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GI APPLICATION No.

474 -

VI

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Date: - 25th March, 2014

To,

The Registrar,  
Geographical Indication Registry,  
Chennai,

Subject: - Submission of ten Geographical Indication applications from state of Maharashtra,

Dear Sir,

It gives us great pleasure to inform you that we have successfully studied ten GI potential products from State of Maharashtra with the support of World Bank assisted project called Maharashtra Agricultural Competitiveness Project (MACP). We have prepared GI application for the same and submitting herewith for your perusal. Kindly acknowledge the same and do the needful in the interest of agri communities involved in this regard.

Thanks and Regards,

Prof. Ganesh S. Hingmire  
Chairman,  
GMGC,  
Pune



Enclosed : following GI applications with required documents

1. Ajra Ghansal Rice
2. Waigaon Turmeric
3. Bhiwapur Chilli
4. Pune Mulshi Ambemohar
5. Mangalwedha Maldandi Jowar
6. Navapur Desi Tur
7. Solapur Chutney
8. Kolhapuri Masala
9. Sindhudurg Ratnagiri Kokum
10. Koregaon Waghya Ghevada

Email: [info@gmgc.co.in](mailto:info@gmgc.co.in) [www.gmgc.co.in](http://www.gmgc.co.in)

Pune: 210-B, Ashoka Pavilion, Near NIV, Dr. Ambedkar Road, Camp, Pune 411 001.

Mumbai: 3/57, Saraswati, Dr S.S Rao Road, Lalbaug, Mumbai 400 012.

New Delhi: Nirmal Tower, Connaught Place, Barakhamba Rd., New Delhi 110 001.

Nashik: 7, Gurudeep Apts., Parabnagar, Indiranagar, Nashik 422 009.

GI APPLICATION No.

474

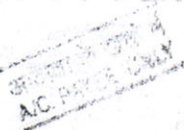
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# Geographical indications Registry

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SINDHUDURG,  
MAHARASHTRA,  
416606,  
INDIA

### C B R Details :

Application No	Form No	Class	No of Class	Name of GI	Goods Type	Amount Calculated
474	GI-1A	29	1	Sindhudurg & Ratnagiri Kokum	Agriculture	5000

### Payment Details :

Payment Mode	Cheque/DD/PO NO	Bank Name	Cheque/DD/PO Date	Amount Calculated	Amount Paid
DD	348261	State Bank of India	24-03-2014	5000	5000

Total Calculated Amount in words : Rupees Five Thousand only

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6.	<p>Research Papers/Thesis:</p> <ol style="list-style-type: none"> <li>1. Production, processing and marketing of kokum (<i>garcinia indica</i>) in konkan region of Maharashtra an economic analysis; research thesis by P.J.Kshirsagar, October 2008.</li> <li>2. 'Kokum seed processing for its Butter Extraction'; Dr.S.P.Sonawane.</li> <li>3. 'Growing of kokum as an intercrop in coconut plantations under konkan conditions of Maharashtra; D.D.Nagwekar, S.S.Gurav, P.M.Haldankar, A.D.Rangwala and B.B.Jadhav. National symposium on Garcinia genetic resources: linking diversity, livelihood and management</li> <li>4. 'Kokum's quiet success, Shree Padre, Kasargod'; published by Civil Society, June 2011.</li> <li>5. 'Garcinia a unique genus for coming decade; H.R.Nadkarni, P.J. Kshirsagar, N.R.Bhagwat, M.B.Dalvi and B.P.Patil.Processing of the first National Seminar on Kokum,12 -13 May 2001.</li> <li>6. Methods and compositions for weight loss using Garcinia indica fruit puree; United States Patent Application Publication Pub. No.: Us 2010/0233306 A1 Pub. Date: 16,Sept. 2010.</li> <li>7. 'Kokum – Presents status and future prospects'; P.J.Kshirsagar, P.M.Haldankar, B.P.Patil and H.r.Nadakarni. National seminar on transfer of technology of medicinal and aromatic crops, 2001.</li> <li>8. 'The world of kokum and kokum in globalised world: facts on kokum, Proceeding of Second National Seminar on Kokum at Goa' ; Patil, B.P,4-5, March 2005, pp.90-112</li> <li>9. 'Softwood grafting, viable propagation technique for kokum production; P.M.Hadankar, M.J.Salvi and G.D.Joshi., department of</li> </ol>	Annexure 6



Horticulture, Konkan Krishi vidtapeeth Dapoli, Maharashtra,  
October, December 1987.

