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भौगोलिक उपदर्शन पत्रिका

GEOGRAPHICAL INDICATIONS JOURNAL



बौद्धिक सम्पदा
भारत
**INTELLECTUAL
PROPERTY INDIA**

भौगोलिक उपदर्शन पंजीकृति,
बौद्धिक सम्पदा अधिकार भवन,
जी.एस.टी. रोड, गिण्डी,
चेन्नै - ६०० ०३२.

**Geographical Indications Registry,
Intellectual Property Rights Building,
G.S.T. Road, Guindy, Chennai - 600 032.**



**GOVERNMENT OF INDIA
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INDEX

S. No.	Particulars	Page No.
1	Official Notices	4
2	New G.I Application Details	5
3	Public Notice	6
4	<i>GI Applications</i>	
	<i>Ajara Ghansal Rice - GI Application No.470</i>	7
	<i>Mangalwedha Jowar - GI Application No.472</i>	16
	<i>Sindhudurg & Ratnagiri Kokum - GI Application No.474</i>	25
	<i>Agates of Cambay (Logo) - GI Application No.508</i>	40
6	General Information	50
7	Registration Process	52

OFFICIAL NOTICES

Sub: Notice is given under Rule 41(1) of Geographical Indications of Goods (Registration & Protection) Rules, 2002.

1. As per the requirement of Rule 41(1) it is informed that the issue of Journal 76 of the Geographical Indications Journal dated 27th November 2015 / Agrahayana 06th, Saka 1936 has been made available to the public from 27th November 2015.

NEW G.I APPLICATION DETAILS

App.No.	Geographical Indications	Class	Goods
530	Tulaipanji Rice	31	Agricultural
531	Gobindobhog Rice	31	Agricultural
532	Mysore Silk	24, 25 and 26	Handicraft
533	Banglar Rasogolla	30	Food Stuffs
534	Lamphun Brocade Thai Silk	24	Textiles

PUBLIC NOTICE

No.GIR/CG/JNL/2010

Dated 26th February, 2010

WHEREAS Rule 38(2) of Geographical Indications of Goods (Registration and Protection) Rules, 2002 provides as follows:

“The Registrar may after notification in the Journal put the published Geographical Indications Journal on the internet, website or any other electronic media.”

Now therefore, with effect from 1st April, 2010, The Geographical Indications Journal will be Published and hosted in the IPO official website www.ipindia.nic.in free of charge. Accordingly, sale of Hard Copy and CD-ROM of GI Journal will be discontinued with effect from 1st April, 2010.

Registrar of Geographical Indications

G.I. APPLICATION NUMBER – 470

Application Date: 26-03-2014

Application is made by **Ajara Taluka Shetkari Vikas Mandal**, Ramdev Galli, Taluka Ajara, District Kolhapur – 416505, Maharashtra, India for Registration in Part A of the Register of **AJARA GHANSAL RICE** under Application No: 470 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 : Ajara Taluka Shetkari Vikas Mandal**
- B) Address : Ajara Taluka Shetkari Vikas Mandal,
Ramdev Galli, Taluka Ajara, District Kolhapur –
416505, Maharashtra, India**
- C) Types of Goods : Class 30 – Rice**
- D) Specification:**
- Ajara Ghansal rice is traditional variety of rice in Ajara Taluka of Kolhapur district.
 - Ajara Ghansal rice is specially famous for its aroma (specific fragrance), taste and nutritional value
 - The Ghansal rice is an Indigenous aromatic rice variety of Maharashtra.
 - It is short bold grain having the ratio(3.61:5.5mm)
 - Its appearance is creamy white
- E) Name of the Geographical Indication:**

AJARA GHANSAL RICE



F) Description of the Goods:

Following are the main features of the Ajara Ghansal Rice:

- Appearance: Creamy white/ brown
- Cohesiveness: Well separated
- Tenderness on touching: Hard

- Tenderness on chewing: Hard
- Taste: Desirable
- Aroma: Strong
- Elongation: Moderate
- Overall acceptability: Good
- It is a short bold grain having ratio (3.61: 5.5 mm).

The most important characteristic of Ghansal variety is its aroma. According to the various research papers covering study of Ajara Ghansal rice mention that aroma of this rice arises from a mixture of many compounds like alcohols, aldehydes, esters etc. It further emphasizes that the main chemical constituent responsible for aroma is 2-Acetyl-1-pyrroline (2AP). Ghansal grown in Maharashtra state excel in 2AP content over some of the Basmati samples. Percentage of 2AP on an average is 0.237 mg/kg in Ghansal rice. Like basmati rice has specific fragrance because of high 2-AP content, this high 2-AP content gives specific fragrance to the Ghansal rice.

The areas of aromatic rice cultivation are based at the foothills and are characterized by relatively low temperature, fertile lateritic soil and favorable cool and dry climate at the stage of maturity for development and retention of high aroma. Various villages from Ajara are blessed by similar geographical conditions, further it is blessed by nature in terms of forest, mountains and waterfalls.

Most of the farmers cultivating Ajara Ghansal rice polish Ghansal by traditional ways manually instead of mechanized polishing which is done by means of machine in industries. Due to this reason the aroma and taste of rice remains on higher side hence it catches great demand from market. In addition to this largest cultivation period of 150-160 days helps in enhancing the aroma and quality of rice grains.

- **Morphological characteristics of Ajara Ghansal Rice**

Sr.No.	Character	Description
1	Plant Height(cm)	138.25
2	Panicle length(cm)	26.65
3	Spikelet per panicle	216.50
4	Spikelet fertility	95.51%
5	Tillers per plant	6.50
6	Test weight(g)	12.69
7	Grain length(mm)	4.36
8	Grain breadth(mm)	2.06
9	Length : breadth ratio	2:12

- **Physico-chemical properties of Ajara Ghansal Rice**

Grain Classification: Short bold
 Chalkiness (%): 0.000
 Volume Expansion: 3.56
 Kernel length after cooking: 3.08
 Elongation Ratio: 1.42
 2AP (mg/kg): 0.237

G) Geographical area of Production and Map as shown in page no: 15

Ajara is located at 16.12 degree North latitude and 74.2 degree East Longitude. It has an average elevation of 660 meters (2165 feet). Ajara is 84 km away from Kolhapur city, 121 km away from Panajim, 320 km away from Pune, and 469 km away from Mumbai.

1. Latitude : 16°-43'N
2. Longitude : 74°-14'E
3. Elevation : 574 m above MSL

Area under cultivation:

There are 2200 farmers in Ajara Taluka cultivating Ghansal Rice. Total area under cultivation is about 513 hectare . Total production of Ghansal rice is 13-15 quintals per acre. Total production of Ghansal rice is 1795 5 quintals, Average cost of cultivation is Rs. 20000 per acre.

There are 35 villages from Ajara Taluka in which Ghansal rice is cultivated which are as follows:

1. Dabhil, 2. Gavas, 3. Pernoli, 4. Latgaon, 5. Shelap, 6. Masoli, 7. Chafwaday, 8. Medoli, 9. Kitwaday, 10. Salgaon, 11. Yemaykod, 12. Polgaon, 13. Chitali, 14. Jaur, 15. Khana pur, 16. Devarday, 17. Ajara, 18. Salgaon, 19. Petiwadi, 20. Ujagi, 21. Kadgaon, 22. Keni, 23. Halewadi, 24. Yerdol, 25. Surgurwadi, 26. Hatwadi, 27. Etay, 28. Hathiwaday, 29. Chandwadi, 30. Watagi, 31. Hajgoli, 32. Sohali, 33. Murday, 34. Bhavewadi, 35. Shirsagi.

H) Proof of Origin (Historical records):

Scented rice have been known in Indian subcontinent since the times of 'Charaka' [600 BC (c .700 BC-eds.)] and 'Sushruta' [200 BC (c . 400 BC - eds.)]. These rice have played important role in many regional economies and have been the favorites of kings, religious heads, royalty and the elite of society. Most of these rice are highly area specific hence each Indian state has its own special scented rice. Scented rice were known since ancient times and were considered the best among the specialty rice. Throughout the world they have been the choicest food of kings, royalty, and common man.

Ghansal rice is cultivated over many generations in Ajara Taluka. Many families of farmers are cultivating Ghansal rice for more than 100 years. In biography of Late Shrimant Narayanrao Govindrao Ghopade, Chief of Ichalkaranji, (born in 1870, ruling period 1876-1943), it has been mentioned that he had given encouragement to increase cultivation of Ghansal rice in Ajara Taluka . Traders like M/s P. M. Kelkar are in the trading for Ghansal rice for more than 100 years.

Table1: Traditional scented rice cultivars of Maharashtra and the area of their origin.

Sl. No.	Name of cultivar	Area of origin
1	Kala girga	Kolhapur Dist.
2	Ghansal	Kolhapur Dist.
3	Kothimbari Sal (Bodga)	Kolhapur Dist.
4	Champakali	Kolhapur Dist.
5	Krishna Sal	Kolhapur Dist.
6	Tambada jog	Satara, Sangali Dist.
7	Ambemohar	Pune Dist.
8	Kasbai	Thane Dist.
9	Thilsa	Thane Dist.
10	White Luchai region	Eastern Vidharbha
11	Chinoor	Eastern Vidharbha region

D) Method of Production:

Ghansal rice is cultivated by Kinishet or patharshet type of farming.

For cultivation Ghansal rice, seeds are selected from the previous year's stock i.e. farmers select good panicles and seeds from last year panicles and these are stored separately for the purpose of sowing. Due to this, purity of seed is maintained.

After harvesting the previous year's crop, land preparation for the next crop starts. Land preparation starts in the month of June. Land preparation involves cleaning, plowing and puddling. In cleaning process all the weeds are burnt. Burning of the weeds helps in removing insects from the paddy field. After the first rain, plowing of the paddy field is done. Plowing helps in making the soil soft. Small stones from the field are removed. This is done to level the field. At this time organic manure as fertilizer is added in the soil. After this, seeds are sown. The aim of land preparation for rice production is to place the soil in the best physical condition for crop growth and to ensure that the soil surface is leveled.

Land is prepared for seedbed in the first or second week of June, after first rain. After preparation of seedbed, sowing of seed is done by applying bio fertilizer like azatobactor. 30-35 kg seed is required per hectare of paddy field. After 20 to 25 days pre-germinated seedlings are transplanted from a seedbed to the wet field. Timely sowing and transplanting of Ghansal rice is an important factor in determining grain yield and quality parameters. Seedlings are transplanted by hand. Before transplanting seedlings, the organic farm yard manure is also added into the soil. 20 X 15 cm distance is kept between two seedlings.

Ajara Taluka is surrounded by hills. In Ajara Taluka most of the rice is cultivated on rain water which comes down from the hills surrounding to it. The Hiranyakeshi River which is at the distance of 5 km from the Ajara Taluka helps in maintaining necessary water level in the soil which is extremely necessary for cultivation of rice.

Suitable amount of water is needed till full growth of the seeds and that is mostly received through rains. Water from the nearby pond is used for irrigation purpose.

For better retention of aroma this variety is exposed to cool humid weather conditions during ripening. It is a tropical crop requiring high temperature and well distributed rainfall during growing season. It requires the soil which has more water storage capacity. Increased heat in the October causes loss of aroma of rice, but particularly in this area the temperature is suitable to maintain the aroma.

Harvesting is done in the month of October-November. Ghansal rice crop usually reaches maturity at around 150 to 160 days. Hand harvesting or manual harvesting of rice is very common practice. It involves cutting the rice crop with simple hand tools like sickles and knives. Following cutting, the rice is then threshed to separate the grain from the stalk and cleaned. This is either done by hand or machine. Harvesting activities include cutting, stacking, handling, threshing, cleaning, and hauling. Good harvesting helps in maximizing the grain yield and minimizing the grain damage and deterioration.

After harvest, the rice grain undergoes a number of processes depending on how it will be used. Such methods include, drying, milling, processing and storing. Drying rice is a critical post harvest activity. Seeds are dried up to 13% moisture. As drying is the most important operation after harvesting a rice crop, delay in drying, incomplete drying or ineffective drying may reduce grain quality.

Storing grains is done to reduce grain loss due to weather, moisture, rodents, birds, insects and micro-organisms.

Milling is a crucial step in post- harvest production of rice. The basic objective of a rice milling system is to remove the husk, bran layers and to produce an edible white rice kernel which is sufficiently milled and free of impurities.

For storage of Ghansal paddy seeds very unique method is used. After drying, paddy seeds are stored in huge pot made up of clay and cow dung. Leaves of Azadirachta - indica (Neem) are used for preservation of rice from insecticides. This method is adopted to store the seed material.

J) Uniqueness:

Geographical Significance

i. Soil

Red to reddish brown soil of varying depths is found in Ajara Taluka. Lateritic soils (Tambadi mati) occur mainly in the western hilly tracks of heavy rainfall, on the hill tops and in the ridges which are not covered by forest. Lateritic soils found in the western parts of Ajara. The soil is rich in Nitrogen, Zink, Iron, Copper, Calcium and Magnesium and very fertile. The quality of soil varies from medium, shallow to coarse soil. Black soil is also found in some parts of Ajara Taluka in the transition tract. Soil is mainly derived from trap and is dark brown in colour, with, a reddish tinge. The region is composed of hilly terrain with rich Lateritic soils (Tambadi mati) favorable for the magnificent growth of Ghansal rice.

ii. Climate

Ajara Taluka comes under the agro climatic zone number IX i.e. western plateau and hill region . Average temperature of Ajara Taluka is 14 degree Celsius to 36 degree Celsius. The temperature during the cultivation period of the Ghansal rice i.e. in between June to November is 17 degree Celsius to 29 degree Celsius. The average annual rainfall recorded is 1900 mm.

The climate is humid and warm during growth while it is cool and dry at maturity. Plant growth, development, aroma are more concern with climatic conditions. The mean temperature ranges between 28-30 degree C, humidity above 65% and minimum temperature do not fall below 10 degree C, such type of climate favors to develop aroma in Ghansal rice which influence the genes of the variety. Though paddy requires hot and humid climate for growth and development, the cool climate at the time of maturity favors development of aroma in panicles and grain.

Ghansal rice is totally rain fed crop. Ajara Taluka is surrounded by hills. In Ajara Taluka most of the Ghansal rice is cultivated on rain water which comes down from the hills surrounding to it. The Hiranyakeshi River helps in maintaining necessary water level in the soil.

Cool climatic condition prevailing at maturity stage has further influenced the production level of the rice.

