrain and part of the Sahyadri range/western ghats. Evidences of Ambemohar rice used in the feast and celebrations go back in the period of "Peshwa regime". During this period there was larger demand for luxurious items like fine rice and sugarcane. 'Bajirao Peshawa' gave meal to 175635 Brahmins in 1809. Especially for this feast Fine rice of Ambemohar variety was purchased from Maval-Mulshi region of Pune District.

I) Method of Production:

Soil:

Soil type usually depends on the type of bedrock, climate and weathering patterns. Two types of soils are found in the Kolwan valley of Mulshi taluka: red to reddish brown, silty soils (alfisols) and black, clayey soils (vertisols). The soils are acidic in nature having pH around 5.5-6.7. The soil is rich in Iron and Aluminum and deficient in Calcium.

Seed Selection:

Seed selection plays a vital role in maintaining originality of the crop. Farmers use previous year's seeds. It is famous as Ambemohar variety among farmers.

Cultivation Practices:

The main practice of establishing rice plants is transplanting rice seedling. Seedbed is prepared in the month of June, i.e after the first rain. After preparation of seedbed, sowing of seeds is done. Within 15 days after sowing seeds, Urea fertilizer is provided as a top dressing. After 30 days seedlings are transplanted from a seedbed to the wet field. Puddling i.e. ploughing in wet field is done by wooden plough. Seedlings are transplanted by hand in the puddled field. Transplanting of the seedling is done in 'Rumali' type. It requires less seeds and is an effective method to control weeds, but requires more labour. Bio-fertilizers like compost or manure are used for crop establishment.

As Mulshi taluka is surrounded by Sahyadri ranges, this creates a suitable atmosphere for cultivation of aromatic Ambemohar rice. Half foot water in the rice field is required at least for first three months after sowing. It is totally a rain fed crop. The rain water coming down from the hills surrounding it, is useful for the crops. The Mula and Mutha rivers flowing through Mulshi taluka help in maintaining water level and dampness in the soil which is extremely necessary for cultivation of rice.

Next step in rice cultivation is harvesting which involves process of collecting the mature rice crop from the field. Ambemohar rice crop usually reaches maturity in approximately 140-160 days. Manual harvesting of rice is very common practice. It involves cutting the rice crop with simple hand tools like sickles and knives. After harvesting, rice is stored in an open place and rice panicles are stored in a way that not a single drop of water can damage inner rice grains. Then the rice is threshed to separate the grain from the stalk and cleaned. This is either done by hand or machine. After harvest, the rice grain undergoes a number of processes such methods include, drying, storing, milling, and processing.

J) Uniqueness

Geographical Significance

i. Soil

Soil type usually depends on the type of bedrock, climate and weathering patterns. Two types of soils are found in the Kolwan valley of Mulshi taluka: red to reddish brown, silty soils (alfisols) and black, clayey soils (vertisols). The soils are acidic in nature having pH around 5.5-6.7. The soil is rich in Iron and Aluminum and deficient in Calcium.

ii. Climate

Temperature: Average temperature of Mulshi Taluka is 17 degree C to 29 degree C. Rainfall and water: Average Rainfall for Mulshi Taluka is between 1866.00 mm. The valley receives most of the rainfall from the southwest monsoon, with the northern slopes bearing the direct brunt of the rainfall (they are exposed directly to the winds and the rains during the monsoon). The inner slopes of the southern ridges, which remain on the leeward side with respect to the direction from where the southwest monsoon precipitates rain, do not experience the direct impact of heavy downpours that characterize the rain in the region. Rivers and Dams help in maintaining water level and dampness in the surrounding soil. The post monsoon below ground water levels have been observed between 2 and 5 m in Mulshi.

Uniqueness of Ambemohar Rice

- Aroma of this variety is very strong and smells like blossoms of mango, when cooked. Heterocyclic compound 2-Acetyl-1-Pyrroline (ACPY) is responsible for aroma of the rice. Fugal strains like Aspergillus awaori present in soil produce ACPY from
- 2AP has been accepted as a universal aroma principle. The study revealed that the content of 2AP and other volatiles in Ambemohar rice are comparable and better in comparison with Basmati, Dubraj, Kalimuch etc. varieties of rice.
- This variety of rice is small and round in shape. On cooking the rice, it swells up and has a sticky texture.
- According to the well known nutritionist, Ambemohar rice is short grained rice and is rich in vitamin B complex and, potassium.
- Weight of rice grains is high. Wt for 100 grains is around 40 g.
- Taste of this rice variety is sweet. Starch content is up to 70%.
- It requires comparatively short time for cooking.
- Kernel size is small after cooking. Elongation Ratio is 1:2.
- The cooked grains have a tendency to break easily and stick together. Therefore it is preferred for children and also old persons.
- The study titled “Differential Response of Two Scented Indica Rice Cultivars under Salt Stress”, it was concluded that Ambemohar showed better tolerance to salt stress than Indrayani, with a lesser extent of antagonistic effect of NaCl on germination and biomass production at seedling stage. In addition Ambemohar showed higher proline, protein and starch content with lesser polyphenol levels