10. 'Effect of post flowering spraying of organic compounds on fruit set and yield in kokum'; S.B.D'souza, p.M.Haldankar, G.D.Joshi, S.C.Talashilkar, V.V.Shinde and Nimbalkar S.D.; National seminar on 'Physiological and molecular approaches for increasing yield and quality of Agriculture Horticulture and Medicinal plants under changing environment', 29<sup>th</sup>-30<sup>th</sup> Nov & 1<sup>st</sup> Dec. 2007.
11. 'Effect of Foliar Application of Ethrel on yield and quality of kokum'; A.V.Somavanshi, P.M.Haldankar, A.D.Rangwala, G.D.Joshi and M.M. Burondkar, National symposium on Garcinia genetic resources: linking diversity, livelihood and management.
12. 'Effect of scions from orthotropic and plagiotropic shoots from different positions on growth behaviour of kokum grafts'; G.M.Waghmare, P.J.Kshirsagar, B.P.Patil, M.B.Dalvi and M.S.Gawankar. Proceedings of first national seminar on kokum 12 - 13 May 2001.
13. 'Studies on grafting various types of shoots as scion to enhance production of orthotropic grafts in kokum'; Journal of plantation crops, 37(1), 86-87,2009.
14. 'Advancing maturity and improving quality of kokum (*Garcinia indica* Choisy) fruits by post flowering foliar sprays'; Journal of plantation crops, 37(2), 152-153,2009.
15. 'Economic viability of production of kokum in Maharashtra, India'; P.J.Kshirsagar, J.M.Talathi, H.K.Patil & S.R.Torane; Journal of spices and aromatic crops, vol 19 (1 & 2): 34-41, 2010.
16. 'Improvement of kokum by selection'; M.S.Gawankar, D.V.Shingre, P.J.Kshirsagar, H.R.Nadkarni, B.P.Patil, G.D.Joshi & N.D.Jambhale, National seminar on new prospective in spices, medicinal and Aromatic plant, 126-130,27-29 Nov 2003.
17. 'Need of standardization and advances in value addition of kokum processing'; Dr.N.J.Thakor, Dr.P.M.Haldankar, Dr.S.B.Swami, Beverage and food world,27-29, 2012.
18. 'Effect of post flowering foliar sprays of nutrients for accelerating harvesting of kokum'; P.M.Haldankar, A.V.Somvanshi, , A.D.Rangwala and M.M.Burondkar, Indian J. Hort.69, 55-59,10 March 2012.
19. 'Effect of post flowering foliar sprays of nutrients on fruit growth of

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474

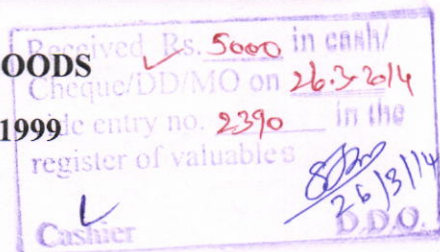
	<p>kokum'; P.M.Haldankar, A.V.Somvanshi and V.S.Dandekar, Journal of Spices and Aromatic Crops, Vol. 21(1): 48-52 ,2012.</p> <p>20. 'Studies on grading and storage of kokum fruits Cv. 'Konkan Amruta'; G.D.Joshi, R.S.Patil, S.S.Torane, P.M.Haldankar, D.D.Nagvekar and D.S.Sawant.National seminar on kokum, 12-13 May 2001.</p> <p>21. 'Economics of value addition in Kokum (Garcinia indica) fruits processing' published in Internationl Research Journal of Agricultural Economics and Statistics ; P.J. Kshirsagar, J.M. Talathi, S.R. Torane and V.G. Naik</p> <p>22. Garcinia indica as an Environmentally Safe Corrosion Inhibitor for Aluminium in 0.5M Phosphoric Acid ; Deepa Prabhu and Padmalatha Rao, Hindawi Publishing Corporation, International Journal of Corrosion, Volume 2013, Article ID 945143, 11 pages, 2013.</p>	
7.	<p>Booklets on Konkam provided by Dr.Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli.</p> <ol style="list-style-type: none"> <li>1. Release proposal of Konkan Hatis</li> <li>2. Release proposal of Konkan Amruta, 1997</li> <li>3. Soils, Research Bulletin-2, May 1990</li> <li>4. Western Ghats kokum Foundation's, resource book on kokum, importing proceedings of three National Seminars held in 2001, 2005 &amp; 2011.</li> </ol>	Annexure 7
8.	News Paper Articles	Annexure 8