Uniqueness of Ajara Ghansal Rice

- **High aroma**

The Ajara Ghansal variety of rice is known for its taste and aroma. The areas of aromatic rice cultivation are based at the foothills and are characterized by relatively low temperature, fertile lateritic soil and favorable cool and dry climate at the stage of maturity for development and retention of high aroma. The most important characteristic of Ghansal variety is its aroma. This aroma arises from a mixture of many compounds like alcohols, aldehydes, esters etc. The major Chemical constituent responsible for aroma is 2-Acetyl-1-pyrroline (2AP). Ghansal grown in Maharashtra state excel in 2AP content over some of the Basmati samples. Percentage of 2AP on an average is 0.237 mg/kg in Ghansal rice. Like basmati rice has specific fragrance because of high 2-AP content, this high 2-AP content gives specific fragrance to the Ghansal rice. and

- **Tender and Non sticky**

Texture of Ghansal rice is firm tender and non sticky. Chalkiness is absent in Ghansal variety of rice. Chalkiness is one of the physical characteristics of the rice varieties. The chalky grains reduce the palatability of cooked products thus the presence of more than 20% chalkiness in rice kernels is not acceptable. This chalkiness is totally absent in Ghansal variety due favorable cool and dry climatic conditions. This rice is less sticky as compare to other rice.

Table 2: The chalkiness frequency, kernel area of chalkiness, type and percentage of chalkiness in aromatic rice varieties

Sl. No.	Varieties	Frequency	Kernel area (Extent)	Type	Chalkiness %
1	Basmati local	OC	Medium (11% to 20%)	White belly	34.90±2.35 ^b
2	Ek-Kadi	OC	Medium (11% to 20%)	White belly	64.36±2.20 ^a
3	Ghansal	A	None	ND	0.000±0 ^h
4	Girga	VOP	Small (less than 10%)	White centre	10.86±3.09 ^g
5	Jiresal	OC	Medium (11% to 20%)	White belly	16.20±0.9 ^f
6	Kotimirsal	A	None	ND	0.000±0 ^h
7	Masuri	VOP	Small (less than 10%)	White centre	13.83±1.50 ^f
8	Pusa Basmati-1	VOP	Small (less than 10%)	White belly	15.30±0.36 ^f
9	Pusa Sugandh-2	A	None	ND	0.000±0 ^h
10	Pusa Sugandh-3	OC	Medium (11% to 20%)	White centre	27.33±1.06 ^d
11	Pusa Sugandh-5	OC	Medium (11% to 20%)	White belly	24.16±0.80 ^e
12	Mugadh Sugandh	P	Long (more than 20%)	White belly	31.26±1.11 ^c
13	Kasturi	P	Long (more than 20%)	White belly	27.30±1.15 ^d
14	Vasumati	OC	Medium (11% to 20%)	White belly	14.43±1.16 ^f

Superscript letters (a-h) indicate significant differences ($p < 0.05$) among different rice varieties. Means with same letter within column are not significantly different ($p < 0.05$), means \pm SD, VOP, very occasionally present; OC, occasionally present; P, present; ND, not detected.

- **Highest elongation ratio**

Ghansal rice kernels elongate almost twice upon cooking i.e. 60-110% elongation than the precooked grain. This percentage of elongation is higher than any other variety of rice. One of the main characteristic required for cooking of rice is higher elongation ratio (ER) of the cooked rice. Kernel length after cooking (KLAC) ranged from 2.31 to 3.76 mm in aromatic traditionally cultivated variety. In Ghansal variety the elongation ratio is highest.

Table 3: The volume expansion ratio, kernel length after cooking, kernel elongation ratio and water uptake in aromatic traditionally cultivated and basmati rice varieties

Sl. No.	Varieties	Volume Expansion	Kernel length after cooking	Elongation ratio
1	Basmati local	3.63±0.05 ^b	3.76±0.04 ^d	1.18±0.04 ^b
2	Ek-Kadi	2.36±0.15 ^f	3.20±0.03 ^{d^e}	1.10±0.02 ^{cd}
3	Ghansal	3.56±0.15 ^b	3.08±0.08 ^{d^{ef}}	1.42±0.03 ^a
4	Girga	4.03±0.05 ^a	2.94±0.04 ^{ef}	1.06±0.04 ^{def}
5	Jiresal	4.10±0.1 ^a	2.56±0.06 ^{ef}	1.22±0.08 ^b
6	Kotimirsal	3.56±0.05 ^b	2.31±0.01 ^f	1.06±0.01 ^{def}
7	Masuri	4.06±0.11 ^a	2.98±0.01 ^{ef}	1.01±0.04 ^g
8	Pusa Basmati-1	3.06±0.11 ^d	5.49±0.03 ^{ab}	1.12±0.02 ^c
9	Pusa Sugandh-2	3.00±0 ^d	4.62±0.04 ^c	1.04±0.01 ^{efg}
10	Pusa Sugandh-3	3.13±0.05 ^d	4.81±0.01 ^{bc}	1.10±0.01 ^{cd}
11	Pusa Sugandh-5	3.63±0.05 ^b	4.73±0.05 ^{bc}	1.04±0.01 ^{efg}
12	Mugadh Sugandh	2.73±0.11 ^e	4.93±0.04 ^{bc}	1.03±0.01 ^{fg}
13	Kasturi	3.3±0.1 ^c	4.68±0.03 ^c	1.02±0.04 ^{fg}
14	Vasumati	3.6±0.05 ^b	5.88±1.73 ^a	1.08±0.01 ^{cde}

Superscript letters (a-g) indicate significant differences ($p < 0.05$) among different rice varieties. Means with same letter within column are not significantly different ($p < 0.05$), means \pm SD.

- **Quality of grain**

The alkali spreading value (ASV) and gelatinization temperature (GT) for Ghansal variety is noted as intermediate. The intermediate ASV indicated the medium disintegration and classified as intermediate GT which highly desirable for quality grain.

K) Inspection Body

Ajara Taluka Shetkari Vikas Mandal has constituted an Inspection structure to oversee the standards and quality assurance system for inspection of every step of production of Ajara Ghansal 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 Ajara Ghansal 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 Ajara Ghansal Rice
- ii. Three (3) Producers from the area
- iii. GI Experts
- iv. Agriculture 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 Ajara Ghansal Rice by any of the marketing agency. The logo of Ajara Ghansal Rice GI will be used to create brand image.

L) Others

Uses of Ajara Ghansal Rice

1. Culinary use
2. It is specially used in marriage ceremonies.
3. Rice puff making (Murmure).
4. The rice bran(s) are used for edible oil extraction.
5. Paddy straws are used in mushroom cultivation.

74°0'0"E 74°5'0"E 74°10'0"E 74°15'0"E 74°20'0"E

LOCATION MAP OF AJARA GHANSAL RICE IN AJARA TAHSIL OF KOLAPUR DISTRICT



16°15'0"N

16°10'0"N

16°5'0"N

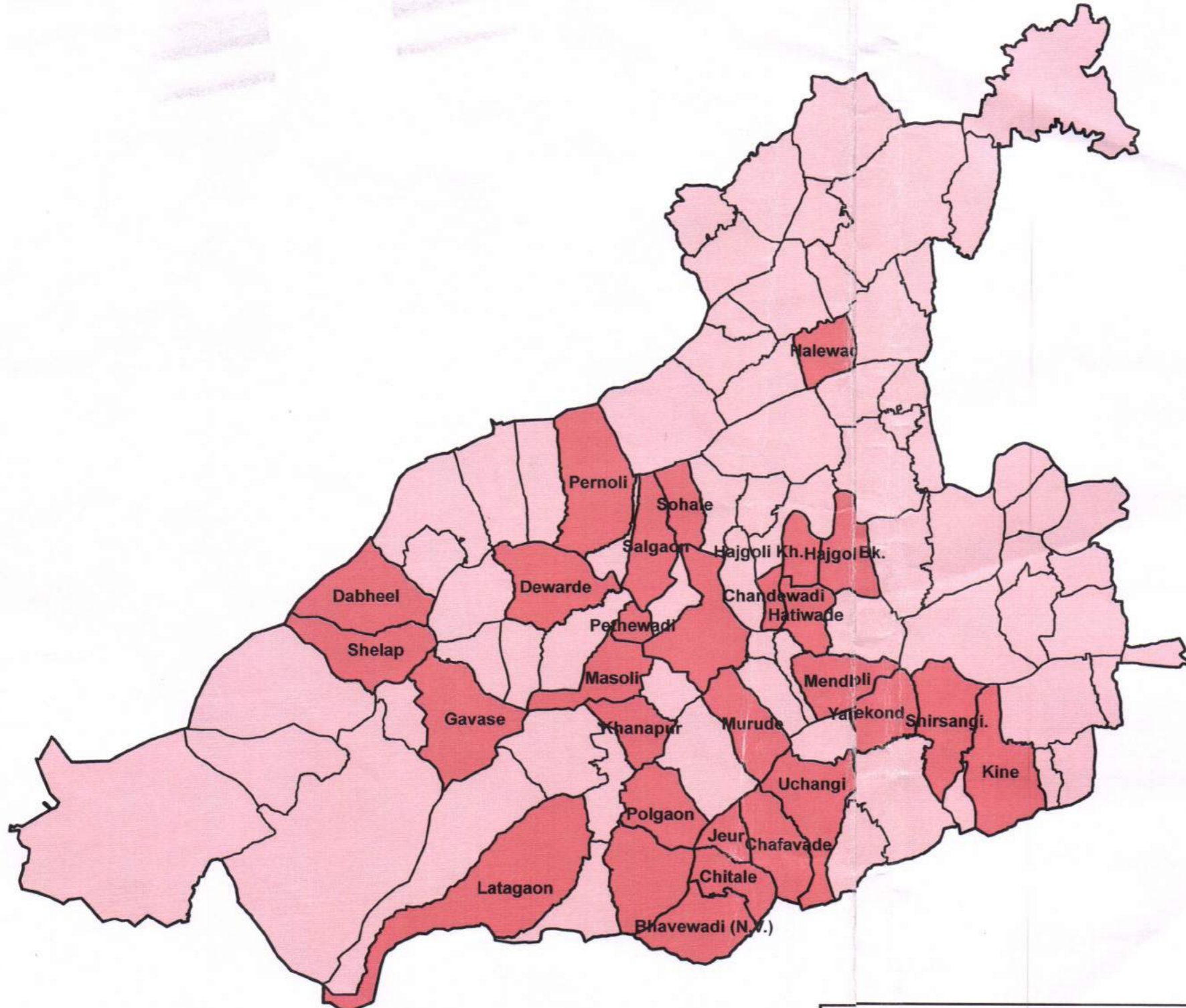
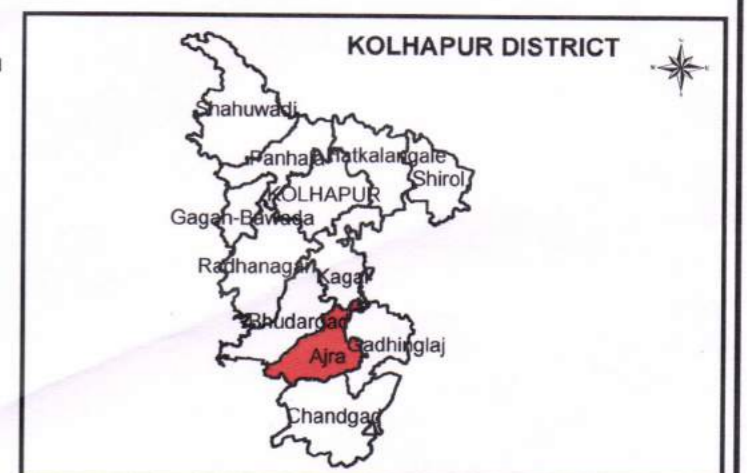
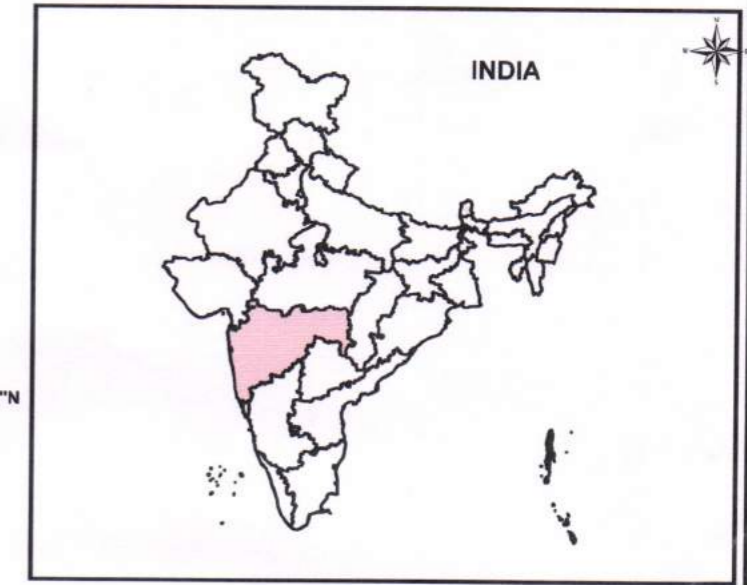
16°0'0"N

16°15'0"N



16°10'0"N

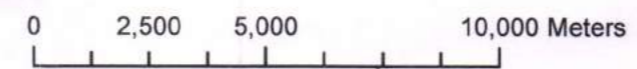
16°5'0"N

16°0'0"N



Legend

-  Ajara Taluka Boundary
-  Ajara Ghansal Rice Major Production Villages
-  Ajara Ghansal Rice Minor Production Villages



MAP PREPARED BY



Maharashtra Remote Sensing Applications Centre, Pune
(Department of Planning, Govt. of Maharashtra)

November 27, 2015

G.I. APPLICATION NUMBER – 472

Application Date: 26-03-2014

Application is made by **Maldandi Jowar Vikas Sangh**, Mangalwedha, Taluka Mangalwedha, District: Solapur – 413 001, Maharashtra, India for Registration in Part A of the Register of **MANGALWEDHA JOWAR** under Application No: 472 in respect of Jowar falling in Class – 31 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 : Maldandi Jowar Vikas Sangh**
- B) Address : Maldandi Jowar Vikas Sangh, Mangalwedha, Taluka: Mangalwedha, District: Solapur – 413 001, Maharashtra, India**
- C) Types of Goods : Class 31 – Jowar**
- D) Specification:**
- Maldandi Jowar is traditional variety of grain of Mangalwedha Taluka in Solapur District.
 - Mangalwedha Jowar is specially famous for its sweet taste and nutritional value
 - It has bold lustrous grain with thin pericarp.
 - It gives the best grain yield and grain quality, fodder yield and fodder quality.
 - This variety dominates the post-monsoon season sorghum areas in India. Several varieties were developed at ICRISAT incorporating genes from Mangalwedha Maldandi (M-35-1).
 - Mangalwedha Jowar contains high percentage of glucose as compare to other kind of Jowar.
 - The roti made from Mangalwedha Jowar is widely believed as the best for taste and softness.
- E) Name of the Geographical Indication:**

MANGALWEDHA JOWAR



F) Description of the Goods:

- The Mangalwedha Jowar is pearly white bold and round grain. Its head is brown in color.
- Plant height: 180 to 200 cms.
- Distinguishing morphological characteristics:
 - i. Plant pigment: Nontan
 - ii. Leaf: Dark green during early age while yellowish green, long at maturity
 - iii. Stem: Juicy and sweet
 - iv. Earhead: Oval shape
 - v. Glume: Straw coloured, wrinkled.
 - vi. Grain: Pearly white, bold and round
- Maturity: range in number of days:
 - i. Days to 50% flowing: 74-78
 - ii. Duration of the crop: 125 to 130.

