

# Pack #109, Item 10

# Type: Backgrounder

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**Backgrounder: Reducing post-harvest losses in mango**

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***Introduction***

***Why is this subject important to listeners?***

Because farmers and processors handling fresh mangoes after harvesting should know:

* When a mango is ready for harvesting.
* The right times of day to harvest mangoes to minimize the latex flow that stains fruits, causing rejection in high-end and export markets.
* Best practices for harvesting and placing mangoes in collecting containers without injuring the fruits.
* How to minimize damage of harvested mangoes in the field and during transport.
* How to conduct postharvest handling of harvested mangoes to satisfy market requirements.
* How to treat harvested mangoes to prevent postharvest diseases.
* The right methods and materials for storing and packing mangoes.

***What are some key facts?***

* Mangoes mature 4-5 months after flowering. Ripe mangoes have a pale green, yellow, or red skin colour, depending on the variety.
* Washing hands before harvesting mangoes prevents cross contamination.
* When harvesting mangoes, maintain a 2-3 centimetre stem on the fruit to ensure that oozing latex does not stain the fruit.
* Pour harvested mangoes onto a clean, soft surface like a tarpaulin. Do not place on the ground to avoid infection, contamination, and bruising.
* Line baskets for harvesting mangoes with newspaper, banana leaves, or soft padding to protect mango peels from scarring, which can hasten decay.
* Treating mangoes with hot water prevents postharvest diseases like stem end rot and anthracnose.
* Separate wounded mangoes from healthy fruit because wounded mangoes emit a gas that hastens ripening.
* Do not expose harvested mangoes to direct sunlight.
* Latex sap stains on mangoes indicate that they were harvested prematurely or were mishandled after harvest.

***What are the big challenges with reducing postharvest loss in mango?***

* Lack of knowledge of the right time to harvest mangoes.
* Failure to detect diseases in immature mangoes—which then appear during ripening.
* Lack of skills or use of best practices by harvesters.
* Poor hygiene and handling of mangoes after harvesting.
* Transporting mangoes poorly and lack of good handling and storage facilities to protect mangoes from spoiling.

***Gender aspects of reducing postharvest loss in mango***

* In Kenya, women collect and sell mangoes by the roadside and in local markets.
* Research found that, in parts of eastern Kenya, men are in charge of decision-making in mango production and marketing in about three-quarters of households.
* In Tanzania, men traditionally own mango trees while women are responsible for selling the fruits.
* In Tanzania, men dominate the large-scale trading of mangoes. But both genders are present among small-scale mango traders.
* In eastern Kenya, women dominate mango production and sales, but men dominate the mango farming groups in their communities.

For further information, please see documents 2, 3, and 4.

***Key information about reducing post-harvest loss in mango***

**Pre-harvest**

The quality of harvested mangoes is mainly determined by the pre-harvest practices a farmer uses as the fruit gradually matures. These include the following:

* Pruning allows maturing mangoes to better access sunlight, enhancing the colour of the fruit. If pruning is done soon after harvesting, it synchronizes shoot growth, which causes flowering to be uniform.
* You can protect a maturing mango fruit from fruit flies, diseases, and injuries by enclosing the fruit entirely with a brown paper bag or glossy paper bag. The recommended time to bag is about 40 days after the fruit sets (appears).
* Thinning removes small-sized fruits so that the remaining mangoes attain the standard market size. It also stops smaller fruits from competing for sunlight and nutrients with market-sized mango fruits. Note that this is more important for export markets than for fresh local market sales.
* Irrigate infrequently when mango trees are flowering to prevent vegetative growth that interferes with flowering.

For further information, please see document 9.

**Harvesting**

Harvest mangoes 4-5 months after flowering. Ripe mangoes have a light creamy yellow pulp, and the skins have a white powdery substance on their surface. The skins of some varieties change from dark to light green when ripe.

Picking and handling ripe mangoes requires caution to avoid spoilage.

* Before harvesting, mango farmers should wash their hands to avoid cross contaminating the fruits.
* To harvest, use a sharp blade to cut the mango from the branch, then place the fruits in a picking pole with a net at the end.
* When harvesting mangoes, farmer can stand on lightweight movable racks.
* The best time to harvest mangoes is from 9a.m. to 3p.m. to minimize the flow of latex sap from the small stem left on the fruit.
* Flowing latex burns and stains the mango skin, making fruits visually unappealing to buyers and exporters, though the mango is not damaged on the inside.
* To harvest, cut the fruit from the branch but retain 2-3 centimetres of the stem to drain the latex, and to ensure it doesn’t touch the skin of the mango.
* Place harvested mangoes on banana leaves, dry grass, or racks for up to half an hour after picking to allow the latex sap to drain off the fruit.
* After the latex sap has completely drained, trim the remaining stem off the fruits.
* After trimming the stem, place the fruit upside down on mesh for around 30 minutes to allow any remaining latex to flow out completely.
* To remove latex sap on the peel, dip the mangoes for 10 minutes in water heated to 52-55 degrees centigrade to clean them, and then cool to room temperature.
* Store mangoes in rigid containers like crates that prevent mangoes from being crushed or from pressing against each other and getting bruised due to compression.
* Add soft padding to the base of the crates, for example, newspaper, before packing the mangoes.

For further information, please see document 3.

