Product characteristics for fresh mangoes

Mangoes are widely used in the world and called the King of the fruits and are famous among people of all ages because of their natural and unique taste. Mangoes are also very delicate and vulnerable. When exporting to the EU, it is crucial not to harvest them to early, to consider its colour (ripeness) and to pack them properly, especially air freighted mangoes. These issues are covered in this module.

This module gives an overview of the:
1. Varieties in the EU market
2. Which mango to export from West Africa?
3. Sizes, colour, shapes and ripeness
4. Packaging
5. Applications and uses

The history of mangoes has started with its cultivation in South Asia thousand years ago. Since the 10th century, cultivation began in East Africa and later in Brazil, Caribbean and Mexico. Now the mango is cultivated in most frost-free tropical and warmer subtropical climates. Around half of the world’s mangoes are cultivated in India, China, other Asian countries and Latin American countries.

The taste of mangoes is generally sweet. Although the taste and texture of the flesh varies across cultivars. Some varieties have a soft, pulpy texture similar to an overripe plum, whereas other varieties are firm or have a fibrous texture.

1. Varieties in the EU market

From the thousand of varieties that exist, there are just a dozen of varieties being derived from the Mangifera Indica, which are suitable for exports to the EU market. Mostly it concerns grafted mangoes that were bred in Florida at the beginning of the 20th century. Exports of non-grafted mangoes are small and its use is mainly in exotic dishes.

MAIN VARIETY SOLD IN EUROPE

- **Tommy Atkins.** Medium size mango (weight 450 – 710 g) with a thick orange/yellow skin with a red blossom. This variety is firm enough for the logistic handling and the fruit is resistant to certain diseases. The main production countries are in Latin America with Brazil being the largest EU supplier. Its orange flesh is slightly fibrous and has a medium (subtle-sweet) flavour. Tommy Atkins is still popular in the UK, Northern and Eastern EU countries and Russia. They cannot be artificially ripened, and, therefore, cannot be sold as ready-to-eat mangoes. This partly causes their decreasing popularity.
Product characteristics for fresh mangoes

Maturity. The main variety sold in the EU, Tommy Atkins is over its economic maturity stage and demand is decreasing. While the tastier and less fibrous Kent variety is still in its growth stage. These findings are from a field study on the prospects for mango’s from Brazil among EU importers, wholesalers and supermarkets (2012, José Lincoln Pinheiro Araujo, José Luis Lopez Garcia) – which can be downloaded from here.

VARIETIES FROM WEST AFRICA

- **Kent.** Medium - larger size mango (weight 600 – 750 g) with differences in sizes depending on origin. Kent has become a favourite variety on the international market and is regarded a reference for mangoes sold in the EU. It has a thick and strong skin with differences in colours ranging from green/yellow with a red/grey blossom - to deep green - or rose/purple. Its kernel is 9% of the total weight of the fruit. Kent is suitable for long-distance transportation, can be artificially ripened and therefore can be sold as ready-to-eat mangoes. Peru, Brazil, Ecuador, Israel and West Africa are the main suppliers. The taste of its yellow/orange flesh is strong. The fruit has no fibres and its flesh ripens slowly. Kent is a full season mango and is vulnerable for fungal attacks.

- **Keitt.** Large size mango (weight 510 g – 2 kg). The skin is thick and strong and has pastel colours ranging from green to orange. A deep red blossom comes up early leading to confusing when evaluating its ripeness. It is a delayed season mango that comes on the market after the Kent as a substitute. The taste of its orange to deep yellow flesh is rich and fruity with fine fibres that can be eaten easily. Its kernel is 7-8% of the total weight of the fruit. Keitt can be artificially ripened as well and comes from the same countries that export the Kent variety.

- **Amélie.** The mango trade growth in the EU was initiated by this variety, mainly produced in West Africa. Now Amélie has gradually been replaced by the other varieties. Its size is variable and its colour ranges from the green to yellow/orange. The fruit is fragile but the taste is good.

- **Valencia.** Medium - larger size mango (weight 600 – 900 g) with an elongated shape is mainly grown in West Africa. The fruit ripens fast and is mostly transported by air freight. The skin is orange/yellow with a red/purple blossom, and it peels off easy as it is thin. The flesh of Valencia is deep yellow, almost fibreless and has a rich taste.

VARIETY FROM SPAIN

- **Osteen.** Medium - larger size mango (weight 600 – 750 g) with as thick violet/purple colour. Its flesh is yellow, firm, fibreless and tasty. Its kernel is long and flat. Since 2000, Osteen is cultivated and exported by Spain and Morocco.

Source: CBI Market Information Database • URL: www.cbi.eu • Contact: marketintel@cbi.eu • www.cbi.eu disclaimer
OTHER VARIETIES

- **Smith, Springfield, Irwin.** These varieties originate in Florida and have an elongated shape with red/gloomy colours. The supply of Smith, Springfield or Irwin is limited to the periods when the most popular other varieties are short in the EU market. They have a relative short shelf life.