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

Mangalwedha is a Taluka place in Solapur District. Mangalwedha lies on the Sangole – Solapur route and 23 Km from Pandharpur. Mangalwedha is situated 55 km towards west side of the district headquarters at Solapur and 25 km towards southeast of Pandharpur. Geographically Mangalwedha Taluka is located between 17 to 18 degrees north latitude and 75 to 76 degrees east longitude.

Mangalwedha Taluka consists of 81 villages and total area is 1140.9 Square Km.

It is found that farmers from each and every village in Mangalwedha Taluka, cultivates Mangalwedha Jowar. Total area under cultivation is 44700 Hectare. Yield Potential - Grain: 15-18 Quintals/Hectare. - Fodder: 50-90 Quintals/Hectare.

H) Proof of Origin (Historical records):

Mangalwedha Jowar is a traditional crop of Mangalwedha Taluka in Solapur District, being cultivated for several hundred years for grain and fodder use.

This is local 'Wan' (kind of Jowar) selected to develop hybrid varieties of Jowar in 1930 at Mohol Research Centre. It is clear that this Mangalwedha Jowar has history of hundreds of year as prior to 1930 also this variety dominating the post-monsoon season.

I) Method of Production:

Soil:

Mangalwedha Jowar grows well in deep black soil. Mangalwedha Taluka has very deep black soil with an average depth of 40 to 50 feet. pH level is between 6.5 and 7.5. Mangalwedha Jowar can also grow in shallow and medium deep black soil.

Preparatory tillage Operation:

Mangalwedha Jowar requires deep ploughing to medium deep ploughing and two to three times harrowing to conserve the moisture and eradicate the weeds from the field.

Period of sowing:

Sowing period of rabi Jowar is from 15 September to 15 October. Especially Mangalwedha Jowar is sown at the end of the monsoon season. The post monsoon rainfall is useful for its growth and development. Cloudy weather during growth is favorable for growth and development.

Seed rate:

Seeds require for sowing Mangalwedha Jowar is approximately 10 Kg. per hectare.

Seed treatment:

- Sulphur seed treatment (for Smut disease) is given at 30g for 10Kg seed.
- Azetobactor as a seed treatment at 250g for 10Kg seed.
- P.S.B. Phosphorus Solubilising Bacteria (for 'JeevanuSawardhan') are also recommended as a seed treatment.

Spacing:

- In land without irrigation facilities spacing observed is 45 X 15 cms. (i.e. 1.5 Lakh seedlings per Hectare).
- If irrigation facility is provided or areas with assured rainfall spacing observed is 45 X 12 cms.

Sowing method:

- Sowing is done by traditional method. Farmers use 'Tiffani' for sowing.
- Seed of the Mangalwedha Jowar should not be sown below the depth 5 cms.

Inter cropping:

- Inter cropping practices found in Mangalwedha Taluka are as under.
- Jowar – Tur- in 2:1 proportion
- Jowar – Kardai in 1:1 or 2:1 proportion
- This is done mainly to maintain soil fertility.
- Thinning

Inter tillage:

2 to 3 hoeing are recommended to remove the weeds and conserve the moisture in the root zone. This technology increases the yield and quality sorghum.

Harvesting and threshing

Mangalwedha Jowar takes approximately 120-130 days to mature. The crop should be harvested immediately after it has matured. The right stage for harvest is when grains have become hard having less than 25 per cent moisture

Harvesting is done by uprooting the entire plant. These plants are kept to dry for three to four days. Thereafter earheads are separated from the plants. Nowadays threshing is done with the help of threshers. In remote areas traditional method of beating the earheads with sticks or by trampling bullocks is still followed. The threshed grain is

cleaned and dried in sun for about a week to bring the moisture content down for safe storage.

Packaging

Good packaging is necessary for easy handling, transportation and storage. The Mangalwedha Jowar is transported from field (threshing floor) to the market and stored in jute and plastic bags in a shade. Good quality jute bags either new or second hand are necessary to avoid spoilage and to protect the Jowar from moisture and insect attack etc.

J) Uniqueness:

❖ Geographical Significance

Soil

Soil of Mangalwedha Taluka is deep black soil. Soil depth is 40 to 50 feet. It contains good moisture.

Rainfall

The average rainfall is registered 519.8 mm .

Climate

Climate of the district is hot and dry. The daily maximum temperature ranges between 30 degree C to 35 degree C and the minimum temperature ranges between 18 degree C and 21 degree C.

Cultivation Practice

The cropping system in Mangalwedha Taluka is unique. Instead of growing the crop in the warm summer-monsoon season it is sown after the rain end in September/October and harvested in February. Farmers plant the crop on deep black soils that retain large amounts of the season's excess rainwater; the sorghum roots then extract that water to support plant growth.

Moisture availability in soil at Mangalwedha Taluka is very high as soil depth is 40 to 50 feet with a good drainage. It can sustain even one time rain in monsoon. It can be grown in limited water and minimal inputs and it can be harvested in five months.

Mangalwedha Jowar grows well in short day length, flower and mature irrespective of temperature fluctuation and sowing dates. It is tolerant to terminal moisture stress and resistant to stalk rot/charcoal rot, produce high biomass (grain and Stover) and have large lustrous grain with semi corneous endosperm. Tolerance to shoot fly, lodging and rust is also found in Mangalwedha Jowar.

❖ Uniqueness of Mangaledha Jowar:

- Mangalwedha Jowar is grown under receding soil moisture after cessation of the rains.
- It has low temperature tolerance.
- It gives good response to photoperiod sensitivity (short day length).
- Irrespective of temperature fluctuations and sowing dates, flowering and maturity in Mangalwedha Jowar is least affected.
- Mangalwedha Jowar has inherent quality/traits which save it from insects like shoot fly and aphids and diseases like charcoal and rust

- It has bold lustrous grain with thin pericarp.
- It gives the best grain yield and grain quality, fodder yield and fodder quality.
- This variety dominates the post-monsoon season sorghum areas in India. Several varieties were developed at ICRISAT incorporating genes from M 35-1.
- Mangalwedha Jowar contains high percentage of glucose as compared to other kinds of Jowar.
- The Roti made from Mangalwedha Jowar widely believed as the best for taste and softness . The softness is because of its rich gluten content.
- Many farmers from Mangalwedha Taluka say that Milk of cows and buffaloes contains high fats after consuming Maldandi Fodder. Resultantly Milk gets high price in the market.
- Farmers do not use any pesticides or fungicides for Mangalwedha Jowar as it very resistive to any kind of diseases and pests.

Comparative Tables

Table1:Marketing of Sorghum varieties

Characteristics	HOPE project area		non-HOPE project area	
	Local and M-35-1	Improved (Swati, P Vasudha)	Local and M-35-1	P Mauli and P Vasudha
Grain				
High demand	98	67	92	75
Fetches higher price	87	74	83	67
Low price fluctuations	84	38	92	92
Bigger grain size	51	77	73	83
Fodder				
High demand	100	67	93	75
Fetches higher price	85	69	88	83
Low price fluctuations	84	51	86	92
Low thickness of stem	58	28	79	67

Table 2: Production of Sorghum varieties

Characteristics	HOPE project area		non-HOPE project area	
	Local and M-35-1	Improved (Swati, P Vasudha)	Local and M-35-1	P Mauli and P Vasudha
High yield	100	23	43	100
Short duration	82	95	76	83
Drought resistance	96	74	87	92
Pest resistance	82	79	74	58
Disease resistance	79	77	83	58
Fits into cropping system	78	74	62	67
Improves soil fertility	9	44	43	67
Others (Good fodder quality)	0	41	93	9

Table 3: Consumption of Sorghum varieties

Characteristics	HOPE project area		non-HOPE project area	
	Local and M-35-1	Improved (Swati, P Vasudha)	Local and M-35-1	P mauli and P Vasudha
Better taste	100	95	93	83
Less cooking time	64	54	62	67
High keeping quality	97	85	94	92
Others	0	0	5	8

Table 4: Grain characteristics of 15 sorghum varieties

Cultivar	Grain				
	Color ^c	Corn- eous- ness	Weight (g 100)	Breaking strength (kg)	Water Absorp- tion (%)
M35-1	5Y 8.4	3	4.24	7.7	18.1
CSH-8	5Y 8.4	3	4.05	6.5	26.4
CSH-6	2.5Y 8.4	2	3.67	9.7	20.7
CSV-5	5Y 7.4	3	3.06	7.6	23.8
BG-30	2.5Y 6.4	3	5.16	7.0	32.4
IS-7943	2.5Y 7.6	3	5.64	9.6	37.0
CK60B	2.5Y 8.2	3	3.16	7.0	20.9
T-SS-47	2.5Y 6.6	3	4.02	8.6	23.8
IS-12611	5Y 8.2	2	4.64	11.0	22.7
P721	5Y 8.2	5	2.51	6.8	32.7
IS-1098	2.5Y 7.6	4	3.15	6.0	37.5
M36082	5Y 8.2	1	2.61	10.0	22.7
IS-2328	5Y 8.4	2	3.12	12.4	29.0
PJ33K	2.5Y 8.4	3	5.01	8.8	25.1
IS-11024	5Y 8.6	3	7.63	11.0	28.9

Can Mangalwedha Jowar be grown at other places?

This variety can be grown at many places from Maharashtra, Karnataka, and Andhra etc. However, due to cross pollination with other varieties the original characteristics in Mangalwedha Jowar are lost. This does not happen in the case of Mangalwedha because all farmers grow Mangalwedha Jowar; hence cross pollination takes place within Mangalwedha Jowar Variety only. Thus the originality can only be maintained

in Mangalwedha. If we want to grow Mangalwedha Jowar at other places we need to get new seeds after every 3 years to maintain its originality.

K) Inspection Body

The quality of Mangalwedha Jowar will be monitored by an Internal Watchdog Mechanism set up by 'Maldandi Jowar Vikas Sangh, Mangalwedha' in order to maintain the original physical and chemical characteristics as per the GI application.

The System of Internal watchdog mechanism will consist of following committee members:

- i. Representative of Producer group of Mangalwedha Jowar
- ii. Three (3) farmers from the area under cultivation
- iii. GI experts
- iv. Agriculture experts

'Maldandi Jowar Vikas Sangh' has constituted an Inspection Structure to oversee the standards and quality assurance system for inspection of every step of production of Mangalwedha Jowar and statutory compliance thereof.

The Inspection Structure consists of President/ Vice President / Secretary / Treasurer of the Applicant Organisation, Farmer Members, GI experts and Agriculture Experts. This Committee will also help to regulate the use of Geographical Indications for the welfare of the local farming community. The Committee will frame the terms and conditions to use brand name Mangalwedha Jowar by any of the marketing agency. The logo of Mangalwedha Jowar will be used to create brand image.

The names of the members of the Inspection Structure and Internal Watchdog Mechanism are available on applicant's record and can be furnished if required.

L) Others

• Uses of Mangalwedha Jowar

- a) Sorghum is one of major coarse grain used for human consumption in the semi-arid tropics and is the staple diet for millions of people, providing the bulk of calories, proteins, vitamins and minerals. In India it is used in the form of 'Roti' (unleavened bread). It is eaten at breakfast, lunch and dinner and is frequently stored overnight. Farmers generally carry roties prepared early in the morning to the fields for lunch. Occasionally they are sun dried and stored for more than a week.
- b) 'Roti' is consumed with several side dishes depending upon the socioeconomic status of the consumers, e.g. cooked vegetables, dal, meat, milk, curd, buttermilk, pickles, chutneys, sauce, etc.
- c) The most common products are leavened and unleavened bread, porridges, boiled grains and steam cooked products such as couscous. Sorghum Floor also makes excellent fry coating for fish, chicken and beef. Sorghum is also used in the preparation of several snacks such as chakali, papad, upma, etc.
- d) Recently various experiments have been conducted to make different food products from Sorghum. Sorghum biscuits, poha, shevaya, pasta, rava will be

available in near future. There is list of 18 products made from Sorghum, developed by 'Jowar Products Research Institute'.

- e) Maldandi, a sorghum cultivar is known for its good quality of roti due to having pearly white grain color and its flour having higher water holding capacity and good organoleptic taste.

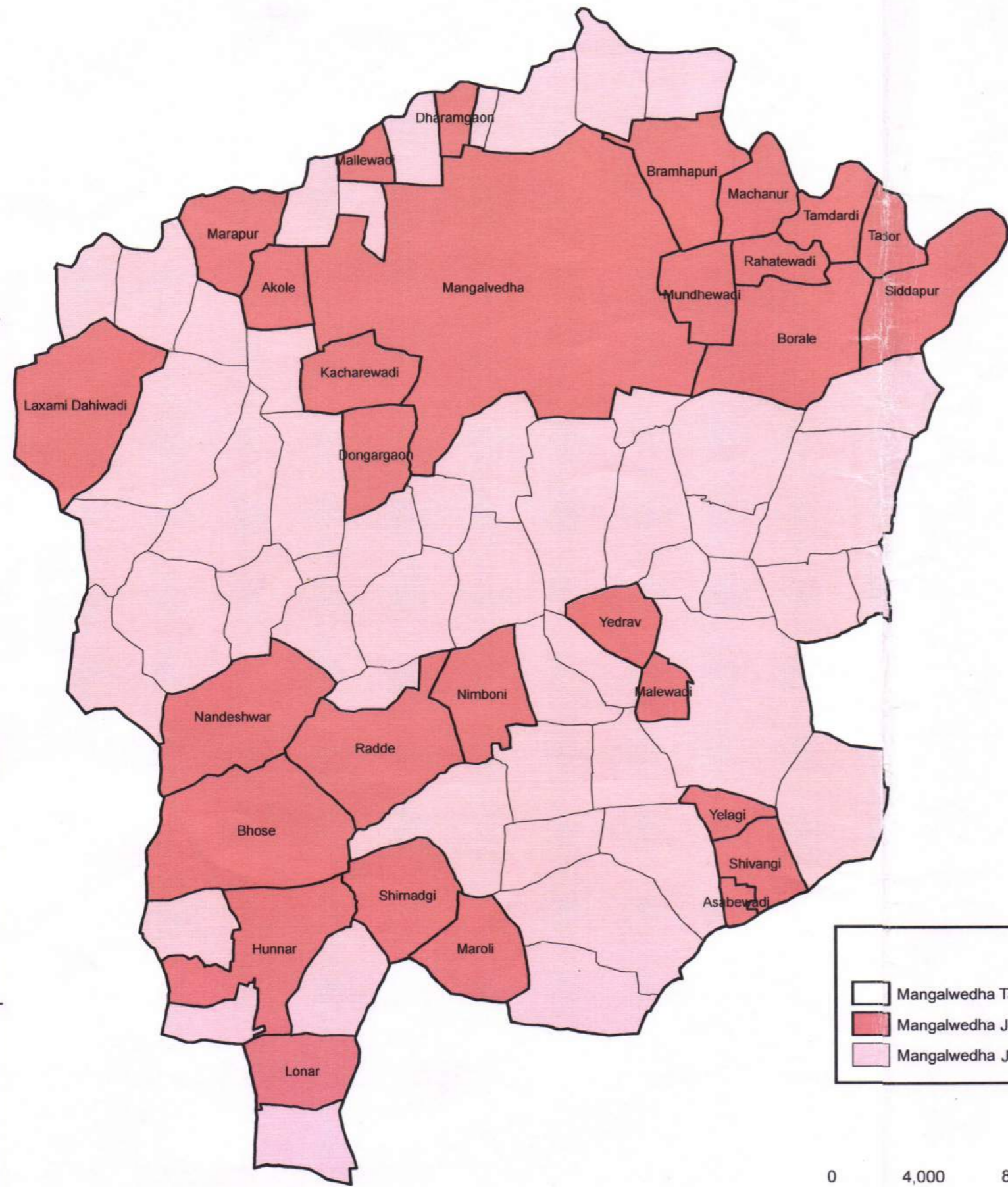
- Nutritional Value of Mangalwedha Jowar:

- i) Protein: 11.6
- ii) Fats: 1.9
- iii) Fiber: 1.6
- iv) Carbohydrates: 0.12
- v) Calories: 349 kg Calories
- vi) Calcium: 0.04
- vii) Phosphorus: 0.35
- viii) Potassium: 0.38
- ix) Sodium: 0.05
- x) Magnesium: 0.19
- xi) Iron: 50.00
- xii) Carotin: 29.00
- xiii) Vitamin: 12.00
- xiv) Thiamine: 0.46
- xv) Crude Fiber: 0.10

LOCATION MAP OF MANGALWEDHA JOWAR IN MANGALWEDHA TAHSIL OF SOLAPUR DISTRICT

75°30'0"E

75°45'0"E



17°30'0"N

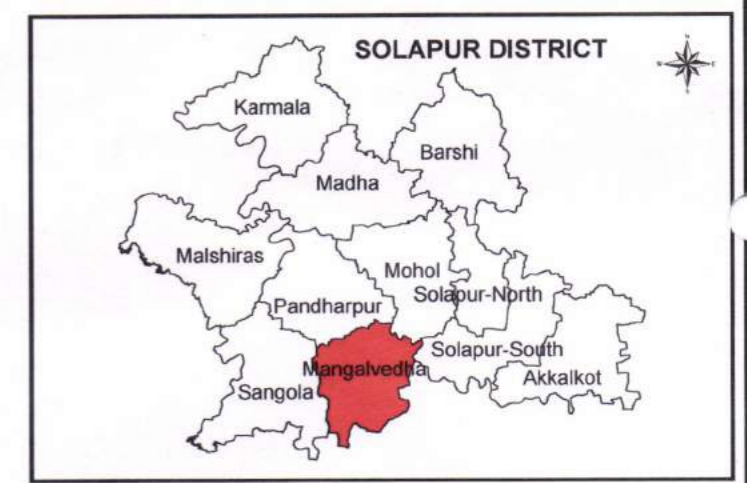
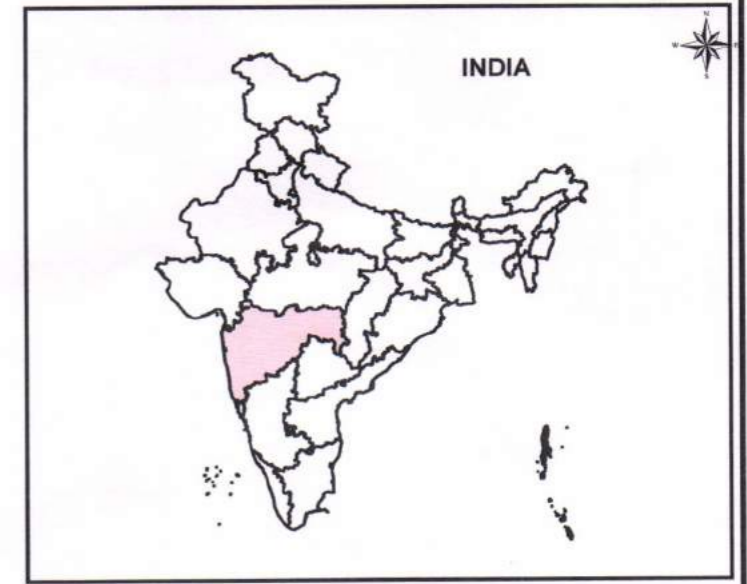
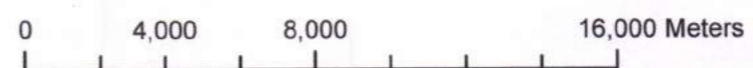
17°15'0"N

75°30'0"E

75°45'0"E

Legend

- Mangalwedha Taluka Boundary
- Mangalwedha Jowar Major Production Villages
- Mangalwedha Jowar Minor Production Villages



MAP PREPARED BY

Maharashtra Remote Sensing Applications Centre, Pune
(Department of Planning, Govt. of Maharashtra)

G.I. APPLICATION NUMBER – 474

Application Date: 26-03-2014

Application is made by **Sindhudurg Ratnagiri Mahakokum Sanstha**, A/P Masade viran bajar, Taluka: Malvan, District: Sindhudurg – 416 606, Maharashtra, India for Registration in Part A of the Register of **SINDHUDURG & RATNAGIRI KOKUM** under Application No: 474 in respect of Kokum falling in Class – 31 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 : Sindhudurg Ratnagiri Mahakokum Sanstha

**B) Address : Sindhudurg Ratnagiri Mahakokum Sanstha,
At Post: Masade viran bajar, Taluka: Malvan,
District: Sindhudurg – 416 606, Maharashtra,
India**

C) Types of Goods : Class 31 – Kokum

D) Specification:

- ❖ Freshly harvested Kokum fruits are Reddish Green in colour and turn into full red when fully matured.
- ❖ Purple in color in a day or two.
- ❖ Kokum fruit is juicy.
- ❖ Kokum has very strong sweetish acid taste. (Konkan Amruta variety: pH value 1.81, Konkan Hatis variety: pH value 1.80)
- ❖ Normal shelf life of Kokum fruit is 4-5 days.
- ❖ It has sour taste.

Kokum fruit consist of 3 major parts;

1. The Kokum Pericarp – which is the rind or peel and contains the highest level of xanthones.
2. The pulp – which is in the fruit and is known for being one of the tastiest fruits in the world.
3. The seeds – found within the white pulp.

E) Name of the Geographical Indication:

SINDHUDURG & RATNAGIRI KOKUM



F) Description of the Goods:

Kokum which is scientifically known as *Garcinia indica*, is a polygamodioecious type of plant. It means that the Kokum tree has many types of flower patterns such as (i) separate trees for male flowers; (ii) separate trees for female flowers; (iii) trees with bisexual flowers and the same tree contains male flowers or female flowers; (iv) trees with bisexual flowers and the same tree containing both male and female flowers.

In the State of Maharashtra Kokum trees are observed all over the east coast and particularly seen in the low lying belt of the Konkan region specifically at Sindhudurg and Ratnagiri districts. Kokum is one of the most important exceptional fruit which is of commercial value and found to grow luxuriously in forest of the Western Ghats of Maharashtra. Ratnagiri and Sindhudurg districts are like bliss for Maharashtra due to their scenery. The scenery of these districts has been shaped due to geography and civilization. They have green hills, deep valleys, and emerald green paddy fields.

Konkan's Kokum is known as The 'Kool King' of Indian fruits. The Kokum fruit tree is treated as a "zero attention crop", since there is the wonderful supportive combination of Konkan soil and climate for natural growth and development of organically grown Kokum crop. Furthermore, combination of suitable sunshine, rain, and soil make the Kokum naturally fed and disease free. Kokum is known for centuries to help the Indian population for digestion, hydration, gastric concerns and fever. Around the world, Kokum is quickly gaining a well-deserved reputation as an outstanding natural fruit that can help everything from appetite to indigestion. Apart from naturally grown Kokum, two Kokum varieties namely 'Konkan Hatis' and 'Konkan Amruta' have been released by Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli.

Kokum as a locally well known wonder fruit, it is just now making a wide and prolific presence in the West and around the world because of its historic reputation as an appetite suppressant and a weight loss agent. It has also been used in the historic practice of Ayurvedic medicine, a practice within the Hindu art of medicine that is considered to increase and prolong human life.

Kokum can be cooked or eaten in a number of enjoyable ways. It is the classic fruit with the modern focus on kokum butter, an excellent emollient and is now used by cosmetics industry for preparation of lotions, creams, lip balms and soaps. Kokum butter is extracted from the kokum seed and is supposed to reduce degeneration of skin cells and restore elasticity. The Kokum fruit is naturally loaded with antioxidants. In fact, adding the Kokum fruit to a diet in any form will improve both health and diet.

The kokum plant is well known as 'Kalpavruksha' since its all parts are useful. Konkan region is enjoying the monopoly status with respect to Kokum fruits production. After realizing the importance of naturally existing Kokum trees in Ratnagiri and Sindhudurg districts, Government of Maharashtra started encouraging the farmers of this region to grow Kokum by planting in systematic manner under the shade of coconut and arecanut trees in the gardens.

Features of Kokum:-

- Most of the kokum plants are naturally grown under vegetation and the cost of cultivation is negligible. The plants require partial shade which is available under natural vegetation.

- Kokum is an evergreen plant with attractive conical shaped canopy.
- Kokum trees are found with four types of flower patterns.
- Value added products of kokum are Lonawale kokum, kokum seed, kokum butter, dried kokum rind-Amsol, kokum Agal which have great demand in society.
- Kokum grown in Ratnagiri and Sindhudurg district is very tasty as compared to kokum grown in other parts of the country.
- Kokum has many medicinal uses especially in Ayurvedic medicines and cosmetics.
- Kokum fruit compounds have antioxidant, anti-bacterial and anti- fungal properties. Scientific research indicates activity against several cancer cell lines, including breast cancer, liver cancer and leukemia. In addition, Kokum also exhibits anti- histamine and anti-inflammatory properties.
- Recently, industries have started extracting Hydroxy Citric Acid {HCA} from the rind of the kokum Fruit.

Value added products of Kokum

- Lonawale Kokum
- Kokum Seed
- Kokum Butter
- Dried Kokum rind-Amsol
- Kokum Agal

- **Lonawale Kokum**

Green unripe fruits are cut in to longitudinal halves keeping seed intact and sundried. It has good demand in Gujarat. It is the split condition of the Kokam, but in a fresh green hue. It is profoundly used in curries for the fresh tangy flavor, especially by the Gujarati community.

- **Kokum Seed and Butter:**

The kernels of kokum seed contains about 33 to 44 per cent oil, which is commercially known as “kokum butter”. Physically it looks like WAX, but it’s the byproduct of the kokum seeds. Previously it was used as edible oil, especially on the fasting days by the Kokani people, in the fasting dishes. Some processors like Mr. Shrikant P. Vaidya of Deepashree Products, Ratnagiri are producing cocoa chocolates using kokum butter instead of cocoa butter. These chocolates are tasty. The use of

- **Kokum Butter**

Kokum Butter in chocolates is cost effective over the use of cocoa butter, Kokum Butter remains solid at room temperature and it is used as a substituent of ghee. Refined and deodorized fat is white in color and compares favorably with high class hydrogenated fats. It is also suitable for confectionery butter. It is also suitable for making candles and soaps. It is used in Sizing Mill to soften the threads.

Inhibitive and absorptive properties of Aqueous extract of Kokum seeds is also studied for Corrosion control of Aluminum in 0.5 M phosphoric acid solution at 30°C to 50°C .

Conventionally the kokum butter obtained from the traditional extraction procedure not including a refining stage is called ‘unrefined kokum butter’.

The kokum butter making process: - The seed is splintered and the shell is removed. The white kernel is then milled in a large specially-made stone mortar and pestle. The milled kernel powder is boiled into an iron pan. The mixture is then cooled. The oil which rises to the surface on cooling becomes gradually solid, and is strongly molded by hand into egg-shaped balls. This valuable oil or fat obtained from kokum kernels is popularly known as Kokum butter.

- **Amsol**

Ripe fruits are cut in to two pieces to remove the seed and pulp. The juice is extracted from the pulp and salt is then added to it. The rind is soaked in juice and sun dried. This dip dry process is repeated for 7 to 8 days. This rind is also called as Amsol and used as condiments in culinary preparation in Maharashtra and Goa. It is a fine ingredient in vegetarian dishes and curries for the tangy taste. It is also useful for skin boils and irritation, if rubbed against the irritated parts.

Culinary uses of Kokum

- It is used only in the regional cuisines of Gujarat, Maharashtra and several southern states where large glasses of kokum Sharbat (drink) are downed during parched summer months.
- Kokum has the same souring qualities as tamarind, especially enhancing coconut based curries or vegetable dishes like potatoes, okra or lentils.
- Kokum is especially used with fish curries, three or four skins being enough to season an average dish. Kokum is one of the key ingredients and culinary spice in Konkani cuisine. According to local sources and research article attached, the rind is used to impart an acid flavor to curries instead of tamarind.
- It is also included in chutneys and pickles. The skins are not usually chopped but are added as a whole to the dish.

Kokum's various special by products are also considered for culinary uses, it mainly included Solkadi, Kokum Sharbat, Kokum Syrup etc. Maximum of such type of products preparation and description are given below.

1. Preparation method for Solkadi

Take Kokum Agal.

Add coconut extract and water (Agal water ratio is 1:7).

Add ground ginger, green chili, garlic, coriander, salt

Solkadhi is ready

2. Kokum Sharbat/ Amrut Kokum

'Kokum Sharbat' is a sweet, tangy and delicious summer drink. This is very famous in the coastal areas of India especially in the Konkani region; they use it in various ways, especially as a souring agent in the curries. The Kokam Sharbat especially restores energy lost due to the summer heat. Kokum sharbat is made with the soft kokum which is deep purple in color, the dried fruit is soaked, mashed and then sugar syrup, black salt and roasted cumin powder is added in it. At present some of the manufactures have started small industries to produce concentrated juice. It is mainly used to prepare 'sharbat' in summer season. It has good market in Pune and Mumbai. Thus it is necessary to expand this industry.

3. Method of preparation of Kokum Syrup

- Wash the ripped kokum fruit.
- Divide it into 4 parts and remove the seeds.