## THE GEOGRAPHICAL INDICATIONS OF GOODS

(REGISTRATION &amp; PROTECTION) ACT, 1999

## FORM GI -1



A: Application for the registration of a Geographical Indication in part A of the register:

Section 11(1) of Geographical Indication Act, 1999 and rule 23(2) of Geographical Indication of Goods (Registration and Protection) Rules, 2002

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

Application is hereby made by Great Mission Group Consultancy for the registration on behalf of Sindhudurg Ratnagiri Mahakokum Sanstha in part A of register of the Geographical Indication furnishing the following particulars.

**NAME OF THE APPLICANT:**

Sindhudurg Ratnagiri Mahakokum  
Sanstha

**ADDRESS:**

A/P Masade viran bajar, Tal- Malvan,  
Dist- Sindhudurg, Maharashtra.

**GEOGRAPHICAL INDICATION:**

Sindhudurg & Ratnagiri Kokum

**CLASS:**

Dry fruits, horticulture & forestry products  
under Class 29 & 31 respectively

**GOODS:**

Dry fruits, horticulture & forestry  
products under Class 29 & 31  
respectively, Ratnagiri & Sindhudurg  
Kokum

**A. Name of Applicant:-**

Sindhudurg Ratnagiri  
Mahakokum Sanstha,  
represented by Mr .Ganesh  
Hingmire of GMGC.

**B. Address:-**

A/P Masade viran bajar, Tal-  
Malvan, Dist- Sindhudurg,  
Maharashtra.

**C. List of association of persons/producer/  
Organisation/authority:-**

Sindhudurg Ratnagiri  
Mahakokum Sanstha

**D. Types of goods:-**

Dry fruits, horticulture &  
forestry products under class 29  
&31 respectively,  
Name: - Ratnagiri &  
Sindhudurg Kokum.

**E. 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.

<b>F. Name of Geographical Indication and Particulars:-</b>	Sindhudurg & Ratnagiri Kokum, Dry fruits, horticulture & forestry products under Class29 & 31 resp.
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#### **G. Description of Ratnagiri and Sindhudurg Kokum**

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.<sup>1</sup>

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<sup>1</sup> Flowering Patterns in Kokum, M. Baskaran and S. Krishnan, Western Ghats kokum Foundation's, resource book on Kokum, importing proceedings of three National Seminars held in 2001, 2005 & 2011.

In Maharashtra state Kokum trees are observed all over the east coast of the state however 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 Ghat 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 since 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**

1. Lonawale Kokum
2. Kokum Seed
3. Kokum Butter
4. Dried Kokum rind-Amsol
5. Kokum Agal

#### **1. 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 Gujarathi community.



**Lanawale Kokum**

## **2. Kokum Seed and Butter:<sup>2</sup>**

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 kokam 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 in chocolates is cost effective over the use of cocoa butter<sup>3,4</sup>

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

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<sup>2</sup> production, processing and marketing of kokum (*garcinia indica*) in konkan region of Maharashtra an economic analysis- thesis by P.J.Kshirsagar)

<sup>3</sup> Article published in Civil Society June 2011 Edition –‘Kokum’s quite success’

<sup>4</sup> Interview of Shrikant P Vaidya.



hydrogenated fats.<sup>5</sup> It is also suitable for confectionery butter. It is also suitable for making candles and soaps.<sup>6</sup> It is used in Sizing Mill to soften the threads.<sup>7</sup>

Inhibitive and absorptive properties of Aqueous extract of Kokum seeds is also studied for Corrosion control of Aluminium in 0.5 M phosphoric acid solution at 30 °C to 50 °C<sup>8</sup>.



Kokum Seeds

Kokum Butter

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

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<sup>5</sup> Kokum Seed Processing for its Butter Extraction -Dr. S. P. Sonawane (Associate Professor Department of Agricultural Process Engineering, College of Agricultural Engineering and Technology, Dr. BSKV Dapoli)

<sup>6</sup> Garcinia a unique genus for coming decade-H.R.Nadkarni ,PJKshirsagar, N.R. Bhagwat , N.B.Dalavi, B.P.Patil ,Proceedings of first national seminar on kokum (12 ,13 May 2001)

<sup>7</sup> [http://www.eyojak.com/products/kokam/kokam\\_oil.htm](http://www.eyojak.com/products/kokam/kokam_oil.htm)

<sup>8</sup> <http://www.readcube.com/articles/10.1155/2013/945143?locale=en>



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.