- **Nam Dock Mai, Sindhri, Chaunsa** come from Asia and have an elongated shape. Their skins are yellow and thin; its flesh is tasty. Exporting countries are mainly India, Pakistan and Thailand to the UK market. Limited volumes are sold in other EU markets mainly by the ethnic/multi-cultural population.

- **Aya, Maya, Kasturi.** These fruits are small and have a yellow or orange skin. Only Israel is exporting these varieties where they are also cultivated.

- **Haden** is a medium sized mango (weight 510 – 680 g) with a round shape. The skin is orange/red and fragile. Haden ripens fast; its flesh is almost fibreless and has a pleasant fresh taste. Haden is regarded a high quality mango and is higher in price. Because of its fragility and fast ripening, it is often transported by air. It has a short shelf-life.

- **Some others varieties** are incidentally sold at the EU market: Ataulfo, Cavallini which originate in Latin America. The exported volumes are marginal.

2. **Exporting mangoes**

Of all mangoes produced in the world only 3.6% is exported, although in West African countries this ratio is higher. Still the decision for smallholders and exporters to produce mangoes for export is difficult to take. Even if people love their delicious taste, mangoes are a delicate stone fruit, easily perishable and mango production is still restrained by the presence of fruit flies.

The choice to export

In general, the choice in exporting a mango variety depends on:

- The availability of this cultivar in an exporting/producing country, farming conditions (weather etc), the production areas and the main markets e.g.
  - **Carton mangoes** for the domestic market in Africa.
  - **Crate mangoes** for the processors (juice, jam etc..)
  - **Export mangoes** (20 – 30% of all mangoes in Burkina Faso).

- Developments, trends in demand and the competition in export markets.

- Cost of transportation by air or by sea.

Which variety?

For the West African countries, Kent and Keitt are main exported varieties, as well as Amélie from time to time. Because of the growing popularity of ready-to-eat mangoes, Kent is the variety most sought after by EU markets, regardless its transportation method.

Given the seasonality of production of this variety and its good adaptation to different soils in the tropics, Kent mangoes are exported from several countries, including West African (Côte D’Ivoire, Senegal, Mali, Burkina Faso, Guinee, Togo). For sea freight, the Kent and Keitt varieties are preferred. Both varieties are exported from Senegal.

Being a delayed season mango, Keitt is very interesting for exporters as this variety still can generate sales through exports - even when the Kent campaign is over.
Amélie is produced early, allowing West African exporters to start their mango campaign sooner. Besides, Amélie is still available when other varieties from West Africa are running out of stock. To extend the period of export, Amélie could be exported prior to the Kent season, although the green colour might be a constraint. Amélie supplies are being limited by air freight from Mali and Burkina Faso and by sea freight from Côte d’Ivoire when the Kent mango production is delayed and when the market is under-stocked (April). Amélie serves well as a back-up supply by ‘default’ during occasional shortages.

To meet the demand for coloured air freighted mangoes during the early season (April/May), the Valencia with its orange colour and good taste could be exported. For exporters from Mali and Burkina Faso, there is an opportunity to back-up shortages of Kent mangoes by exporting air freighted Valencia (pre-season) and Amélie varieties depending on market demand.

The seasonal calendar for each variety and supplying country can be found at in section 2 of the Module ‘Product competitiveness’.

3. Sizes, colour, shape and ripeness

Sizes
EU importers and consumers prefer mangoes of medium sizes (between 450 and 650 g). Larger sized mangoes have a slower turnaround and often have to be sold at low prices being overripe. On the other hand, consumer in the main EU countries (UK, France, Germany etc.) show a growing interest in larger sizes. In smaller EU markets – especially in Eastern EU countries, mangoes of smaller sizes are preferred. As for the varieties from West Africa, Kent and Amélie fit well into the medium size range, while Keitt and Valencia are larger.

Colour
The colour of the mango plays a crucial role in the consumers’ buying decision. People like red, orange and yellow reflecting warmth and ripeness. Warm and bright colours are preferred to green being often associated with unripe especially by the mainstream consumers who are less familiar with mangoes. This can be illustrated by the low popularity of Amélie in the beginning of its season.

In the air freight segment, colour is even more important. Mangoes must be bright and warm (red, orange, yellow according to the variety) in colour or they should reflect this by at least 40% of its surface. This colouring must be clear in all fruits in the same carton.

In the sea freight segment, the colour requirements are less strict and each mango should at least have one coloured spot/zone. Actually, this requirement is not always met, with fruits often shipped while still green. Still, if your mangoes do have coloured spots/zones there is a good opportunity to sell them at a higher price.

Shape
This shape of mango does not play a significant role and differs per variety. In fact, no perfect or standardised shape exists for each variety.

Ripeness
The development of ripeness for each mango is different and rather unpredictable. Checks in ripeness are done at random. It is wise to put aside those mango that have not reached their physiological maturity. There are different ways to assess the physiologic development:
• The number of days between the first step of fruit ripening and the harvest.
Product characteristics for fresh mangoes

- The shape of the fruit such as the inflated cheek, widening of the peduncle area etc..
- The destruction technique by checking the colour zone level around the kernel), grade of °Brix. These aspects are seriously checked throughout the value chain (farmers, harvesters and exporters) according to their experience and know-how.
- Traditional parameters to assess ripeness are sometimes used e.g., the level of sweetness of the mango should be equivalent to six sugar cubes.