**Disease control**

* Anthracnose is a fungal disease that affects mangoes during flowering and early fruit development, causing significant postharvest losses. In ripe mangoes, it causes decay.
* Hot water treatment reduces anthracnose and stem end rot infections. Dip freshly harvested mangoes for approximately 10 minutes in water heated to 52-55 degrees centigrade.

For further information, please see document 1.

**Transportation**

* To avoid contaminating mangoes, ensure that whatever kind of vehicle is used to transport the mangoes is clean and hygienic.
* Handle containers of mangoes gently during transport, and do not drop or press containers against each other if you use soft containers such as baskets or cartons.
* When stacking mango containers, ensure that the upper part of the crate is spacious enough for air to circulate between the crates.
* Cover the transport vehicle with a light-coloured material to reflect heat away from the mangoes.
* The canvas covering the transport vehicle should leave space for air to circulate in the packed mango containers.
* Mangoes for export can be coated with carnauba wax to enhance their appearance and shield them from water loss during packing.

For further information, please see documents 3 and 5.

**Drying**

Drying is a form of preservation and processing that removes water from mangoes and stops the growth of microorganisms like moulds. Drying reduces the weight and bulkiness of mangoes, thereby reducing transport and storage costs and postharvest losses.

* Drying is the most basic form of processing for mangoes.
* Sun drying is the cheapest method, but the processor has little control over drying conditions, and the mangoes can easily be contaminated.
* Solar drying of mangoes involves using energy tapped from the sun to power a drying machine that can be regulated and the fruits protected from contamination.
* In drum drying, the pulp is dehydrated by passing it through drums containing heated air. Drum drying mango pulp produces mango powder.
* Hot air drying of mangoes involves passing warm air across mango slices.
* To efficiently dry mangoes, slice them into 2-3 mm pieces.
* Well-dried mango slices should not stick to each other.
* After drying the mangoes, wait for 30-60 minutes before packing to prevent moisture build-up in packing containers.

For further information, please see document 8.

**Processing**

Mangoes can be processed in the household into products such as juices, jams, pickles, mango powder, nectars, yoghurts, chutney, and *murabba*, a sweet fruit preserve.

* You can make mango pickle by cutting up a raw mango and mixing it with salt and turmeric powder and sun drying the mixture, then mixing it with edible oil and spices.
* Make mango chutney by cutting up a mango and cooking it with salt and vinegar.
* You can make mango *murabba* by soaking a raw mango in lemon water, washing it, cooking it with sugar at 60 degrees centigrade, and then cooling the mixture.

For further information, please see document 2.

**Storage**

Mangoes should be stored in a hygienic environment to prevent contamination and spoilage.

* Mangoes stored at 12 degrees centigrade and a relative humidity of 85-90 percent can last 1-2 weeks.
* Clean mango storage crates well with soap before use.
* Clean rooms where mangoes will be stored to avoid pest and rodent infestation.
* Do not store mangoes in a room with chemicals to avoid contamination.
* Unspoiled mangoes can spoil if mixed with spoiled mangoes.
* Store mangoes in a well-ventilated room.
* Sort and store mangoes according to their size.
* Store ripe mangoes in 10 degrees centigrade and green mangoes at 12.2 degrees centigrade.

For further information, please see document 3.

**Varieties**

* There are local and improved mango varieties available, and they offer different market opportunities to the farmers who grow them. Local varieties that grow in Kenya are Ngowe, Boribo, Batawi, Sabre, and Dodo. Improved varieties are Tommy Atkins, Kent, Van Dyke, Apple, Sabine, Sensation, Pafin, Maya, Kenston, Gesine, and Haden.
* In Kenya, a typical mango season lasts from November to March of the following year. Ngowe and Apple varieties are unavailable only in April.
* The Apple variety is popular in local and export markets for direct consumption due to its sweetness, aroma, and yellow colour when ripe.
* Processors prefer the Ngowe variety because of its large size and the high quality and quantity of pulp and the fact that it has a better conversion rate.
* In Kenya, Ngowe is the only variety available on farms and markets from May to July, when all other varieties are offseason.
* The Kent variety has a shelf life of 9-10 days, while the Ngowe and Apple varieties have shelf lives of 6-7 days.
* The Kent variety matures late and does not easily fall off the tree even when mature.
* Exporters prefer the apple variety as it has a bigger export market.

For further information, please see document 7.

***Where can I find other resources on this topic?***

*Documents*

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4. Jurgen Griesbach, 2003. *Mango Growing in Kenya.* <http://www.worldagroforestry.org/downloads/Publications/PDFS/97_Mango_growing_in_kenya.pdf> (2.74 MB)
5. Adel Kamer et al, undated. *Post harvest handling of mango.* National Mango Board (USA). <http://ucce.ucdavis.edu/files/datastore/234-1344.pdf> (727KB)
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7. AP Mnkeni, P Soundy and MO Brutsch, 2008. *Solar drying of fruit and vegetables.* [http://www.daff.gov.za/docs/Infopaks/Solardrying.pdf](http://www.daff.gov.za/docs/Infopaks/Solardrying.pdf%20)  (1.52 MB)
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9. M. Poffley and G. Owens. 2006. *Mango pruning in the Top End*. <https://dpir.nt.gov.au/__data/assets/pdf_file/0018/232920/598.pdf> (79.9 KB)
10. World Agroforestry Centre, undated. *Mango Planting Manual.*<https://www.worldagroforestry.org/sites/default/files/users/admin/mango-planting-manual.pdf> (6.16MB)

## Acknowledgements

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