- Add sugar into kokum with 2:1 ratio. Mix it properly.
 - To remove the excess moisture from the above mixture keeps it in sunlight for 5- 6 days.
 - Store the mixture in the drum for 3 to 4 months.
 - Remove the sweet kokum from the mixture. Dry this sweet kokum for 2 to3 days in sunlight.
 - Keep the remaining Juice in sunlight at least for 15 days.
 - Add sugar with ratio 1:1
 - Syrup is ready.
 - Take the Syrup and water in the proportion of 1:7 and serve. Add Salt to taste. Soda water or Butter milk are also good substitutes for water.
4. **Ketchup**
Take some green chillies, fresh coriander leaves, a piece of ginger, some salt to taste. Garlic can also be added. Pound this mixture together with 8-10 kokum peels and make it homogeneous. Use it as a sauce. It is a choice morsel with bread.
 5. **Soup**
Take the Kokum syrup and water in the proportion of 1: 9. Add few garcinia peels to it. Heat a spoonful of ghee, add jeera seeds and pour this into a soup when hot. Soup is ready. Serve it. It is equally tasty.
 6. **Kokum Agal**
Salt is added to Kokum fruits after harvesting. Then these fruits are dried in sun or shade and juice is extracted from these fruits by osmosis. It is used as substitute for Tamarind as Tamarind is not grown in Konkan region. It gives a unique flavor especially to fish dishes. As it contains HCL in it, it helps reduce the fats.
 7. **Muthali:**
It is made from Kokum seed. It is a base of lipstick industry.

G) Geographical area of Production and Map as shown in page no: 39

The production of kokum is generally 70 % from Sindhudurgh and 30 % from Ratnagiri.

Ratnagiri

Latitude : 160.30' and 180.00' N
Longitude : 730.00' to 740.00' E

Sindhudurgh

Latitude : 15.37 and 16.40 N
Longitude : 73.19 and 74.18 E

At present, the total productive area for kokum fruits in Maharashtra is about 5000 ha. The production of kokum fruits in Maharashtra is around 50,000 tonnes with an average productivity of 10 tonnes/ha (Sengar et al., 2012). Kudal from Sindhudurgh has the highest area under cultivation. Sawantwadi has covered the largest area under kokum. Malwan, Kankawali, Vengurla, Devgad have less area covered by kokum

trees. In one acre approximately 160 kokum trees are found. The production of kokum is generally 70 % from Sindhurgh and 30 % from Ratnagiri.

H) Proof of Origin (Historical records):

Kokum has been known for centuries to aid the Indian population with benefit of digestion, hydration, gastric concerns and fever. As a locally well known wonder fruit, it is just now making a wide and prolific presence in the West and around the world because of its historic reputation as an appetite suppressant and a weight loss agent.

It has been used in the historic practice of Ayurvedic medicine, a practice within the Hindu art of medicine that is considered to increase and prolong human life.

Konkan region is enjoying a monopoly status with respect to Kokum fruits production. According to local sources, Ratnagiri district has kokum trees which are 100 years old. In this region cultivation of kokum is observed to be under natural forest habitat, till the beginning of the last decade of the 20th century.

According to the survey conducted earlier by Chief Conservator of Forest out of the total 46,600 Kokum trees in the state of Maharashtra; 43,000 trees existed in Ratnagiri and Sindhurgh Districts.

The kokum trees are perennial in nature.

Other Historic nexus: In Sanskrit Kokum is variously known as vrikshamia, amlabija, amlapura, amlashaka. In French, Italian and Spanish the name is spelt as cocum and in Portuguese it is known as brindao or brindonna.

I) Method of Production:

Most of the Kokum plants are naturally grown under vegetation and the cost of cultivation therefore, is negligible. The plants require partial shade which is available under natural vegetation. The plants can be cultivated under the natural shade of Coconut and Arecanut but the area has limitation.

Dr. Babasaheb Sawant Krishi Vidyapeeth Dapoli, District Ratnagiri has done wide research in the field of kokum propagation and various grafting techniques.

Plant propagation

Kokum is traditionally propagated by sexual means however recently it is also propagated by the vegetative method like softwood grafting. Kokum is strictly humid tropical crop. Kokum plant is propagated by Sexual or by vegetative propagation.

A. Sexual Propagation

Seed and seed germination

Kokum fruit generally contains 4 – 8 seeds. For propagation seeds are collected from fully ripe fruits of early and high yielding kokum tree, having good quality. Mostly the kokum fruits are harvested at the onset of monsoon. The seeds are recalcitrant and loose viability fast. It has been reported that storage of seeds for 30 days led to 30 per cent decrease in the seed germination. They do not germinate once they are fully dried. Seeds are extracted and spread on the floor under shade. Many times seeds are

left under the tree itself where they germinate naturally. Kokum seeds regenerate rapidly in open fields and need moist hot condition for germination. The seeds are allowed to soak in rains for germination.

Pre sowing treatment of seed with wet packing or drying with coal ash is recommended for good germination. The seeds can be sown on raised bed or in polybag. Soil was found to be the best medium for seed germination of kokum. The mixture of soil, sand and FYM in 2:1:1 ratio is also recommended as sowing media for kokum.

Seed treatment

90 to 100 per cent seed germination is reported in kokum. However, the seed treatments such as soaking in water, cycocel 500 ppm have shown promising results.

Raising of seedling

The seedlings can be raised on raised beds or in polybags. For germination on bed, raised bed of 1 m width, 20 cm height and of convenient length is prepared. The top soil of the bed should be mixed with FYM. The seeds are sown horizontally at 1.5 – 2.5 cm depth in a row. Distance between two rows should be 5 cm. After germination the seedlings are transplanted in polythene bags of 10 X 15 cm size containing potting mixture of soil and FYM in the ratio of 3:1. The transplanted seedlings should be kept under shade and watered as per the requirement.

The seeds can be directly sown in polybag. Many times two seedlings are sown in polybag in Konkan region. After sowing, the seeds germinate after 40 – 60 days. The initial growth of kokum seedling is very slow. For planting in the field, 12 – 14 month old seedlings are preferred. The experience of farmers suggests that bigger size seedlings suffer less mortality in the field.

B. Vegetative propagation

Kokum is a dioecious plant. Female plants are productive whereas male plants supply pollen grains for proper fruit set but do not produce fruits. Furthermore wide variability for economical characters is found in kokum. The probability of occurring male plants is 50 per cent in sexual propagation. Only 10 – 15 per cent male plants in a population are essential. Hermaphrodite plants are also observed but they are mostly poor yielders.

The vegetative method of propagation helps to obtain required plant. The various asexual methods such as air layering, inarch grafting, veneer grafting, softwood grafting and root cutting were attempted. The studies conducted under Karnataka conditions revealed that among the cleft, whip, tongue and epicotyl grafting the survival was lowest in epicotyl grafting and maximum in cleft grafting. Softwood grafting is presently used commercially for vegetative propagation of kokum.

Softwood grafting

a) Selection of scion

The scion sticks should be selected from high yielding female trees having all the desirable characters. Terminal shoots of 0.5 – 0.6 cm thickness and 10 – 12 cm length, of greenish brown colour are selected as scion sticks. The mature scions of 5 – 6 month old contribute more success. The length of scion does not have any influence on success of softwood grafting.

b) Selection of rootstock

The rootstock should be healthy and vigorous. Kokum seedlings of 10 – 12 cm height, 0.25 cm thickness at collar region with green apical softwood are selected. The age of rootstock should be more than 22 weeks. The retention of leaves on rootstock do not influence success of softwood grafting.

c) Procedure of grafting

The selected rootstock should be decapitated leaving sufficient softwood. This softwood should be split vertically into cleft from the top to the length of about 4 cm below with the help of sharp knife. The scion shoots should be prepared like a wedge giving about 4 cm slanting cut from both the sides at the lower end. This wedge should be inserted in cleft of rootstock and the joint should be tied tightly with the help of polythene sheet of 250 gauge and 1.5 cm width.

d) Season of grafting

October to November and March to August was found to be the best season for softwood grafting in kokum under Konkan conditions.

e) Effect of tropism

The vegetative propagation in kokum is significantly influenced by tropism. When orthotropic shoots are used for grafting the resulting graft take the typical architecture that of a mother tree. When plagiotropic shoot is used as a scion the resulting graft remain short and bushy. Extremely limited numbers of orthotropic shoots are available on kokum plants as compared to plagiotropic shoots. Both types of architecture have their own merits and demerits.

ii) In-situ grafting

In seedling population, many times the proportion of male seedlings is remarkably higher. Conversion of excessive male seedlings into good female types helps to augment production of kokum orchard. Coppice grafting can be useful for conversion of male kokum plants into female. In-situ grafting was reported for better establishment than planting grafts of kokum.

iii) Rootstocks

Most of the trials on grafting are conducted by using kokum seedling as a rootstock. Kokum seed yields edible oil which remains solid at room temperature and used in many pharmaceuticals and cosmetics. Alternative rootstock will help to save kokum seeds. The studies have revealed the success of kokum grafting by using *G. gummigutta* and *G. cowa*. *G. hombroniana* can be adapted to marshy soil. The rootstock selection should aim at providing drought resistant plant which will help to establish kokum plantation at rainfed areas.

Tissue culture

Tissue culture is being attempted for micro propagation. Morphogenic responses of matured seed segments of kokum were studied with increase in BAP concentration from 1– 4.5 mg/per L water increased number of shoot formation. The seed segments explants cultured on WPM without any plant growth regulators did not show any regeneration.

Land preparation and planting

Kokum can be planted as a monocrop or as a mixed crop in coconut and arecanut plantation and can also be planted in a kitchen garden. Considering the growth habit and conical canopy of kokum Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli has recommended a spacing of 6 X 6 m for sole plantation of kokum. Square system of planting can be adopted.

Hedge row system can also be used which provide scope for intercropping and better intercultural operations. In an established coconut plantation planted at 7.5 to 8 m spacing, Kokum can be planted in the centre of 2 coconut palms. 300 kokum plants can be accommodated per hectare as a mixed crop in coconut plantation. Planting of kokum as mixed crop has proved to increase the coconut yield by 34 per cent. In an arecanut plantation planted at 2.7 X 2.7 m, kokum can be planted at the alternate centre of arecanut palm. When grafts are used for planting the spacing can be reduced to 5 m. While planting in the kitchen garden, kokum should be planted at least 4 to 5 m away from other tall plants.

The land should be marked at proper spacing. A pit of 60 cm is prepared before monsoon and filled with a mixture of top soil, 10 kg FYM and 1 kg Single Super Phosphate.

Planting is done at the onset of monsoon. The plants are protected from stray cattle's and other wild animals. The initial growth of kokum seedling and graft is very slow and hence requires staking. When grafts are planted, periodical removal of suckers below graft joint is essential. For the first year, it is necessary to protect kokum plant in summer by providing shade.

Irrigation and Manuring

Irrigation helps for better establishment of kokum plant. Initially 15 L of water per week in winter and twice a week in summer is advised in Konkan region of Maharashtra.

For the first three years after planting, irrigation is essential. The modern methods like drip irrigation are beneficial than the conventional methods. Mulching helps to retain soil moisture. The weed near kokum plant should be removed and used for mulching.

For Konkan region of Maharashtra application of 2 kg FYM, 50 g N, 25 g P₂O₅ and 25g K₂O is recommended for 1 year old kokum plant. This dose is increased in same proportion every year upto 10 years and there onwards 20 kg FYM, 500 g N, 250 g P₂O₅ and 250 g K₂O is recommended. The fertilizers are applied in the month of August after the heavy rains, in a circular trench around plant of about 30 cm deep and 30 – 45 cm wide and covered with soil.

Farmers in the Konkan region do not apply inorganic fertilizers to kokum. FYM or available organic manures are used. Most of the kokum plantation can said to be organic. However, since the plantation is scattered and very small the certification becomes difficult.

Training and pruning

Kokum is an evergreen plant with attractive conical shaped canopy. When seedlings are planted, the central stem is allowed to grow without pinching to develop the canopy.

The plant attains a height of about 10 m when it is fully grown. It is often experienced that, as the height increases the lower portion of plant comes under shade and becomes less productive. Furthermore it is also noticed that the fruits at the top of tall trees remain small in size and becomes unmarketable. The harvesting from tall plants of kokum is an important constraint. Maintaining the height of kokum tree at about 4 – 5 m by decapitating the apex have preliminary shown promise at Dapoli.

When the grafts are planted it is observed that only one branch grows in a certain direction. This growth should be prevented by regular pinching. Growth in all directions should be tried to induce on a graft. The suckers from rootstock below graft union should be removed regularly.

Plant protection

Major diseases and pests are not noticed on the kokum trees. Sometimes pink disease is noticed on branches. It is advised to remove the diseased portion of a branch and then smear Bordeaux paste on the wound.

Flowering and yield

Kokum tree has dense foliage. The seedlings start flowering 7 to 8 years of planting whereas flowering in grafts is noticed after 3 to 4 years. Generally kokum plant flowers during December to January.

Flowers are borne singly or as fascicular cymes on leaf axils and are tetramerous. The period from flower bud appearance to initiation of flowering is about 30 days. Pollination is through wind. The fruits are harvested after about 120 days of fruit set. Kokum fruits are ready for harvesting from the month of April to May. Most of the fruits are harvested in the month of May and June which is the start of rainy season. About 40 – 70 per cent fruits are trapped in rains and hence lost. Presently in Konkan region alone, this loss is estimated to be of Rs. 157 lakhs. Not only farmers suffer seriously because of this loss but the processing industry is also adversely affected as large quantity of kokum fruits is required for value addition. Post flowering foliar spray of Potassium Nitrate and Monopotassium Phosphate helps to prepone harvesting by about 10 to 34 days.

All kokum fruits on a tree are not ready for harvesting at the time and hence periodical plucking is done. The amount of plucking varies from tree to tree. Generally 6 – 8 pluckings are required in high yielding plants. Number of pluckings in kokum is a constraint in harvesting. Spraying of ethrel at the 300 ppm at the stage of full maturity of kokum fruits helps to facilitate harvesting by reducing the number of plucking and improving the yield as well as chemical composition of fruits.

Fully ripe fruits are plucked by hand. Skilled persons climb on the tree and shake the branches. The ripe fruits which fall down are collected. It leads considerable loss of fruits. Approximately 35 – 40 per cent fruits are lost which include immature and broken fruits. In a seedling population 30 – 50 kg yield per plant is obtained. In a well managed plantation 100 kg yield per plant is obtained. When kokum is planted as mixed crop in coconut plantation approximately 15 kg yield per plant is obtained. The harvested fruits are exclusively used for processing.

Post harvest handling

The shelf life of kokum fruits is 4-5 days under ambient temperature storage. It can be extended to 15 days when treated with Waxol 12 per cent and stored in cool chamber

0 and up to 28 days when stored at 13°C + 10 c and 86 per cent RH and Waxol 3 per cent. CFB boxes and paddy straw are good packaging material for kokum.