Boiling Unit

Ghatan (used for crushing kokum)<sup>9</sup>



Oil Expeller (Screw press type) used by cottage industry<sup>10</sup>

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<sup>9</sup> Kokum Seed Processing for its Butter Extraction -Dr. S. P. Sonawane (Associate Professor Department of Agricultural Process Engineering, College of Agricultural Engineering and Technology, Dr. BSKKV Dapoli)

<sup>10</sup> Kokum Seed Processing for its Butter Extraction -Dr. S. P. Sonawane (Associate Professor Department of Agricultural Process Engineering, College of Agricultural Engineering and Technology, Dr. BSKKV Dapoli)



### **3. 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 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 veg dishes and curries for the tangy taste. It is also useful for skin boils and irritation, if rubbed against the irritated parts.



Amsol

### **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, rind is used to impart an acid flavor to curries instead of tamarind.<sup>11</sup>
- It is also included in chutneys and pickles. The skins are not usually chopped but are added whole to the dish.

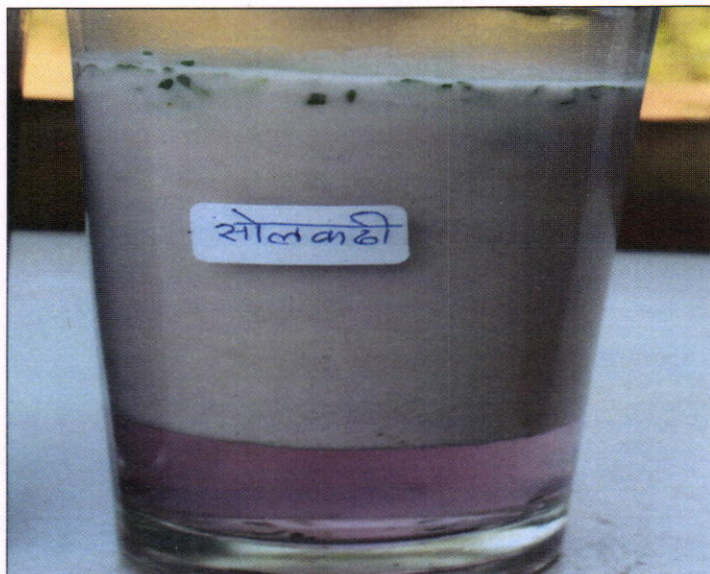
Kokum's various special byproducts are also considered for Culinary uses, it mainly included Solkadi, Kokum Sharbat, Kokum Syrup etc. Maximum of such type of products preparation and description are given below.

### **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

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<sup>11</sup> Production, processing and marketing of kokum (garcinia indica) in konkan region of Maharashtra an economic analysis- thesis by P.J.Kshirsagar



Solkadhi

## **2. Kokum Sharbat/ Amrut Kokum**

‘Kokum Sharbat’ is a sweet and tangy 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 in 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 ripped kokum fruit



- ✚ Divide it into 4 parts, remove seeds from kokum fruit.
- ✚ 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.

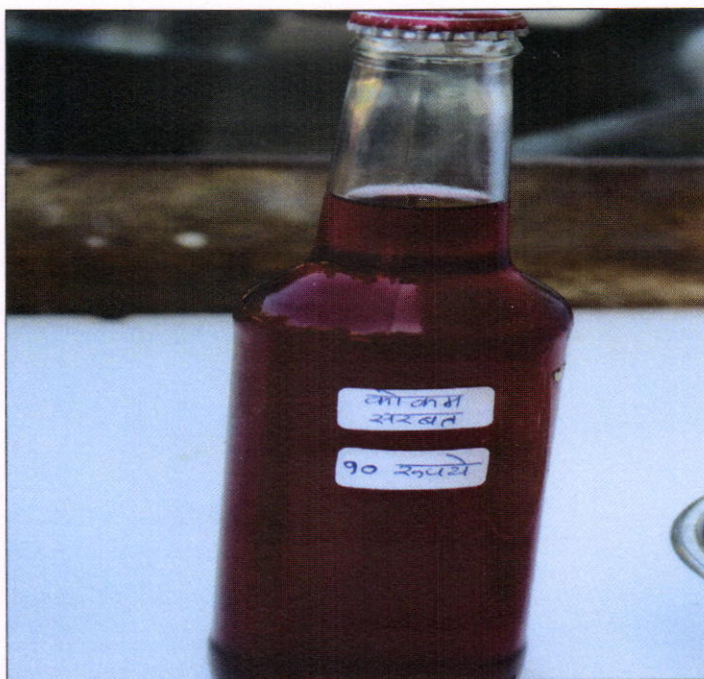
#### **4. Ketchup**

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 homogenous. 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.





**Sharabat**

#### **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.



Kokum Agal

#### **7. Muthali:**

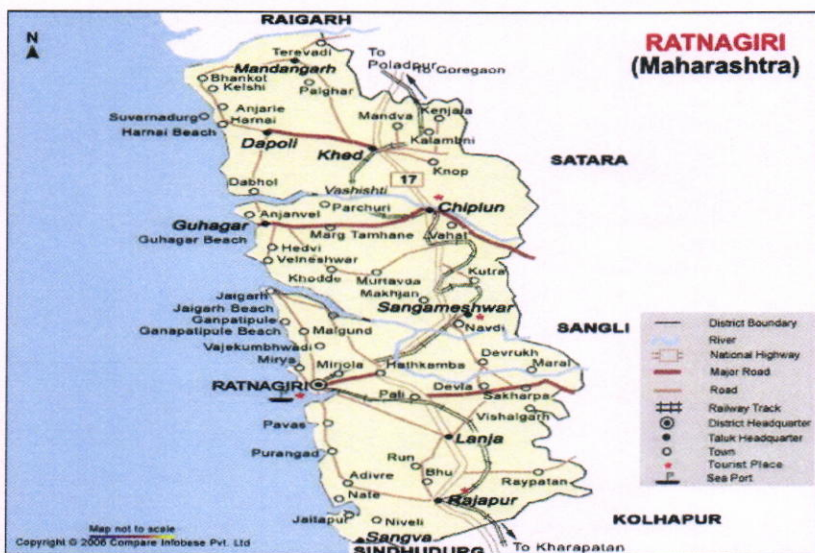
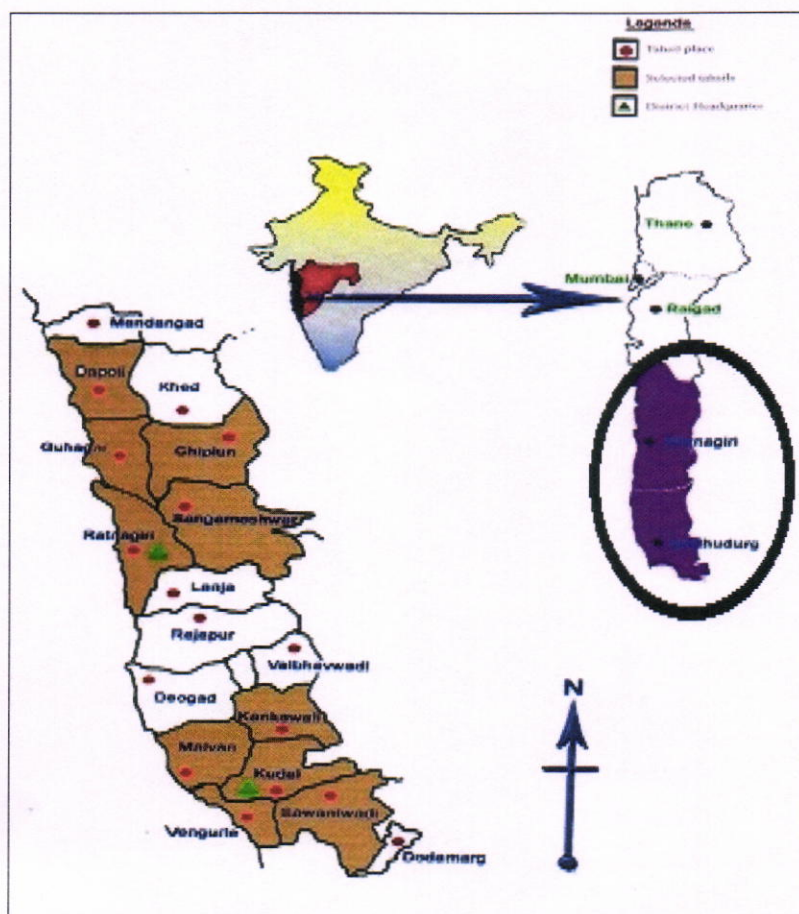
It is made from Kokum seed. It is a base of lipstick industry.<sup>12</sup>

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<sup>12</sup> Dr Parag Haldankar, head of the Department of Horticulture, Balasaheb Sawant Konkan Krishi Vidyapeeth (BSKKV), Dapoli.



## H. Geographical Area of Production and Map



1. Latitude : 160.30' and 180.00' N

2. Longitude : 730.00' to 740.00' E



1. Latitude : 15.37 and 16.40 N

2. Longitude : 73.19 and 74.18 E

At present, the total productive area under kokum fruits in Maharashtra is about 5000 ha. The production of kokum fruits in Maharashtra is around 50,000 tonnes with average productivity of 10 tonnes/ha (Sengar et al., 2012).<sup>13</sup> Kudal from Sindhudurg has highest area under cultivation. Sawantwadi has covered 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 Sindhudurg and 30 % from Ratnagiri.

<sup>13</sup> Kokum Seed Processing for its Butter Extraction Dr. S. P. Sonawane Associate Professor Department of Agricultural Process Engineering, College of Agricultural Engineering and Technology, Dr. BSKKV Dapoli



## **I. Proof of Origin**

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.<sup>14</sup>

Konkan region is enjoying the monopoly status with respect to Kokum fruits production. According to local sources, Ratnagiri district has kokum trees of 100 years old.<sup>15</sup> 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 Sindhudurg Districts.

The kokum trees are perennial in nature.

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<sup>14</sup> [http://kokumfacts.com/?page\\_id=2](http://kokumfacts.com/?page_id=2)

<sup>15</sup> *It is also noted at Kokan's Agriculture University at Dapoli, this became a source point for release of Kokam Hatis variety of Kokum as this tree is located at Hatis Village of Ratnagiri Districts.*



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Photograph showing Kokum trees are more than 100 years old (Hatis, Dist. Ratnagiri)

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.

## **J. Method Of Cultivation Of Kokum**

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<sup>16</sup>.

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

### **Plant propagation<sup>17</sup>**

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**

##### **I) 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

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<sup>16</sup> Growing of Kokum *Garcinia indica* as an intercrop in coconut plantation under Konkan conditions of Maharashtra, PM Haldankar, BB Jadhav, AD Rangwal,

<sup>17</sup> Present status and future thrust areas in production technology of Kokum P. M. Haldankar, C. D. Pawar, P. J. Kshirsagar and M.M.Kulkarni



cent decrease in the seed germination. They do not germinate once fully dried. Seeds are extracted and spread on 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.

#### **ii) 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.

#### **iii) 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 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.

### **I) Softwood grafting<sup>18</sup>**

#### **a) Selection of scion**

The scionsticks should be selected from high yielding female trees having all desirable characters. Terminal shoots of 0.5 – 0.6 cm thickness and 10 – 12 cm length, of

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<sup>18</sup> Softwood Grafting viable propagation techniques for Kokum Production, P M Haldankar

greenish brown colour are selected as scionsticks. 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**

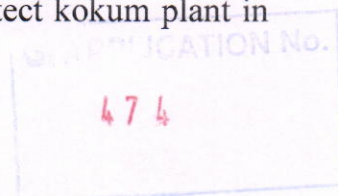
Kokum can be planted as a monocrop or as a mixed crop in coconut and arecanut plantation and can also be planted in a kitchen garden. Considering the growth habit and conical canopy of kokum Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli has recommended a spacing of 6 X 6 m for sole plantation of kokum. Square 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 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<sup>3</sup> 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  $P_2O_5$  and 25 g K<sub>2</sub>O 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  $P_2O_5$  and 250 g K<sub>2</sub>O 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 an 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 tree 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 grow in 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 in kokum. Some times pink disease is noticed on branches. It is advised to remove the diseased portion of a branch and smearing of 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.<sup>19</sup>

All kokum fruits on a tree are not ready for harvesting at the time and hence periodical plucking is done. The number of plucking vary 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.<sup>20</sup>

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<sup>19</sup>Effect of post flowering foliar sprays of nutrients for accelerating harvesting of Kokum (*Garcinia indica* (Choisy)), Indian Journal of Horticulture, 69 (1) March 2012, 55-59.

<sup>20</sup>Effect of foliar application of ethrel on yield and quantity of Kokum *Garcinia indica* (Choisy), A. V Somavanshi, P. M Haldankar, A D Rangwala, G D Joshi and M M Burondkar.

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 15 kg yield per plant is obtained. Annual fruit yield fluctuation is reported in kokum the higher yield was reported every alternate year. Considerable variability in physico-chemical composition of kokum is also noticed. The harvested fruits are exclusively used for processing.

### **Post harvest handling<sup>21</sup>**

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

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21 Present status and future thrust areas in production technology of Kokum P. M. Haldankar, C. D. Pawar, P. J. Kshirsagar and M.M.Kulkarni

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

## **K. Geographical Significance and Uniqueness Of Kokum**

### **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 clay loam to clay in texture.<sup>22</sup> 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<sup>22</sup>.

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.<sup>23</sup>

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<sup>22</sup> Production, processing and marketing of kokum (garcinia indica) in konkan region of Maharashtra an economic analysis- thesis by P.J.Kshirsagar)

<sup>23</sup> Research bulletin :Soils ,Koken Krishi Vidyapeeth Dapoli Ranagiri (May 1990)

<sup>24</sup> Production, processing and marketing of kokum (garcinia indica) in konkan region of Maharashtra an economic analysis- thesis by P.J.Kshirsagar)



## 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<sup>24</sup>.

The bright sunshine hours are normally 4-5 hours during monsoon season<sup>25</sup> 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 of March & April the fruit development took place and at the end of summer season the fruits are 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

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<sup>25</sup> As per information provided by Dr.P. M. Haladankar and Soil analysis report - Table 1- Available nitrogen ,phosphorus and potassium status of lateritic , medium black and coastal saline soil of Konkan from soil analysis report

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 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.
- 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.
- **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.<sup>26</sup>
- **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.<sup>27</sup>
- **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.<sup>28</sup>
- **Anti-cancer:** According to the Journal of Oncology and Haematology, Garcinol, present in kokum, can inhibit intestinal cancer cell growth without

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<sup>26</sup> Kokum-Present Status and Future Prospect, National seminar on transfer of technology of medicinal and aromatic crops, 2001.

<sup>27</sup> Patil, B.P. 2005. The world of kokum and kokum in globalised world: facts on kokum, Proceeding of Second National Seminar on Kokum at Goa. 4-5, March 2005, pp.90-112.

<sup>28</sup> <http://www.google.com/patents/US20100233306>



affecting normal cells. Garcinol also has anti-oxidant and anti-inflammatory properties, which reduce the cancer causing reactive oxygen species.<sup>29</sup>

The important morphophysiological characters of these varieties are as under:<sup>30</sup>

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

<sup>29</sup> Patil, B.P. 2005. The world of kokum and kokum in globalised world: facts on kokum, Proceeding of Second National Seminar on Kokum at Goa. 4-5, March 2005, pp.90-112.

<sup>30</sup> Western Ghats Kokum Foundation's Resource Book on KOKUM (Garcinia indica Choisy)

<sup>31</sup> Release proposal for Kokan Amruta

<sup>32</sup> Western Ghats Kokum Foundation's Resource Book on KOKUM (Garcinia indica Choisy)

- Chemical analysis of Fruit rind of Konkan Amruta compared with Konkan Hatis<sup>31</sup>

Sr 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.<sup>32</sup>

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<sup>31</sup> Release Proposal of Konkan Hatis, Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri.

<sup>32</sup> Release Proposal of Konkan Hatis, Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri.

**L. Inspection Body:**

Sindhudurg Ratnagiri Mahakokum Sanstha will work as an Inspection body, it will form an internal group consisting Agri-scientists, farmers, GI experts to monitor the quality norms.

**M. Others: -**

The kokum plant is a '*Kalpavruksha*' since 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.

Along with the Statement of Case in Class 29 and 31 in respect of Sindhudurg & Ratnagiri Kokum in the name(s) of Sindhudurg Ratnagiri Mahakokum Sanstha, whose address is A/P Masade viran bajar, Tal- Malvan, Dist- Sindhudurg, Maharashtra, Who claims to represent the interest of the producers of the said goods to which the geographical indication relates and which is in continuous use since in respect of the said goods.

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



- All communications relating to this application may be sent to the following address in India: Ganesh S. Hingmire, 959, Budhwar Peth, Pune, Pin-411002, Maharashtra, India.

Signature of Applicant



Name of Applicant

(GANESH S. HINGMIRE)