under varying salt stress level than Indrayani and all these biochemical parameters might have played an important role in its salt tolerance nature.

Comparison chart of Ambemohar Rice with GI registered rice

	Registered GI Rice			**Normal Properties of Rice**
Ambemohar rice	**Navara Rice**	**Palakkadam Matta Rice**	**Pokkali rice**	
It's a traditional variety and also used for religious and marriage ceremonies. Taste of this rice variety is sweet. It requires comparatively short time for cooking. The short cooked grains have a tendency to break easily and stick together. It is used for making 'Vapholya'. A traditional food item prepared during Makarsankranti festival.	The Navara Rice is the indigenous medicinal plant of Kerala. It has unique medicinal characteristics and hence widely used in Ayurvedic treatments.	The rice is, coarse bold and red in color. The rice has got a unique taste.	It is a unique saline tolerant rice variety that is cultivated in an organic way in the water-logged coastal regions, spread in about 5000 hectares area	Rice is a major food staple and a mainstay for the rural population and their food security. It is mainly cultivated by small farmers in holdings of less than 1 hectare. Rice is also a wage commodity for workers in the cash crop or non-agricultural sectors. Rice is vital for the nutrition
It has strong fragrance reminiscent of mango blossoms, which is noticeable when the rice is cooked. 2AP content at about 0.115 to 0.365 mg/kg, responsible for aroma of Ambemohar rice. Ambemohar rice is also preferred for its softness and easy chewability.	Navara rice is easily digestible and hence a light food and has got a unique taste	The coarse rice with red pericarp by itself ensures high content of nutrients.	Its resistance to salinity is remarkable. The rice is cultivated from June to early November when the salinity level of the water in the fields is low.	Rice is the staple food of over half the world's population. It is the predominant dietary energy source. Rice provides 20% of the world's dietary energy supply.

Taste of this rice variety is sweet. Starch content is up to 70%. Cultivation period in 140-160 days. days.	The short span of about sixty days to mature is unique to Navara rice.	The grains is grown on unique black cotton, derived from rocks rich in lime peculiar to Palakkad also in "Poonthalpadam" where the soil is heavy, containing 60-80% of clay and silt and posses low permeability and high water holding capacity.	The tidal flows make the fields highly fertile, no manure or fertilizer need to be applied; the seedlings just grow the natural way.	

K) Inspection Body

'Mulshi Taluka Ambemohar Samvardhan Sangha' has constituted an Inspection structure to oversee the standards and quality assurance system for inspection of every step of production of Ambemohar Rice and statutory compliances thereof.

This Inspection Body consists of President / Vice-President / Secretary / Treasurer of the Applicant Organization, Farmer Members, GI Experts, and Agriculture Experts.

The quality of Ambemohar Rice will be monitored by an Internal Watchdog Mechanism in order to maintain the original physical and chemical characteristics as per GI registration.

The system of internal watchdog mechanism will consist of following committee members:

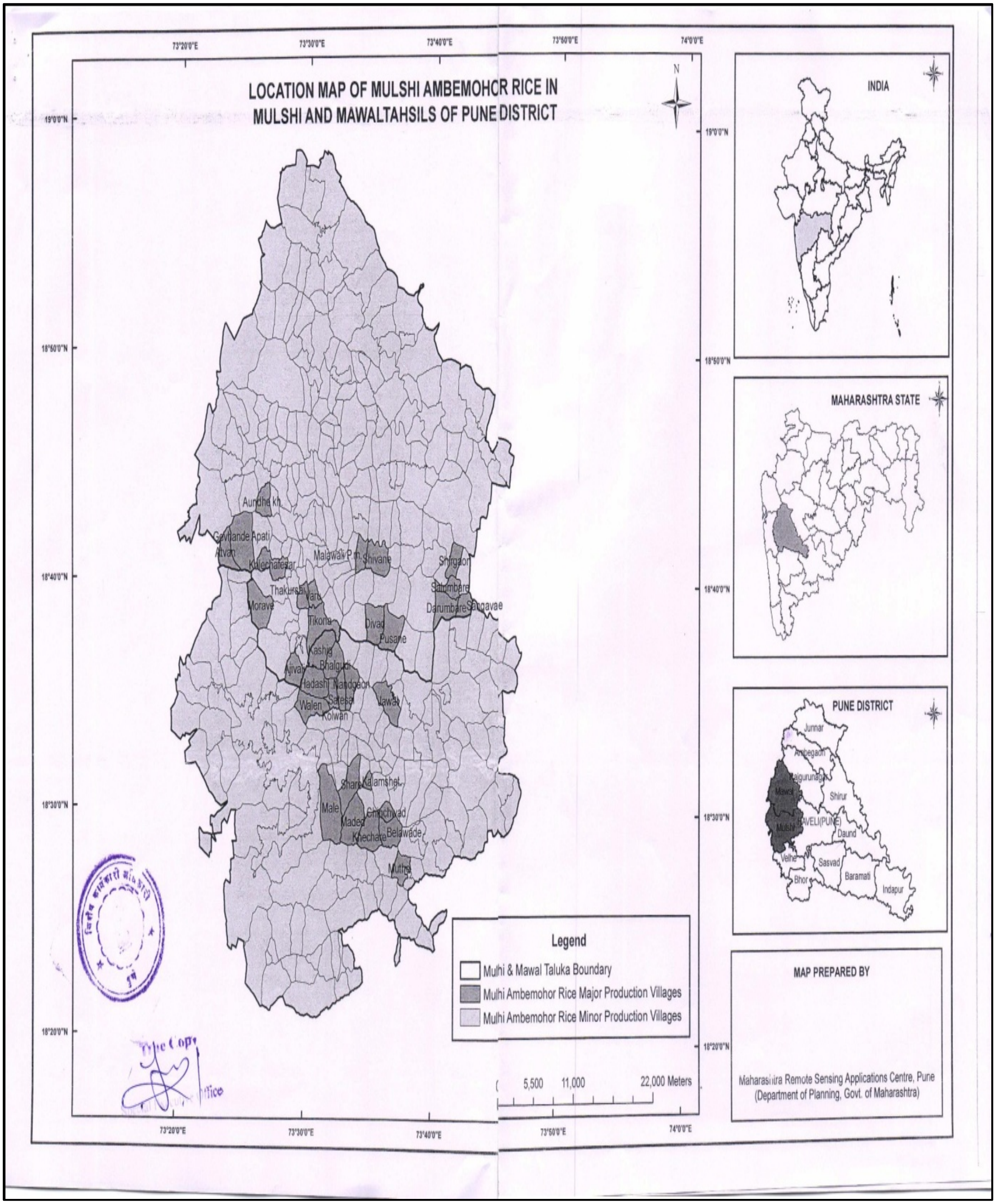
i) Representative of Producer group of Ambemohar Rice
ii) Three (3) Producers from the area
iii) GI Experts

This committee will also help to regulate the use of Geographical Indications for the welfare of local producers' community. The committee will frame the terms and conditions to use brand name of Ambemohar Rice by any of the marketing agency. The logo of Ambemohar Rice GI will be used to create brand image.

L) Others

Uses of Ambemohar Rice:

- Ambemohar rice is used to prepare a thick soup of rice and milk called ‘Bhatachi Pej’ locally, mainly for children, elderly people and patients. (Rice Kanji).
- It’s a traditional variety and also used in religious and wedding ceremonies.
- It is used for making ‘Vapholya’ - A traditional food item prepared during Makarsankranti festival in Mulshi region.
- Ambemohar rice is used for making soft Idli and crispy dosa.
- Also used for rice puff making (Murmure).
- Rice bran is used for oil extraction.
- Rice bran is also used for Mushroom cultivation.


LOCATION MAP OF MULSHI AMBEMOHOR RICE IN
MULSHI AND MAWALTAHSILS OF PUNE DISTRICT
Legend
Mulhi & Mawal Taluka Boundary
Mulhi Ambemohor Rice Major Production Villages
Mulhi Ambemohor Rice Minor Production Villages
INDIA
MAHARASHTRA STATE
PUNE DISTRICT
MAP PREPARED BY
Maharashtra Remote Sensing Applications Centre, Pune
(Department of Planning, Govt. of Maharashtra)
5,500 11,000 22,000 Meters