Few bottlenecks observed in kokum cultivation

1. Long pre bearing age
2. Dioeciousness
3. Non availability of sufficient quality genotypes
4. Bold type of fruits are preferred in processing unit
5. High cost of labour and the low returns on the fruit
6. Late harvesting
7. Wastage of fruits
8. Non availability and high degree of mortality of kokum graft
9. Laborious home processing

J) Uniqueness:

Geographical Significance

1. Soil

Kokum is grown in Kokan region because of high vegetation in which plants of kokum trees are grown under partial shade. Soil of Ratnagiri and Sindhudurg is sandy a clay loam to clay in texture.²² The soils are suitable for cultivation of paddy, millets and horticultural crops like mango, cashew and minor fruits like kokum, aonla, jamun and jackfruit etc . .

Kokum is grown in this region because organic content is high in this soil. These soils are acidic in nature (pH 4.75 to 6.50 mean 5.6) fairly well drained with medium in organic carbon and total nitrogen. The available potassium content is medium, but phosphorus content is slightly low.

2. Climate

Most favourable region for kokum cultivation is warm, moderate and humid zone. Ratnagiri and Sindhudurg region gets annual rainfall in the range of 3000 to 3500 mm from south-west monsoon during the month of June to middle of October. The climate of Ratnagiri and Sindhudurg region is humid, which ranges from 65 to 90 % throughout the year. The temperature ranges from 15°C to 34°C.

The bright sunshine hours are normally 4-5 hours during monsoon season mainly because of cloudy weather. However at the time of flowering during November & December the bright sunshine hours are 10 to 11 hrs in a day and the temperature ranges as minimum 12 to 14°C and maximum upto 25 to 28°C. This kind of temperature and photoperiod induce flowering. During the summer season in the months of March & April the fruit development takes place and at the end of summer season the fruits mature. Thus the flowering is in winter season, while fruit development is in summer season. This kind of typical weather is available at Sindhudurg & Ratnagiri district only.

Kokum is very sensitive crop for climate. In case of heavy fog, flowering of kokum gets affected. This results into low production of kokum.

Ratnagiri and Sindhudurg districts are part of south konkan area. The climate and soil of South konkan are slightly different than North konkan i.e. Raigad and Thane districts. The rainfall increases from North konkan to South konkan area. The humidity also increases from North konkan to South konkan area. The soils in North konkan are Lateritic type, while the soils in the South konkan are Laterite type.

Uniqueness of kokum

Kokum has a longstanding natural forest based production system. It is a unique product with strong geographical link and localized consumption. The involvement of indigenous technical intelligence makes this product one of its kind.

Spice Board of India considered the manifold uses and medicinal value of kokum and poised the Kokum tree as a commercial crop for the future with vast potential.

A survey conducted under United Nations Conference on Trade and Development (UNCTAD) project in 25 states of India has identified Kokum from Western Ghats as promising indigenous product that merit protection as Geographical Indication.

Kokum grown in Ratnagiri/ Sindhudurg district has sour taste as compared to other kokum. The Kokum fruit is characterized by agreeable flavour combined with sweetish acid taste and serves as garnish to impart an acid flavour to curries. Product acceptability by the retailers and consumers is high and hence companies are willing to invest. Hector Beverages (Paper Boat) and Mapro source Kokum specifically from Sindhudurg.

According to the report of Spice Board of India, the Rind of Kokum fruit is a rich source of natural red color to the tune of 2.5 percent, probably the richest among the plant kingdom.

Popular Kokum varieties in Ratnagiri and Sidhudurg are ‘Konkan Hatis’ and ‘Konkan Amruta’. These two improved kokum varieties have been released by Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli.

The table given below depicts the differences between Konkan Hatis and Konkan Amruta and random Kokum selections from Western Ghats of Karnataka

Variety	Konkan Amruta	Konkan Hatis	S4	S9	S16	S22
Characteristics						
Length of Fruit (cm)	3.74	4.22	3.54	3.13	3.54	3.89
Diameter of Fruit (cm)	3.95	4.20	3.51	3.90	3.61	4.04
Weight of Fruit (g)	34.45	91.50	25.40	25.68	22.64	30.68
Weight of Rind (g)	17.55	48.34	13.05	12.32	12.99	14.52
Rind Thickness (cm)	4.45	5.58	0.33	0.21	0.27	0.31
TSS (°B)	9.08	9.20	13.80	8.46	11.60	9.77
Acidity (%)	5.12	5.10	17.91	16.23	5.31	7.87
TSS:Acidity Ratio	1.78	1.80	0.77	0.52	2.18	1.24

Health benefit of Kokum: Medicinal use:

- **Digestion:** Kokum is normally used to combat digestive problems like flatulence, acidity and constipation. It is also used in the treatment of piles and anal fissures. It is also used to stimulate the appetite and has anti-helminthic properties (removes worms like ascaris from the stomach).
- **Healing wounds:** Kokum infusions are used to treat rashes, chaffing, burns and scalds. Kokum paste and oil are often applied to open wounds to fasten the healing process. Kokum butter is considered as nutritive, demulcent, astringent and emollient. In addition, due to Kokum butter's suitability for ointment, suppositories and other pharmaceutical purposes kokum is compositing greater export potentiality. The ointment is used for the local application for treating ulcer, fissures of lips, cracks/cuts in hands and feet etc.
- **Reduces body heat:** Kokum has long been known as a cool refreshing drink in the scorching summer heat. It reduces sunstrokes and prevents dehydration. It is a great thirst quencher and is also known to reduce fever.
- **Skin care:** Kokum butter is gaining rapid popularity. It is an intensive skin moisturizer. Its effects are miraculous on dry, chapped, sensitive or irritated skin.
- **Cardio-care:** Kokum rind contains hydr-oxycitric acid, which is used to lower cholesterol. The anti-inflammatory properties of kokum prevent the onset of heart diseases.
- **Fights obesity:** Kokum is a strong anti-obesity agent as it suppresses lipogenesis - synthesis of fatty acids and food consumption. By doing this action, kokum brings about weight loss. Reducing inflammation in obese people is a treatment goal and kokum does this wonderfully well. Capsules made up of HCA, cyanidin-3-sambubioside and cyanidine 3-glucoside from *Garcinia indica* are used for weight loss in mammals.
- **Anti-cancer:** According to the Journal of Oncology and Haematology, Garcinol, present in kokum, can inhibit intestinal cancer cell growth without affecting normal cells. Garcinol also has anti-oxidant and anti-inflammatory properties, which reduce the cancer causing reactive oxygen species.

The important morpho-physiological characters of these varieties are as under:

S.N.	Characters	Konkan Amruta	Konkan Hatis
1	Yield (7 years) kg	138	250
2	No. of fruit/kg	29	11
3	Length of fruits (cm)	3.74	4.22
4	Circumference of fruit (cm)	13.15	20.10
5	Wt. of fruit (g)	34.45	91.50
6	Wt. of rind (g)	17.55	48.34
7	No. of seed/fruit	6.40	5.60
8	Shape of fruit	Apple shape	Apple shape
9	Shelf life (days)	15	18
10	Volume of fruit (ml)	35.50	112.8
11	Diameter of fruit (cm)	3.95	4.20
12	Thickness of rind (cm)	4.45	5.58
13	Chemical parameters		
A	T.S.S.	9.08	9.20
B	Reducing sugar	2.41	2.40
C	Total sugar	4.52	4.10
D	Acidity	5.12	5.10
E	pH	1.81	1.80
14	Flowering behaviour		
a.	Flower bud appearance	1st week of October	2nd week of November
b.	Initiation of flowering	2nd week of November	2nd week of December
c.	Harvesting period	March-April	April-May

Chemical analysis of Fruit rind of Konkan Amruta compared with Konkan Hatis

SI No.	Characters	Kokum Types	
		Konkan Amruta	Konkan Hatis
1	Moisture	81.72	81.7
2	TSS	9.08	9.2
3	Reducing Sugar	2.41	2.4
4	Total Sugar	4.52	4.1
5	Acidity	5.12	5.1
6	pH	1.81	1.8

According to local sources and research articles, Kokum trees are organically grown. Farmers in the Konkan region do not apply inorganic fertilizers to kokum. FYM or available organic manures are used. Most of the kokum plantation can said to be an organic. However, since the plantation is scattered and covers very small areas the certification becomes difficult.

K) Inspection Body

Sindhudurg Ratnagiri Mahakokum Sanstha has constituted an Inspection structure to oversee the standards and quality assurance system for inspection of every step of production of Kokum 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 Kokum 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:

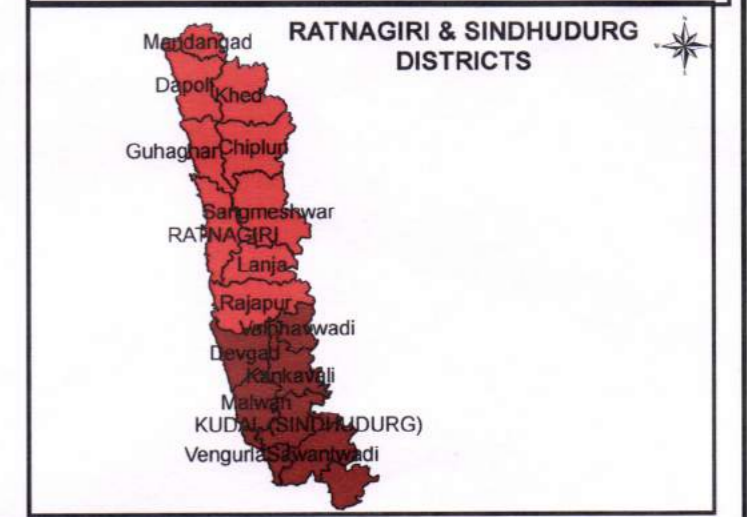
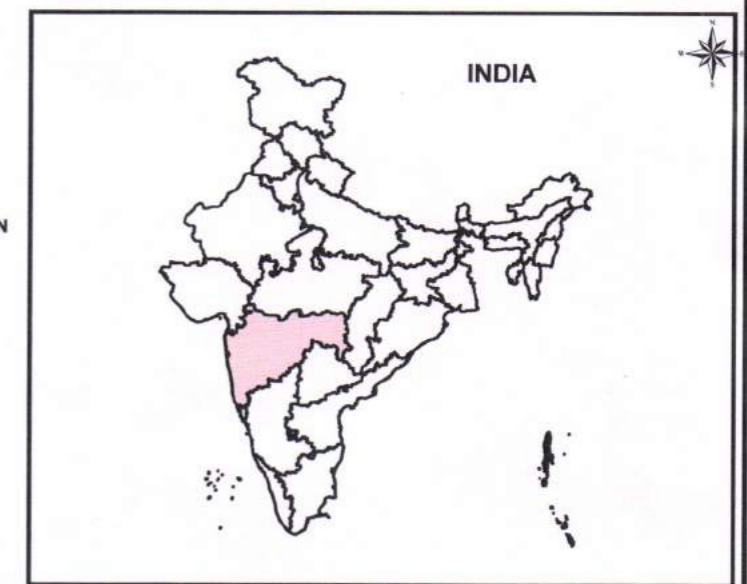
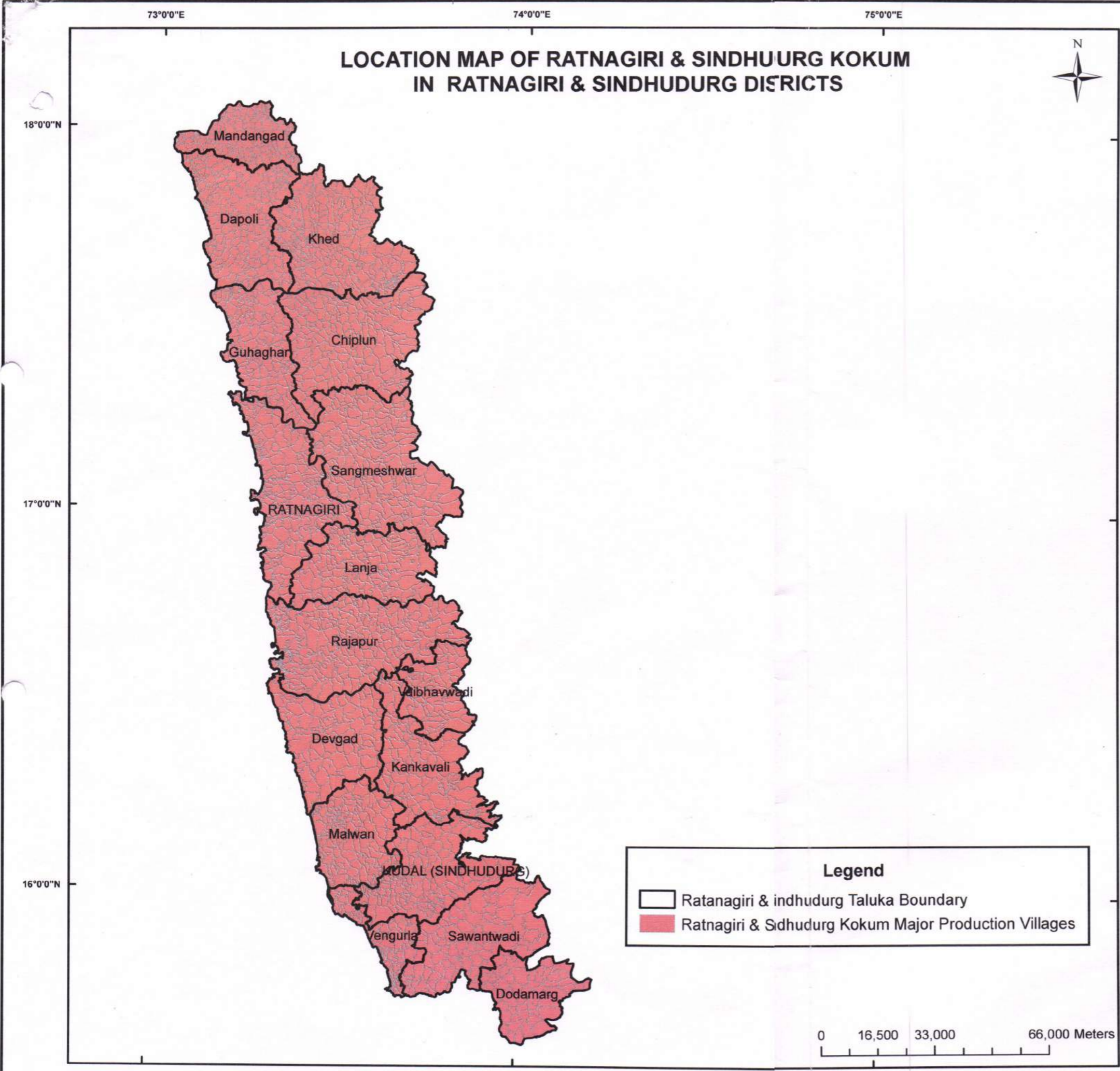
- i. Representative of Producer group of Kokum
- ii. Three (3) farmers from the area under cultivation
- iii. GI Experts
- iv. Agriculture Expert.