**Avoid also delivering mangoes of different maturities within one shipment.** In addition, exports of immature mangoes that are picked too early must be avoided, for instance, far before the beginning of the monsoon or before their climacteric peak.

Even if the selling conditions are met with EU buyers, and you still deliver e.g. immature mangoes or mangoes of different maturities, you run the risk to damage the image of your company - or even of your country. This might have happened a few times by unprofessional companies in your country, but the negative rumours among buyers go quickly. It will takes a long time & investment to re-establish your quality image.

This phenomenon often happens at the beginning of the campaign and could be the reason of limited sales during the rest of the season.

The ripeness level also varies according to the transportation:

**Air freighted mangoes** must be ‘décollés’ or ‘tournants’ which means that the mangoes have reached a certain stage of maturity on the tree and are likely to withstand the period of transport and marketing before being consumed in optimal conditions of flavour, texture and sugar content.

**Sea freighted mangoes.** In terms of sea shipment, the ripeness level is different. The harvest should be done when the fruits have their physiological ripeness level (climacteric peak).

The timing of harvesting must ensure the preservation of the mangoes quality and their ripening development during transports to destination countries. The harvesting period can be adapted to the 10-12 days shipping time from Western Africa to the EU. For South American countries, this is up to 3 weeks.

### 4. Packaging

In recent years, the packaging of mangoes have become more standardized. There are two main types of packing according to the method of transportation used. In case of air freight, some packaging differences may occur from one country to another.

**Sea freighted mangoes** are packed in stackable trays that can be ‘blocked’. The size of a tray is 30 x 40 x 10/12 cm with the fruits lying or posed vertically with the peduncle side up or down depending on mango size and the cardboard dimensions. The package of the mangoes on the photo above (right) is basic. It is important to always show the coloured side of the fruit. To add more value to the mangoes, you could wrap each mango in soft paper as is usually done in air freighted mangoes.

Usually, a tray contains 4 kg (net) of mangoes with 6 - 10 fruits per tray depending on the variety. Several examples of ‘basic’ and ‘correct’ package of several varieties are shown in Annex 1.

The trays are stacked on pallets of 80 x 120 or 100 x 120 cm that are common in transportation.
Air freighted mangoes packing is more variable. Most of the fruits are shipped in boxes with a cardboard flap or cover, or in telescopic boxes (see photos) with refold. Each box contains 6 kg net of mangoes. Recently telescopic boxes containing 7 – 8 kg (net) of fruit are used as well – see Annex 1.

The fruits always come with a small sticker and are wrapped well with paper or polystyrene for a maximum protection against damaging. The boxes look more sophisticated with sometimes the bottom covered with a soft layer/foam carpet. If necessary, the fruits are wedged in the box with paper pads.

The size of a box is the same as sea freight (30 x 40 x 10/12 cm). Also, the cardboard boxes are provided with blocking system in order to stack them firmly in the pallets.

In the boxes ‘by air’ could be mentioned or a proper illustration to indicate this. Other information/slogans can be printed on the box that are related to the ripeness of the mangoes or excellent quality etc etc...

More information about packaging and labelling can be found in the Module ‘Buyer requirements for fresh mangoes’.

Storage-life of all varieties
At ambient air temperature, mangoes harvested at correct stage of maturity can be stored for about 8-12 days. Under cold conditions at 8-12⁰, storage life can be further extended up to 25 days without losing fruit quality. Mangoes are not appropriate for freezing or to conserve in temperatures below 8⁰.
ANNEX 1 - EXAMPLES OF PACKAGED MANGOES

**Sea freighted mangoes**

**SENEGAL:** Packaging of *Kent* – 9 pcs with sticker (left) and 6 pcs box with cardboard flap

**MALI:** Packaging of *Kent* – 9 pcs box with cardboard flap (left) and *Kent* 8 pcs from *COTE D’IVOIRE* and sticker

**PERU:** Packaging of *Kent* – 8 pcs basic (left) and *Kent* 10 pcs from *BRAZIL* with sticker and polystyrene
Air freighted mangoes from West Africa

**SENEGAL**: Packaging of Kent – 9 pcs basic (left) and 10 pcs correct (right) with polystyrene and sticker

**MALI**: Packaging of Amélie – 12 pcs basic/not attractive (left) and Kent 10 pcs (right) with paper and sticker

**BURKINA FASO**: Packaging of Kent – 7 pcs basic/not attractive (left) and Amélie 12 pcs with polystyrene
Air freighted mangoes from other countries

**MEXICO:** Packaging of Kent – 12 pcs in telescopic box (left) and 12 pcs with compartments (right) which are both correct with polystyrene/paper and sticker (both 6 – 7 kg)

**MEXICO:** Packaging of Kent – 14 pcs in telescopic box (left) and 7 pcs Nam Dok Mai from THAILAND well-packed in polystyrene

**ISRAEL:** Packaging of Maya – 24 pcs in 40x60 tray (6 kg)

**PAKISTAN:** Packaging of Sindhri – 10 pcs