GEOGRAPHICAL INDICATIONS OF GOODS
(REGISTRATION AND PROTECTION) ACT, 1999

STATEMENT OF CASE

ALPHONSO MANGO

It is a variety of mango grown in the region of some districts in Gujarat, Konkan in Maharashtra State and North Karnataka and State of Goa.

The colour of the fruit is having attractive orange yellow, the pulp is firm but melting, fibreless, texture is soft, flavour is pleasant and the taste is very sweet

Its skin is thick and green in colour before ripening. After ripening, the skin changes to thin and orange yellow in colour. It has an attractive blush towards basal end. The colour of the fruit is attractive orange yellow, pulp is firm but melting, fibreless, texture soft, flavour pleasant and taste very sweet.

Additional Details:

(1) Tree
Height of atleast 9.3 m and average spread of 9.7 m (upon attaining 30 years). The tree is moderately vigorous, trunk is medium, shoot thick, leaves are medium size and intermediate

(2) Inflorescence
Inflorescence is broadly pyramidal with yellowish colour of main axis and rachis. The percentage of bisexual flowers in inflorescence is low

(3) Flowering
Flowering is in 3 (three) flushes. First flush comes is last week of October - November with 15 - 20 % crop. Second flush comes in November end to December with 35 - 40 % crop and the third flush comes in January second fortnight to February which gives rise to maximum fruit set and yield.

(4) Fruiting
The tree starts fruiting at the age of 5 (five) years. The fruit gets matured and ready for harvest in 110 – 120 days. Fruits borne are in single or cluster.

(5) Fruit.
Medium to big, 250 - 300 gms., oblong oval, stalk inserted obliquely base obliquely flattened, cavity shallow, shoulders prominent and unequal, ventral rising and then rounded, dorsal ending in a long curve, sinus almost absent, round back of fruit without beak, apex broadly pointed. Skin very thick, yellow green, dots very few, medium and not prominent. Flash attractive orange yellow, firm but melting, texture fine, fibre absent, flavour pleasant, taste very sweet.

(6) Root
The root system consists of a long, vigorous tap root and abundant surface feeder roots

(7) Stem
Growth of stem is upright and branching of stem is from1-1 5 m. height from ground level For the purpose of measuring, the girth of stem and age of the tree is calculated Average girth of the stem is 1 0 m.-1 8 m depending on age of tree (1 3 m. is the girth of a 35 year old tree)

(8) Branching
Type of branching is indeterminate

(9) Leaf
Shape of leaf is oblong lanceolate The leaves are spirally arranged and produced in flushes

(10) Seed
It is solitary (mono-embryonic), flat, ovate oblong, in a large woody stone, having excellent quality. It is surrounded by the fibrous endocarp at maturity.

(11) Fruit Quality It is large, fleshy drupe, containing edible mesocarp of varying thickness. It is resinous and highly ariable with respect to shape and size. Chlorophyll, carotenes, anthocyanins are present in the fruit, although chlorophyll disappears during ripening, whereas anthocyanin and caretonoid increase with maturity

(12) Colour
Attractive yellow with slight reddish blush at the shoulder

(13) Stone
Small to medium, oblong oval, fibre - absent, medium course with veins on surface

(14) Harvest Time
Harvesting starts from March end to onset of monsoon.

Table: **Basic characteristics of Alphonso Mango**

QUALITY CRITERIA	ALPHONSO MANGO
TSS (° B)	19
Acidity (%)	0.34
Ascorbic mg / 100 g	62.15
B-carotene µg / 100 g	16.78 µg / 100 g
Non Reducing Sugar	13.8 %
Reducing Sugar	3.79 %
Vitamin C	32.7 mg / 100 g

Table: **Nutritional value of Alphonso Mango**
Nutritional value per 100 g (3.5 oz)

NUTRIENTS	VALUE (per 100 gram)	% VALUES
Proximates		
Energy	70 kcal (270 kJ)	
Carbohydrates	17.00 g	
Sugar	14.8 g	

Dietary fibre	1 8 g	
Total Lipid (Fat)	0 27 g	
Protein	0.51 g	
Vitamins		
Vitamin A equiv	38 µg	4 %
ß carotene	445 µg	4 %
Thiamin (Vit. B 1)	0.058 mg	4 %
Riboflavin (Vit. B 2)	0.057 mg	4 %
Niacin (Vit. B 3)	0.584 mg	4 %
Pantothenic acid (B 5)	0.160 mg	3 %
Vitamin B 6	0.134 mg	10 %
Folate (Vit. B 9)	14 µg	4 %
Vitamin C	27 7 mg	46 %
Minerals		
Calcium	10 mg	1 %
Iron	0.13 mg	1 %
Magnesium	9 mg	2 %
Phosphorus	11 mg	2 %
Potassium	156 mg	3 %
Zinc	0.04 mg	0 %

Percentages are relative to US recommendations for adults
Source : USDA Nutrient database

GEOGRAPHICAL AREA

The geographical area consists of the western coastline of India. This includes some districts of Gujarat viz., Balsar, Vadodara and Bhavnagar, the Konkan region i e., rugged coastal region of Maharashtra and North Karnataka, stretching from Raigad (in Maharashtra) to Mangalore and the state of Goa

In 1961, the Konkan region became a part of the newly formed state of Maharashtra Prior to this, it was a part of Bombay province which was split to form Gujarat and Maharashtra

The geographical characteristics of this region is the narrow, hilly terrain strip of the Sahyadri ranges in the East and Arabian Sea in the West. This region comprises of following districts in various states

Maharasthra State : 5 (five) districts viz., Mumbai, Thane, Raigad, Ratnagiri and Sindhudurg,

North Karnataka 3 (three) districts viz. Uttar Kannada, Udupi and Dakshina Kannada,

Gujarat 3 (three) districts viz., Balsar, Vadodara and Bhavnagar

Goa 2 (two) districts viz., Pernem and Madgaon

The soils are mainly lateritic and medium black.

Based on agro – climatic variations, the Konkan region in Maharashtra is broadly divided into 2 (two) zones viz., South Konkan Coastal Zone and North Konkan Coastal Zone

The South zone comprises of Ratnagiri and Sindhudurg districts, whereas, the North zone includes Raigad and Thane districts.

The Konkan region is distinguished from rest of Maharashtra State by virtue of its distinct agro-climatic conditions, soil types, topography, location crops, cropping pattern, land holdings and socio – economic conditions of the farmers.

Although, Konkan region is traditionally famous as homeland for the commercial cultivation of world famous Alphonso Mango and cashewnut as rainfed crops, the area under each of these is presently around 35,000 ha. The other commercial crops grown in this area are coconut, arecanut and sapota.

At present, Alphonso Mango is mainly concentrated in Ratnagiri and Sindhudurg district, while a few pockets are found under cultivation in Raigad and Thane district of Konkan region.

While the agro – climatic characteristics of North Karnataka, Gujarat and Goa are as follows.

In North Karnataka, there is dry and humid climatic condition with medium rainfall (1500 – 2000 mm), while Coastal lines belts of Goa and Gujarat having Alphonso belts, is blessed with hot and humid climate and heavy rainfall ranging 3000 - 4000 mm (during June – September)

Brief description of the GI Area.

Location	
Geographical Position	Portions of Gujarat, Konkan Region in Maharashtra State and North Karnataka and State of Goa
Latitude	Gujarat : Balsar 20° 36' N Bhavnagar : 21° 44' 57 " Vadodara : 22° 18' 11 " Maharasthra State : Mumbai 18 ° 56' N Thane : 18.42° to 20.20° N Raigad: 17.51° to 19.80 N Ratnagiri : 16.30° to 18.04° N Sindhudurg : 15.37° to 16.40° N North Karnataka : Uttar Kannada : 13 ° 55' to 15 ° 31' Udupi : 13° 20' 60 N Dakshina Kannada : 12° 57' to 13° 50' N

	Goa Pernem : 15° 43' 12" N Madgaon : 15° 16' 47" N
Longitude	Gujarat Balsar : 72° 59' E Bhavnagar : 72° 08' 41" Vadodara : 73° 11' 40" Maharasthra State Mumbai : 72 ° 51' E Thane : 72 45° to 73.48° E Raigad : 72 51° to 73.40° E Ratnagiri : 73 02° to 73.52° E Sindhudurg : 73 19° to 74 13° North Karnataka : Uttar Kannada : 74 ° 9' to 75 ° 10' E Udupi : 74° 45' 0E Dakshina Kannada : 74 ° to 75 ° 50' E Goa Pernem : 73° 47' 59" E Madgaon : 73° 56' 23" E
Altitude	150 to 550 meters above MSL
Annual Rainfall (during June - September)	North Karnataka : 1500 - 2000 mm Goa and Gujarat : 3000 - 4000 mm
Temperature	Summer : 23° C to 35° C Winter : 16° C to 25° C
Languages spoken	Gujarati, Marathi, Konkani, English and Hindi
Communities Settled	Hindu, Muslim, Christians, Jains and others
Agricultural Cultivation	Fruit crops - Mango, Cashew, Sapota, Kokum, Karonda, Jamun and Jackfruit, Plantation crops - Coconut, Arecanut and Spices, Field crops - Rice
Districts	Maharashtra State : Mumbai, Thane, Raigad, Ratnagiri, Sindhudurg, North Karnataka State: Uttar Kannada, Udupi and Dakshina Kannada; Gujarat: Balsar, Vadodara and Bhavnagar, and Goa: Pernem and Madgaon.
District Boundaries	North : Rajasthan State; West : Arabian Sea, South : Southern Karnataka State, East : Sahyadri Mountain range (Western Ghat)

Origins of Alphonso Mango

The name '*Alphonso*' can be traced almost 400 (four) hundred years back to a Portuguese noble man, *Afonso De Albuquerque*. He introduced this exquisite and expensive variety of mango by brining them on his journeys to Goa. The locals called it '*Aphoos*' in Konkani while it was pronounced as '*Hapoos*' in Maharashtra. Thereafter, it spread to the coastal track of Maharashtra particularly to Konkan region.

Alphonso - As a Variety

Alphonso, the most delicious variety of mango, is known for its excellent texture, taste, aroma, early bearing and keeping quality.

The botanical name of the Alphonso Mango is *Mangifera indica* L.

This delicious and juicy mango with pleasant flavour and fragrance has long been one of the world's most popular fruits. India grows the finest mangoes in the world and although more than a thousand varieties exist, the Alphonso is considered the best. The luscious fruit is loved for its wonderful colour, wholesome fragrance and irresistible taste.

Accordingly, the Alphonso Mango is nicknamed as "King of Mangoes".

Plantations of Alphonso Mango in the Konkan region is being presently cultivated on an area of about 1,64,000 hectares. In the Konkan region, more than 95 % of the area is under production of a single variety viz., Alphonso Mango.

However, this variety bears yield only alternate years. The productivity in general is very low (2.5 t/ha) due to irregular and alternative bearing habit of the tree.

Exports

This variety accounts for nearly 60 % of the mango export trade from India.

Export data for the last 5 (five) years indicated that export of Alphonso Mango from India has boosted to Rs. 63.05 Crores. This is likely to double by the year 2010 to the extent of Rs. 100 Crores of foreign exchange for India.

An additional Rs. 45 – 50 Crores of foreign exchange is also expected from the export of processed mango products.

Method of Production:

(1) **Cultivation Process**:

- Selection of site and soil: It should be nearest to seashore and well drained lateritic soil PH 6.5 to 7 is good for cultivation of Alphonso mango.
- Pit size: 1m x 1m x 1m size.
- Filling of Pits: This is done in May month., Filling with 3 to 4 pots of FYM + 2 to 2.5 kgs.; SSP 100 gms. and 5 % Carbaryl;

- Plotting and Spacing cleaning, spacing - normal 10 m x 10 m and high density 5 m x 5 m square planting system,

- Planting During start of monsoon in month of June,

- Topography Hilly areas / sloppy land and plain land too is best suited for cultivation;

- Irrigation : Irrigation with 150 to 200 litres of water per tree at the interval of 15 20 days from pea stage. Irrigation should be stopped one month prior to harvest

  Irrigation is also managed in the following manner
  For first 3 years @ 30 lit. per plant / application:

Age of Graft	During Winter Season	During Summer Season
1st Year	Weekly	3 to 4 days interval
2nd Year	Fortnightly	Weekly
3rd Year	Monthly	Fortnightly

- Fertiliser requirements Fertiliser management is done during the months of June and July right from the first year of growth of the tree by application of FYM, Urea, Super phosphate and murate of potash,

- Pruning and Trimming . Pruning is done the month of May or October by Center opening. The system of pruning involves cutting of center branch at 15 feet height from ground level and cutting of overlapping branches. While pruning, branch should not split. Thereafter, bordeaux paste is applied on cut portion of branches.

(2) **Soil :**

It is best suited in well drained lateritic soil with PH 6.5 to 7.0. It does not perform well in soils having PH beyond 7.5

(3) **Agro – Climatic Conditions** .

It is best suited to hot and humid climate which prevails in western coastline of India. This includes the following regions:

Konkan Region i.e., coastal region of Maharashtra and North Karnataka, stretching from Raigad (in Maharashtra) to Mangalore, some portions in Gujarat and the whole of Goa state.

(4) **Climate**:

- High rainfall ranging from 2000 to 4000 mm,
- Temperature range (max. 27 – 37 °C and min 13 – 23 °C),
- Relative humidity range 35 % - 99 %,
- Sunshine hours about 8 12 hrs.

(5) **Propagation**

It is highly heterozygous and cross pollinated crop. Epicotyl or Stone grafting is widely practice in Konkan region of Maharashtra.

[Epicotyl grafting - It is also known as stone grafting. In this method, the seeds of mango are sown in nursery bed and covered with 5 to 7 cms. thick layer of farm yard manure. While sowing seed, preference is given to sand bed which provides ease in uprooting of seedling required at the time of grafting. In about 15 to 20 days, seeds start germination. The germinated seedling of 7 to 10 days age, when its leaves remain coppery in colour, is used for grafting. The seedling is deheaded at a height of 10 cms. from ground level. A vertical slit of 2.5 to 4 cms. length is given on deheaded portion of rootstock. Scion shoot of 2 to 3 months age having pencil thickness is used. The leaves of scion is defoliated 10 days before grafting to facilitate sprouting. After uniting rootstock and scion, it is wrapped using polythene tape of 300 gauge. The grafted plant is then maintained in other bed or pots in nursery. This method of grafting is practiced during June-July during which the environment remains sufficiently moist.]

(6) **Required Nutrients:**

21 (twenty one) nutrients are required for the growth of plants which include mainly N (Nitrogen), P (Phosphorus), K (Potassium), Ca (Calcium), S (Sulphur), Mg (Magnesium). These are the major nutrients. Fruits remove these nutrients in various quantities.

Studies showed that 1 (one) ton Alphonso remove nutrients as detail below:

Sl. No.	Nutrient	Quantity (kg.)
1.	N	6.270
2.	P	0.660
3.	K	9.880
4.	Ca	2.620
5.	Mg	2.000
6.	S	1.710
7.	Fe	0.270
8.	Mn	0.290
9.	Zn	0.021
10.	Cu	0.022

(7) **Management of Pests / Diseases:**

Enclosed in the Annexure of various diseases and pests that attack different parts of the Alphonso Mango tree and its schedule of management.

(8) **Bearing Age:**

The tree starts bearing in its fifth year of age. The fruit starts maturing in 110 to 120 days. The season is March to May and harvesting is over before the onset of Monsoon.

(9) **Yield:**

150 to 250 fruits per tree

(10) **Harvesting:**

* Stage of Maturity:
The fruit is harvested when it at a maturity stage of 85 %. At this stage, following changes occur:
  - the colour of the fruit changes from dark green to yellowish green;
  - it bulges at the shoulder leading to dipration at peduncle,
  - the beak of the fruit changes from pointed to blunt;
  - Oily glands develop of on the fruit surface

* Method of harvesting:
  - The fruit is harvested by a mango harvester;
  - At this stage, the fruit has a pedicel length measuring 4 – 5 cms ,
  - The harvested fruits are to be kept under shade,
  - Minimum handling of the harvested fruit should be followed.

* Post Harvest Management

A. *Sorting*:

- It is done according to weight;
- Spotted fruits are first removed,
- The fruits are then dipped in 2.5 % salt solution. The good quality fruits normally float and these are taken out for export purpose. The balance fruits are affected with 'spongy tissue';
- The harvested fruits are dipped in 0.1% carbendazim solution for 5 (five) minutes to avoid spoilage.

B. *Grading and Standards*:

The fruits are graded as per their weight in the following manner:
- Grade A – 250 to 300 gms
- Grade B – 225 to 250 gms
- Grade C – 200 to 225 gms
- Grade D – 175 to 200 gms

(11) **Packaging:**

* Waxing.

Alphonso fruit when dipped in 1.7 to 2.7 % aqueous emulsion of a fungicidal wax containing O-phenyl phenol lessened the physiological loss in weight and increased the storage life of the fruits reported that fresh Alphonso fruits treated with 6 % wax emulsion recorded the lowest percentage of spoilage as compared to control fungicide (thiabendazole) alone. Another fruit coating, marked as 'Vapor Gard', is an antitranspirant. Its effect on the post harvest life of Harumanis mangoe was studied by. The effect of coating the fruit in a 1.3 % solution was to reduce water loss, retard

firmness decrease, reduce the loss of ascorbic acid content, inhibit the malic enzyme activity and increase polygalacturonase activity compared to untreated fruits

* Pre-cooling

Methods adopted to pre-cool the fruits

The primary ones are:

(i) air cooling - This is done by placing the fruits into a cool room
(ii) hydro cooling - This is done by either dipping the fruits in cold water or effective spraying of cool water,
(iii) vacuum cooling - . This is done by reducing atmospheric pressure which reduces the pressure of water vapour in the chamber.

Pre-cooling of mango to 12 - 15° C with 500 ppm Bavistin, increases the shelf life. In case of Alphonso variety, it also reduces the incidence of spongy tissue. Significant reduction in respiration rate, slow rate of ripening and good surface colour of fruit in mango were achieved by hydro cooling, coupled with Bavistin.

* Packing:

Packing of Alphonso mangoes is done in wooden boxes for the distant market and corrogated boxes are used for export purpose.

* Domestic Transport / Shipping for Exports:

- *Domestic Transport* : Transport in un-refrigerated carriers is done during evening and night only to avoid the incidence of spongy tissue as temperature is low during night hrs.

- *Sea exports* . It is transported under refrigeration conditions, wherein the respective vessel is having entire refrigerated decks filled with pallets. In the case of sea containers, each is linked to central ducted refrigerated container vessels. Alternatively, integral containers with their own individual cooling systems or in integral controlled atmosphere (CA) containers may be used

Uniqueness

The distinctiveness or uniqueness of *Alphonso Mango* lies in the following

(1) The tree has early bearing,
(2) The size of the fruit is uniform and large - medium sized and weighing about 250 gms.,
(3) It has an attractive yellow colour with slight red blush towards stalk end;
(4) The shoulder of the fruit is prominent with round back of fruit without beak;
(5) The pulp is firm, fibreless with excellent orange colour,
(6) It has good sugar acid blend and a pleasing flavour,

(7) It has a longer shelf life i e , its keeping quality is good for about 21 (twenty one) days, and

(8) It is best suitable for fruit processing activities i e , for making into pulp, powder, leather and 'khawa'

Dr BALASAHEB SAWANT KONKAN KRISHI VIDYAPEET (BSKKV)

BSKKV is having its headquarters situated in Dapoli, Ratnagiri district in Maharashtra It was earlier referred to as 'Konkan Krishi Vidyapeeth' (as per Konkan Krishi Vidyapeeth Act, 1972), which was established as an independent Agriculture University on 18th May, 1972 for the agricultural development of Konkan region by the Maharashtra Govt., comprising the area of 5 (five) districts of Konkan region viz., Mumbai, Thane, Raigad, Ratnagiri and Sindhudurg.

The said Act was further amended as "Maharashtra Agriculture University, Act 1983" as a common Act for 4 (four) Agriculture University in Maharashtra Thereafter, 'Konkan Krishi Vidyapeeth' has been re-named as "Dr Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli" w e f 12 02 2001

BSKKV is presently having jurisdiction of 5 (five) districts of Maharashtra viz., Brihan-Mumbai, Thane, Raigad, Ratnagiri and Sindhudurg districts of Maharashtra state The major objective of the University is agricultural education, research and extension education in an integrated way to attain the sustainable agricultural development of Konkan region

Regional Fruit Research Station, Vengrula

Regional Fruit Research Station at Vengrula in the Sindhudurg District of Maharashtra, was established in 1957. This Research Station has done lot of research on Alphonso Mango It has also standardised its cultivation practises like pit size, spacing, planting system, grafting technology, irrigation and fertilisers requirement, training and pruning, plant protection measures, etc

(ZAHEDA MULLA)
Advocate Wmlexis

61, Annex – I Floor
6 Main , 15 Cross
Malleswaram
Bangalore – 560 003

Telefax: 080 2356 8084
Email: mail@wmlexis.co.in