This committee will also help to regulate the use of Geographical Indications for the welfare of local farming community. The committee will frame the terms and conditions to use brand name of Sindhudurg-Ratnagiri Kokum by any of the marketing agency. The logo of Sindhudurg-Ratnagiri Kokum GI will be used to create brand image.

L) Others

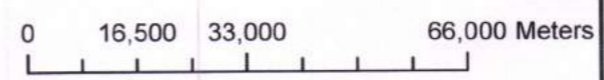
In kokum plant all its parts are useful. Raw/ripe fruits need to be processed before their consumption. This activity creates employment opportunities at rural area and develops suitable products for earning the foreign exchange through the export of kokum derivatives.

LOCATION MAP OF RATNAGIRI & SINDHUURG KOKUM IN RATNAGIRI & SINDHUDURG DISTRICTS



Legend

- Ratnagiri & Sindhudurg Taluka Boundary
- Ratnagiri & Sindhudurg Kokum Major Production Villages



MAP PREPARED BY



Maharashtra Remote Sensing Applications Centre, Pune
(Department of Planning, Govt. of Maharashtra)

G.I. APPLICATION NUMBER – 508

Application Date: 08-01-2015

Application is made by **Development Commissioner (Handicrafts)**, Ministry of Textiles, Government of India, Haroon House, 3rd Floor, 294 – P Nariman Point, Mumbai – 400 001, Maharashtra, India, for Registration in Part A of the Register of **Agates of Cambay (Logo)** under Application No: 508 in respect of Semi Precious Stones falling in Class – 14 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** : Development Commissioner (Handicrafts),
Ministry of Textiles, Government of India
- B) Address** : Development Commissioner (Handicrafts),
Ministry of Textiles, Government of India
Haroon House, 3rd Floor, 294 – P,
Nariman Point, Mumbai – 400 001,
Maharashtra, India
- C) Types of Goods** : **Class 14 – Semi Precious Stones**
- D) Specification:**

Agates are semi precious stones which display a wide spectrum of colours and fancy images. One of the most interesting gems of collectors delight, agate is a type of microcrystalline quartz falling under the general category chalcedony. They are believed to have been formed under earth's cavities out of volcanic action and extreme climatic conditions.

(a) Agate/Akik – Occurrence and diagnostic features

Agate is a variety of chalcedony, which is the general term applied to fibrous cryptocrystalline quartz varieties. It is a mineral generally of secondary origin, forming in cavities and veins by deposition from meteoric groundwater containing gelatinous silica from the weathering of silicate minerals. It can also form by deposition from late hydrothermal solutions at or near the earth's surface under conditions of low temperature and low pressure. Agate is commonly associated with siliceous volcanic, occurring as vein or vesicle filling. It occurs as a petrifying agent in fossil wood and bone. Agate is frequently found lining or filling rock cavities and fissures, sometimes forming geodes.

Agate is characterized by its occurrence, hardness, fracture, specific gravity, refractive index and luster. Agates as well as Chalcedony are a variety of cryptocrystalline quartz gemstones composed of layers of quartz, sometimes of different colors. Agate usually occurs as rounded nodules or veins. The layers of quartz are often concentric. The composition of agate varies greatly, but silica is always predominant, usually with alumina and oxide of iron. The colors and "scenes" in agate are endless. While agate is usually an inexpensive stone, some varieties or special stones with very unusual scenes or markings can be quite expensive.

Crystal system: Hexagonal-R; 32 (trigonal-trapezohedral)

(b) Agate Chemical composition: SiO₂

Class: tectosilicate

Crystal system: Hexagonal-R; 32 (trigonal-trapezohedral) Crystal habit: usually as banded or layered botryoidal masses with micro-fibrous structure

Zoning: color banding and layers of inclusions are common

Specific gravity: 2.57-2.64

Index of refraction: 1.53-1.55

Birefringence: weak, 0.005 to 0.009

Hardness: 6.5 to 7

Color: frequently colored by impurities and then may be any color, most agate used for ornamental purposes is colored by artificial means.

Luster: dull vitreous to greasy

Transparency: translucent, can be transparent or opaque

Cleavage: Cryptocrystalline quartz shows no cleavage, although parting may occur along layers and splintery fracture can develop parallel to micro-fibrous orientation.

(c) Agate/Akik – Occurrence and Sources

Akik or agate is the general term applied to different varieties or Carnelians, and includes various forms of Chalcedonic silica found either underground in mines, in beds of rivers or on hill slopes. Different varieties of agates are known by different names differing in color and luster. Agate word is derived from ‘Achates’, a river in Sicily on the banks of which it is said to have been found now known as agate or Dirillo, well known in early times for its agates. The word again a derivative of the Arabic word Akik, a name for agate which means riverbed.

E) Name of the Geographical Indication :

AGATES OF CAMBAY (LOGO)



F) Description of the Goods:

Agate beads are the chief products, which command a good market in the countries of Middle East and African coast. Other agate products are flower vases, ash trays, bangle, mortar and pestle necklaces, paper weights, buttons, rosaries, lamp shades, earrings, rings, bracelets, key chains, bowls, cufflinks, pendants etc.

Agates are semi precious stones which display a wide spectrum of colours and fancy images. One of the most interesting gems of collectors delight, agate is a type of microcrystalline quartz falling under the general category chalcedony. They are believed to have been formed under earth's cavities out of volcanic action and extreme climatic conditions.

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G) Geographical area of Production and Map as shown in page no: 49

Khambhat is located between 22°18'N 72°37'E and 22.3°N 72.62°E / 22.3; 72.62. It has an average elevation of 8 metres (26 feet). Khambhat has warm and humid climate. It is located on the plains. The land on which Khambhat sits right now is the silt deposited by Mahiriver, so Khambhat has got very fertile and wet soil. Soil over

here is Coastal Alluvial. The area south of Khambhat is muddy wetlands and then coast line comes. Normally April to June is summer. From July, it rains until September. It has muggy climate for most part of the year except winters. Sometimes Khambhat receives heavy rain. And sometimes surrounding areas gets affected from the floods in Mahiriver. October to February is winter. Maximum average temperature remains 25 to 30 and minimum average temperature goes until 10 to 12. Summer maximum average temperature remains 38 and minimum remains around 22. In summer, wind blows high. Khambhat coast's tides are the highest in the world. It goes high up to 35 feet.

H) Proof of Origin (Historical records):

Cambay came into the picture towards the end of 15th century and the start of 16th century. Akik industry assumed importance during the rule of sultans of Gujarat when it reached the zenith of prosperity. The main market of agate being outside India, it was not only essential for the finished products to be brought to a convenient marketing centre on sea but also for the development of the industry to be located near some port to facilitate the export. It was equally necessary for the raw material required to be close to the place of manufacture. Cambay was a flourishing and chief centre of trade and commerce. This prosperity of the town naturally gave impetus to the growth of many industries including Akik and other precious and semi-precious stones. The fate of Akik industry seemed to have been linked with the rise and fall of different places that grew into importance as sea-ports or centres of maritime trade at different periods of history. In Gujarat various places came into prominence as centers of trade and commerce at one time or another according to their importance as seaports. At one time it was Bharuch, at another time it was Vallabhi and still another time it was Surat or Cambay/Khambhat. Finally it was at Khambhat that Akik industry reached the pinnacle of prosperity and survived till present times despite depression and competition to which it was later subjected.

In the beginning of 17th century many Akik craftsmen of Cambay were staying at Goa where they had their own locality and shops. Forty years later an Abyssinian merchant by the name of Baba Ghor started Akik factory at Limodra near Rajpipla where the raw material was available in plenty. For the export of finished products to the African coast he had to resort to a seaport, which was Cambay. Here the Abyssinian merchant seemed to have started a lucrative business in agates under the supervision of his brother Baba Abbas. They later shifted all their business to Cambay. Export in Akik got boost up when Cambay became a principal port of embarkment by Hajj pilgrims to Mecca. The pilgrims carried with them their agate beads, which were highly valued as articles of sanctity.

During the 18th century agate trade was referred to as one of the most important of the Cambay industries. Some of the articles made at Cambay stones for signets and rings were said to be worth double their weight in gold. Bowls, spoons, handles of swords, daggers, knives etc. were of great value. Agate industry reached the pinnacle of prosperity during the 16th century and continued its importance till 18th century. During the 19th century the agate trade fluctuated but did not really decline. But with the passage of time and change in consumer habits and competition from other countries the industry suffered a setback. Moreover, the Cambay port got silted, which made it impossible for the larger vessel to reach the harbor and as a result it lost all its former glory. During the 20th century due to decline of Cambay as an important center of trade, industry and export, diversion of trade channels with the

opening of rail route from Bombay to Ahmedabad, and increase in competition from cheap synthetic stones agate industry declined.

D) Method of Production:

Production Process:

The various techniques and processes, which have been so far evolved in the making of agate articles have undergone quite a few changes, inspite of advance unscientific methods, as it is believed there is very little scope for mechanization except in a few operations, viz., smoothing the surface and polishing with the help of electric motor. These operations have been mechanized only as far back as 55 years. Raw stones have to pass through six different stages of work before they are processed into finished products. The various processes are described below under the following heads:

- i) Mining
- ii) Sun-heating and firing
- iii) Cutting and shaping
- iv) Roughing and smoothing
- iv) Polishing
- v) Drilling

Mining:

The main source of supply of raw materials required for working in this industry at Khambhat is the agate mines comprise in the former Rajpipla state in Jhagadiataluka of Bharuch district. This area is situated on the left bank of the Narmada, about fourteen miles above Bharuch. The mines are located on the slope of the hill known as Ratanpor Hill, also known as BawaGhori or Bawa Abbas Hill.

Before the agate bearing stratum is reached, the bore holes pass through a bed of gravel. After a thin seam of iron bearing rock comes the clay mixed with carnelian. The mine shafts are about 4ft. in diameter and about 13-15ft. deep. Nowadays, miners work in small groups scattered over a large area. At the mine mouth, the stones are chipped and classified into three grades, the best one known as 'tukdi', medium type known as 'gar' and the lowest quality known as 'khadya'. Stones are carried by truck or rail from Jhagadia or Rajpipla to Khambhat. Besides, the stones that are mined and supply Khambhat, also come from Madhya Pradesh, Utter Pradesh, Bihar, Andhra Pradesh, Orissa and Tamilnadu. The akikias (also written as akikiyas) or the agate-dealers who are also the karkhanedars purchase the mined stones from the mining contractor or from the cooperative society of which they are members and store them in godowns in gunny and plastic bags.

Sun-heating and firing:

In the months of March and April the stones are spread and exposed to the sun on the terrace or corrugated iron sheets on the house roofs for a period of one and a half to two months, as the stones dug out from the underground are damp and retain some portion of water in them. Without the actual heat treatment of the sun the stones get cracked into pieces while working on them and the material gets wasted. If the stones are directly baked with the help of fire which is the next process, the watery vapours that come out can crack the stones. There are two methods of firing followed locally:

Bhalsal:

A trench two feet deep, and three feet wide is dug in a dry ground or field. Some now have trenches built of bricks and cement. A layer of ash one to one and a half inches thick is spread at the bottom. The sun-heated stones are placed on this layer of ash, and covered with alternate layers of ash on which goat and cow-dung cakes, pieces of charcoal and sawdust are spread. Three or four layers are arranged one upon the other so that the stones get evenly heated from all sides. This process is applied for three days continuously, where after the baked stones are taken out and those which are not properly baked are baked again till they take their natural colour.

Handla:

Pebbles are placed within cracked and holed earthen pots, with the holes in the bottom facing upwards. These pots are arranged in a row in a trench. Goat and cow-dung cakes are piled around them and the fire is kept burning from sunset to sunrise. Bricks are kept in between the vacant spaces of rows of pots so that the cow-dung cakes and other material may not drop out. The properly baked stones are separated from the ones that have not yet attained a natural colour. The latter are baked again. Repeated baking is the key of bringing out the real colour of agate. This is resorted to even after polishing, if necessary. The temperature at which this change takes place is 300-450 degrees Centigrade. The spread of iron oxide determines the intensity of the colour. Artificial colouring is a recent introduction although it has been prevalent in countries like Germany since 1820.

Cutting and shaping the stones:

The stones which are baked properly, are cut in the required shape on an iron spike known as 'sink' with 'shingadi', a horn-headed hammer, made of goat or buffalo horn, and mounted on a thin handle or bamboo. Sawing is however necessary in case of large size stones which are cut into convenient pieces with a toothless saw. The workers engaged in cutting or shaping is known as 'bhangiya' or 'khondiya'. In the workshop the agate stones are shaped on the iron spikes which are embedded into platforms of a mud and cow-dung mixture, locally known as 'otli'. The striking with the hammer is known as 'tappa', and the outer skin of the baked stones which is removed is called 'chal', for getting the stones into desired shapes. As fingers get injured by sharp edges of flint, the workers wrap them with cotton bandages, known as 'anguthiya'. Some also wear numberless spectacles to protect their eyes from the flying flint. Experts can shape stones into the smallest of beads. This has given rise to a proverb, "Jeykhandetasbi, tethaikasbi".

Roughing and smoothing the surface:

The stones after they are chiselled into desired shapes, flat, round, triangular, quadrangular, hexagonal etc. are handed over to the 'ghasiya' for smoothing the surface by grinding on the emery wheel. This work is done mechanically as well as manually.

In the mechanical method the 'emery' or the carborandum wheel is powered by an electric motor of 1/2 H.P. If the articles to be smoothed are rough and thick, the wheel is given greater momentum and lesser, if the articles are thin.

Two or three workers can operate at a time. The worker keeps one small earthen vessel filled with water by his side and the articles are dipped in water before they are put on the emery wheel to avoid inhalation of the powder (stone dust), which could be detrimental to his health, often being the cause of T.B. If water is not used the wheel moves more rapidly giving better 'wadh' or cut and greater output.

As the ghasiyas are given wages on piece rate basis, they do not dip the stones in water and thereby get greater output of seven or eight pieces per minute, but in the process become more susceptible to fatal diseases. Before the introduction of electric motors the work of grinding and polishing of agate articles was done entirely by hand operated emery. The four different types of lapidary wheels required for grinding and hand polishing are described as i) Ghat-ni-saran, used for removing the unevenness of surface and giving correct shape to the stone. ii) 'Naram' or soft saran is used to make the surface smoother and the remaining two wheels to give them appropriate glaze and polish.

Polishing:

The articles which are roughened and smoothed on emery wheel are polished to give them shine and lustre. The persons engaged in this activity are polishers known as 'opiya' derived from the word 'op' which in local parlance means shine or lustre. These days the common methods of polishing are:

- i) Saran or hand operated lapidary wheel method
- ii) Pattimar method
- iii) Mechanical method

The Pattimar method is specially resorted to in case of small round beads which are fixed in a bamboo clamp and rubbed against a special type of stone called Porbandari stone to give them a smooth surface and rough polish. They are then rubbed on a polishing board called 'patti' having its surface cut into grooves. This method is not popular now.

The mechanical method comprises of a leather bag containing beads, emery dust, leather pieces and fine carnelian powder, placed in a barrel of crude oil and tar. The barrel is supported with an axle on either end. The barrels are three to four in number. Three of them are made of tin and one of copper. The finished articles are rotated in these drums in turn and finally transferred to the copper drum in each of which the proportion of polishing material varies. The barrels are rotated mechanically and within two or three days the beads get polished. There is no physical labour in this method. What is required is general supervision and examination of the glaze obtained. This method has replaced all the former processes as machine polishing is quicker and physical labour is totally eliminated.

Drilling:

After the beads are polished they are passed on for drilling holes. The persons engaged in this operation are known as 'vindhar' or 'sari', being derived from the local word 'vindhavu' or 'saravu', meaning to pierce a hole from one end to another. Drilling is done in two ways - those which work in their cottages in the fields during leisure hours, and those who have regular establishments at home in the village, wherein the household members and hired workers participate.

The technique of drilling consists of boring holes through beads by a diamond tipped steel drill. In order that the beads to be holed are gripped properly they are fixed between two forks in a wooden clamp and kept in position by an iron ring, so that the beads do not get loose and remain properly fitted. This is known as 'bhinthi.' The round beads are kept in the hollow crevices on the wooden frame which in colloquial terminology is known as 'khamanu.' After marking drilling points on the top and bottom of the beads, the craftsman takes it up for drilling. The drill is encircled by a bow-shaped string fastened on a thin stick known as 'dhandhodi' held in the right

hand. A small earthen pot known as 'dagholu' or 'atodi' is kept on stand. Inside this pot is a tamarind solution of water mixed with agate powder. A thin narrow metal reed which is usually an umbrella reed is fixed in the side of the pot in slanting position so that the solution dripping from it helps drilling and prevents the diamond tip from slipping and heating up. While drilling the artisan inserts a portion of the drill in and out intermittently so that the water mixed with carnelian powder comes out from the hole and allows the drill to go ahead. After drilling midway the bead is reversed if it is long. A bead which is not correctly holed loses its value and is known as 'ghodeveh'. Drilling is an important activity because this operation is not favourable on a ny mechanical device as direct and continuous drilling by machine will generate heat and cause cracks whereas by hand drilling the artisan can rotate the drill and regulate the pressure according to his requirements

J) Uniqueness:

The articles to be produced from agate are determined by and shaped according to the size, color, and natural formation of raw stones. The color and design found in one article wouldn't exactly be the same as that in any other article and in that lays its uniqueness. According to ancient beliefs agates possess medicinal properties and are thought to cure Insomnia. People possessing this stone were believed to have gathered strength and courage.

K) Inspection Body:

The inspection body consisting of the following have been constituted for maintaining the quality of the product

- Officer In-charge, O/o the Development Commissioner (Handicraft), Ahmedabad.
- Director (Market Research), Textiles Committee, Ministry of Textiles, Mumbai
- Representative of Producers Associations, Khambhat Prominent Master Artisans of the product.

L) Others:

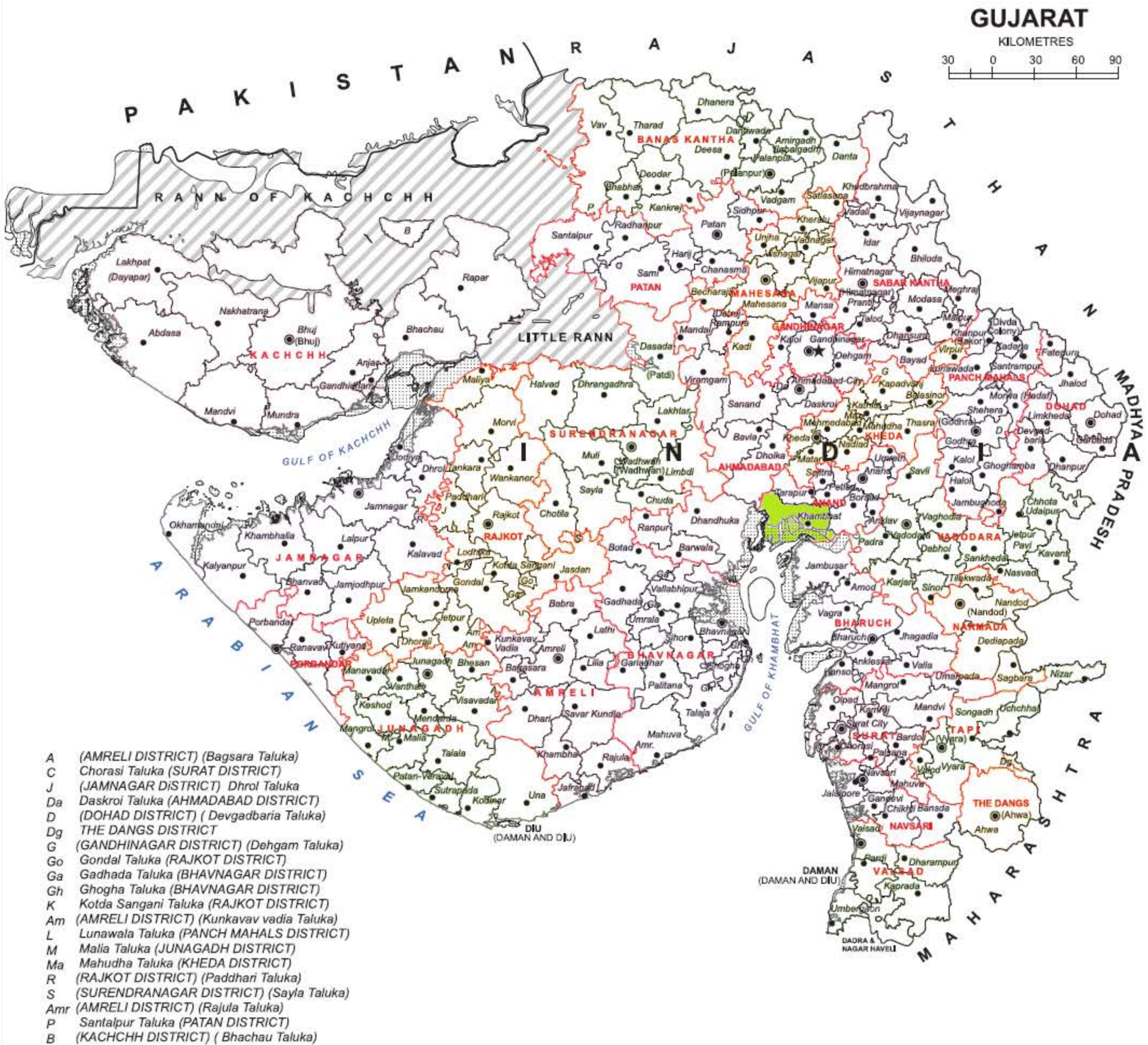
One of the major steps by means of which a developing economy seeks to sustain its growth is a rapid expansion of the internal market to absorb increases in production. A second step is to diversify the range of products that will yet restrain, within manipulability limits, the spiraling of rising expectations. One of the fields which demands immediate attention is traditional handicrafts. The products mostly handmade and rooted in the traditions of a nation's culture and economy are often sources of the deepest satisfaction in everyday life. Apart from the question of its value as social or ethical investment, the resuscitation of these aids becomes all the more imperative within a developing economy, on account of the fact that the tools employed are often timeworn and rudimentary, the pools of skill narrow, highly specialized and hereditary, being limited to certain communities or castes.

The Akik (Agate) industry in Khambhat or Cambay, in South Western Coastal Gujarat is an example of such a handicraft based small scale industry, rooted in tradition. Akik or agate is the general term applied to different varieties of carnelians, and includes different forms of chalcedonic silica found either underground in mines, in beds of rivers or on hill slopes. Agates are known by different names depending on colour and lustre or their chemical compositions. In India, the Akik industry has been in existence since antiquity. In Gujarat, it finds mention from the beginning of the

Christian era by a number of foreign travelers who came to India at different periods. The key to the prosperity of Gujarat was the port city of Khambat on the northern edge of a Gulf, now a crumbling town, heavily silted up with decaying population.

The fortunes of the Akik industry in India seem to have been linked with the rise and fall of different places that grew into importance as sea-ports or centres of maritime trade. It was at Khambat that the Akik industry reached the pinnacle of prosperity and survived till present times despite economic depression and competition. The Khambat port has lost all its former glory but the industries that still thrive are the handicrafts of cutting and polishing of precious and semi-precious stones like rubies and sapphires and the unmatched art of working on Akik. Further, the product bears generational legacy as the artisans learn the art from their forefathers.

GEOGRAPHICAL AREA OF PRODUCTION AGATES OF CAMBAY (LOGO)



- A (AMRELI DISTRICT) (Bagsara Taluka)
- C Chorasi Taluka (SURAT DISTRICT)
- J (JAMNAGAR DISTRICT) Dhrol Taluka
- Da Daskroi Taluka (AHMADABAD DISTRICT)
- D (DOHAD DISTRICT) (Devgadbaria Taluka)
- Dg THE DANGS DISTRICT
- G (GANDHINAGAR DISTRICT) (Dehgam Taluka)
- Go Gondal Taluka (RAJKOT DISTRICT)
- Ga Gadhada Taluka (BHAVNAGAR DISTRICT)
- Gh Ghogha Taluka (BHAVNAGAR DISTRICT)
- K Kotda Sangani Taluka (RAJKOT DISTRICT)
- Am (AMRELI DISTRICT) (Kunkavav vadia Taluka)
- L Lunawala Taluka (PANCH MAHALS DISTRICT)
- M Malia Taluka (JUNAGADH DISTRICT)
- Ma Mahudha Taluka (KHEDA DISTRICT)
- R (RAJKOT DISTRICT) (Paddhari Taluka)
- S (SURENDRANAGAR DISTRICT) (Sayla Taluka)
- Amr (AMRELI DISTRICT) (Rajula Taluka)
- P Santalpur Taluka (PATAN DISTRICT)
- B (KACHCHH DISTRICT) (Bhachau Taluka)

BOUNDARIES:

- INTERNATIONAL.....
- STATE/U.T.....
- DISTRICT.....
- TALUKA.....

HEADQUARTERS:

- STATE..... ★
- DISTRICT..... ●
- TALUKA..... ●



Geographical Area of Production of Agates of Cambay (Logo)

General Information

What is a Geographical Indication?

- It is an indication,
- It is used to identify agricultural, natural, or manufactured goods originating in the said area,
- It originates from a definite territory in India,
- It should have a special quality or characteristics unique to the geographical indication.

Examples of possible Geographical Indications in India:

Some of the examples of Geographical Indications in India include Basmati Rice, Darjeeling Tea, Kancheepuram silk saree, Alphonso Mango, Nagpur Orange, Kolhapuri Chappal, Bikaneri Bhujia etc.

What are the benefits of registration of Geographical Indications?

- It confers legal protection to Geographical Indications in India,
- It prevents unauthorized use of a registered Geographical Indication by others.
- It boosts exports of Indian Geographical indications by providing legal Protection.
- It promotes economic Prosperity of Producers.
- It enables seeking legal protection in other WTO member countries.

Who can apply for the registration of a Geographical Indication?

Any association of persons, producers, organization or authority established by or under the law can apply.

The applicant must represent the interest of the producers.

The application should be in writing in the prescribed form.

The application should be addressed to the Registrar of Geographical Indications along with prescribed fee.

Who is the Registered Proprietor of a Geographical Indication?

Any association of persons, producers, organisation or authority established by or under the law can be a registered proprietor. Their name should be entered in the Register of Geographical Indications as registered proprietor for the Geographical Indication applied for.

Who is an authorized user?

A producer of goods can apply for registration as an authorized user, with respect to a registered Geographical Indication. He should apply in writing in the prescribed form along with prescribed fee.

Who is a producer in relation to a Geographical Indication?

A producer is a person dealing with three categories of goods

- Agricultural Goods including the production, processing, trading or dealing.
- Natural Goods including exploiting, trading or dealing.
- Handicrafts or industrial goods including making, manufacturing, trading or dealing.

Is registration of a Geographical Indication compulsory?

While registration of Geographical indication is not compulsory, it offers better legal protection for action for infringement.

What are the advantages of registering?

- Registration affords better legal protection to facilitate an action for infringement.
- The registered proprietor and authorized users can initiate infringement actions.
- The authorized users can exercise right to use the Geographical indication.

Who can use the registered Geographical Indication?

Only an authorized user has the exclusive rights to use the Geographical indication in relation to goods in respect of which it is registered.

How long is the registration of Geographical Indication valid? Can it be renewed?

The registration of a Geographical Indication is for a period of ten years.

Yes, renewal is possible for further periods of 10 years each.

If a registered Geographical Indication is not renewed, it is liable to be removed from the register.

When a Registered Geographical Indication is said to be infringed?

- When unauthorized use indicates or suggests that such goods originate in a geographical area other than the true place of origin of such goods in a manner which misleads the public as to their geographical origins.
- When use of Geographical Indication results in unfair competition including passing off in respect of registered Geographical indication.
- When the use of another Geographical Indication results in a false representation to the public that goods originate in a territory in respect of which a Geographical Indication relates.

Who can initiate an infringement action?

The registered proprietor or authorized users of a registered Geographical indication can initiate an infringement action.

Can a registered Geographical Indication be assigned, transmitted etc?

No, A Geographical Indication is a public property belonging to the producers of the concerned goods. It shall not be the subject matter of assignment, transmission, licensing, pledge, mortgage or such other agreement. However, when an authorized user dies, his right devolves on his successor in title.

Can a registered Geographical Indication or authorized user be removed from the register?

Yes, The Appellate Board or the Registrar of Geographical Indication has the power to remove the Geographical Indication or authorized user from the register. The aggrieved person can file an appeal within three months from the date of communication of the order.

How a Geographical Indication differs from a trade mark?

A trade mark is a sign which is used in the course of trade and it distinguishes goods or services of one enterprise from those of other enterprises. Whereas a Geographical Indication is used to identify goods having special characteristics originating from a definite geographical territory.

THE REGISTRATION PROCESS

In December 1999, Parliament passed the Geographical Indications of Goods (Registration and Protection) Act 1999. This Act seeks to provide for the registration and protection of Geographical Indications relating to goods in India. This Act is administered by the Controller General of Patents, Designs and Trade Marks, who is the Registrar of Geographical Indications. The Geographical Indications Registry is located at Chennai.

The Registrar of Geographical Indication is divided into two parts. Part 'A' consists of particulars relating to registered Geographical indications and Part 'B' consists of particulars of the registered authorized users.

The registration process is similar to both for registration of geographical indication and an authorized user which is illustrated below:

