



Quick Harvest and Postharvest Tips for Better Quality and Longer Postharvest Life

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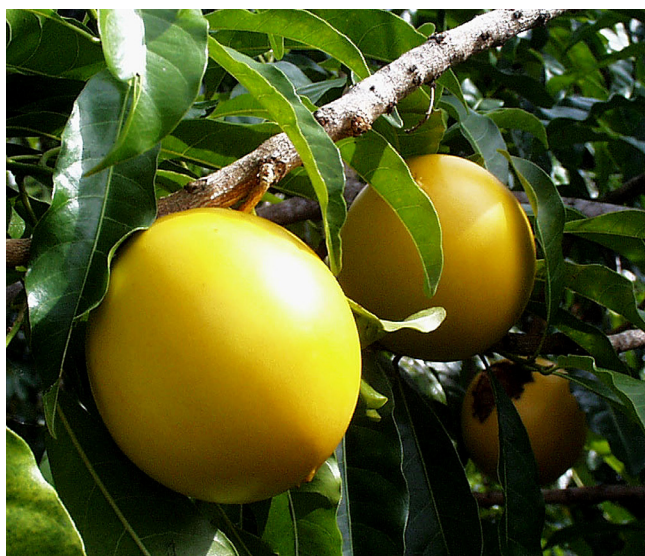
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Abiu

Pouteria caimito

Abiu fruit are harvested when they become bright yellow, and the fruit continue to ripen after harvest. Full ripening occurs in 1 to 5 days after harvest, when the fruit pulp no longer has a sticky latex. The translucent flesh becomes jelly-like, with a pleasant, somewhat caramel-flavored pulp. The tough, leathery skin can be easily bruised, but if handled carefully the fruit has a good postharvest life. The flesh browns quickly after slicing, and the fruit is usually prepared just before eating.



Abiu, *Pouteria caimito*

Acerola

Malpighia emarginata

Acerola is extremely fragile and must be harvested gently. Generally, acerola should be picked when almost fully red. Fruit are often field-packed into clamshell plastic containers, no more than two layers deep. A third layer often puts too much weight on the bottom fruit. The clamshell should be placed in a pre-chilled cooler in the field to reduce the temperature of the fruit as quickly as possible. With rapid cooling, the postharvest life can be increased from about 4 to 10 days. Fruit with a longer postharvest life are more desirable to grocery stores and chefs and enhance your reputation for high-quality fruit.

Atemoya / Cherimoya

Annona squamosa x *A. cherimola* / *Annona cherimola*

It is notoriously difficult to determine the best time to harvest atemoya and its relatives. Generally the skin starts to take on a dull hue and become smoother. But if the trees are producing fruit of irregular sizes and shapes due to inadequate pollination, you may not be able to use the skin becoming smoother as an indicator of ripeness. Judging the subtle changes in the fruit that indicate optimal harvest time takes practice, but the final taste of the fruit makes it well worth the effort. When packaging the fruit, it is preferable to use single-layer trays. Ripening fruit becomes very soft and is crushed if packed in multilayered boxes. Some packers use foam or newspaper in between each fruit, while others pack each fruit with a foam sleeve.

Avocado

Persea americana

Knowing when to harvest avocados has plagued Hawai'i growers for more than a century. The numerous named varieties with wide genetic backgrounds grown in Hawai'i, coupled with the many seedling trees descended from unknown parents, has meant different criteria have been used. In fact, no single criterion to judge harvest stage is available. Experienced growers who know their trees rely on a number of ways to tell when it's harvest time. For example, with a variety like 'Sharwil', a dulling of the skin and darkening of the collar between the fruit and stem is one indicator. Occurrence of fruit drop of larger fruit, as long as it's not due to stress associated with bad weather, is also taken into consideration. The skin color of 'Kahaluu' lightens very slightly, and the skin will become dull at maturity. Fruit size is not a good indicator, as avocados come in many shapes and sizes. When to harvest is also complicated by year-to-year variation, as sizes and ripening times change due to rain and temperature patterns. Some varieties with higher oil content like 'Kahaluu', 'Sharwil', 'Malama', 'Linda', and 'Hass' tend to be more forgiving than other varieties. Varieties that turn black when mature, like 'Malama', need to be fully



Avocado, *Persea americana*

black before being harvested. If picked early, the fruit will continue to turn black, but flavor and sugar will never fully develop.

Depending on the needs of a customer, some growers will harvest a few fruit to see how long they take to ripen. If longer than a week, it's generally too early to harvest for full flavor. A grower needs to observe the fruit on the trees to determine when a particular variety is mature and ready for picking. Avocados should be packed no more than 3 layers deep, with similar-sized fruit.

Banana

Musa spp

Bananas can be harvested in a variety of ways and at different stages of development. A recent trend by resort hotels is to display whole bunches on buffet lines so that guests can pick their banana off the bunch. It is a memorable experience for many. This practice has created the need for growers to be more careful when harvesting so that the sap does not discolor fingers or whole hands. Transportation becomes an issue so the bunch does not get bruised from abrasion, impact, and compression injury. A frame on the back of the truck can be used, with bunches tied down so they do not bang into the floor or roll back and forth while driving. Secured upright boxes with newspaper or foam padding also work.

Bananas sold to stores will suffer less damage when the hands are cut and packed in the field, though draining the sap before packing is crucial. Boxes should ideally leave no room for hand movement during handling and transportation. A thin plastic film is used to prevent scuffing injury caused by the fruit rubbing against the cardboard. Again, care should be taken not to let sap discolor the fruit and to avoid all chances of mechanical and abrasion injury.

Depending on variety, ripeness indicators can differ greatly. Often the start of loss of fruit angularity is used as a starting point for determining maturity. With Brazilian dwarf, known as Hawaiian apple banana, the sharp lines (angularity) on a finger will begin to smooth and round out and the color will lighten. However, one yellow banana on a bunch or hand is not always an indicator of ripeness, as it might be prematurely yellow from insect or mechanical damage. For other varieties, color and skin texture are usually an indicator of when to harvest.

Bilimbi***Averrhoa bilimbi***

Bilimbi, like most small fruit, should not be packaged more than 2 or 3 layers deep in a box. Although they can be used at any stage of development, the fruit will soften considerably when fully ripe and are easily damaged. Generally the fruit are harvested when darker green. The fruit should be field-packed in vented clamshells that are then placed in coolers in the field, as this can extend shelf life by as much as one week. Bilimbi can also be cut and dried for long-term storage; when reconstituted in soup or water, it retains most of its distinctive flavor.

Breadfruit***Artocarpus altilis***

Mature green fruit are harvested as a starch vegetable, while some people prefer to eat the ripe, sweet fruit. Maturity is indicated by larger size, a slight change in the skin color, small drops of latex on the rind, and firm flesh texture. The skin segments are also more rounded and smoother on mature fruit. As the fruit starts to ripen, the skin changes to a yellowish green and begins to soften. Harvested green fruit produce copious latex,

especially from the cut peduncle and any injuries on the fruit. Latex needs to be allowed to drain from the fruit after harvest before washing in water to avoid latex stain. The fruit should be cooled as soon as possible after harvest. It is graded according to appearance, blemishes, maturity, and size.

Carambola (Starfruit)***Averrhoa carambola***

Carambola can be harvested when the fruit has turned mostly yellow. Wholesalers prefer about 10% to 20% green, and the fruit should not have turned from yellow to orange. If too green, the fruit will not contain much sugar. If too orange, the fruit will be soft and have little postharvest life remaining. Before packing, the fruit should be carefully inspected for mechanical injury as well as damage from insects and birds. The fruit should always be packed with the stem end down in a box in a single layer. Sometimes soft foam is put between the rows as well as in the bottom of the box. Some packers place each fruit in an individual foam sleeve for maximum protection. Carambola should be chilled as soon as possible after harvest.



Bilimbi, *Averrhoa bilimbi*



Breadfruit, *Artocarpus altilis*



Carambola (starfruit), *Averrhoa carambola*

Coconut

Cocos nucifera

For fresh consumption, the fruit is harvested at the immature stage (7 to 8 months) when the white endosperm has begun to form and is jelly-like before it gradually thickens and hardens. These young nuts are highly prized for eating the juicy, jelly-like endosperm out of the shell, for the water, and for use in cooking. The fruit skin is uniform green in color and smooth, while the coir is white. Green nuts are harvested every 20 days or so. The nuts are cut using a blade on a pole, or a climber goes to the top of the tree, cutting a bunch and either carrying them down or lowering them by rope to the ground to avoid damage. Mechanical damage will cause the white coir to turn brown and can cause nut cracking. Younger nuts have a lower rupture force than mature nuts (108 versus 537 kg). The nuts are held in a cool place until processed or sold at market.

Mature coconuts (10 to 11 months) are also used after the hardening of the white endosperm inside the nut. At this stage the skin is green with brown patches to fully brown, and the coir is brown. The nuts can be collected

from the ground if desiccation is not a problem, but more commonly all nuts on one or more bunches, 8 months or more old, are cut and collected at regular intervals throughout the year. Trained monkeys are also used in Asia. Mature nuts are comparatively light, though bulky, while green nuts are up to three times denser than mature nuts. The white endosperm inside the nut is scraped and squeezed to produce “coconut milk,” for which fresh scraped endosperm is preferred over the dehydrated product. Mature nuts enter the fresh market chain dehusked. The dry nuts should be brown; free from fiber, damage, and cracks; and of the required weight or size (14 to 18 inches, 35 to 45 cm circumference). The nuts are shipped in sacks or cardboard cartons. Postharvest stress cracks are directly related to coconut weight loss.

Dragon Fruit - Pitaya

Hylocereus spp.

Only five *Hylocereus* species are important as fruit producers. Four of these species have red or scarlet skin with bracts and white, red, or purple flesh containing small seeds. They include *Hylocereus undatus*, which is rosy-red and is called dragon fruit, and *H. costaricensis*, *H. purpusii*, and *H. monacanthus*, which are all called red pitaya. A fifth species is the yellow pitaya (*H. megalanthus*), with a yellow peel and spines, white pulp, and sweeter flavor and larger seeds than the red species. All are sold either by weight or by the piece, from \$2.00 to \$5.00 each.

Both red or yellow pitaya fruit are non-climacteric and are harvested normally when $\frac{3}{4}$ to almost fully colored. Harvested fruit should be handled carefully, as they are easily bruised. Yellow pitaya is difficult to handle during harvest due to its spines, and laborers have to wear protective gloves and use special harvest tools. The spines are removed under water using a knife blade, to avoid possible eye injury. Other growers will harvest the fruit wearing thick gloves and brush the fruit in the field before taking it to the packing area. Curved harvest shears are used to detach the mature fruit. All pitaya fruit are packaged in single-layer vented boxes.

Durian

Durio zibenthinus

To prevent natural fruit abscising, fruit may be tied to the limb or harvested at maturity before fruit drop



Dragon fruit, *Hylocereus* spp.

occurs. Maturity can be judged by appearance, a hollow sound when tapped with the finger, aril dry matter content, and days from anthesis (flowering). Fruit harvested at 85% maturity, based upon days from anthesis and rind characteristics, ripen to excellent quality in less than a week at 72°F (22°C). Fruit that is 95% mature has already commenced ripening, while 75% mature fruit may ripen but will be of inferior quality. Fruit collected from the ground after falling are more subject to disease and fracture and have a shorter postharvest life (2 to 3 days) instead of 7 to 8 days when picked.

In Thailand, the fruit is harvested with the peduncle attached. The peduncle is wrapped in a leaf or paper, which is reported to extend shelf life. Fruit are cleaned and, if to be exported, brushed to remove insects, especially scale insects. Fruit are graded on weight, shape, size, and defects. Defects include disease, insects, mechanical injury, and flesh disorders. The standards vary with variety.

Guava

Psidium guajava

In more intensively managed orchards in parts of Asia, the fruit is enclosed while young in a foam net sleeve and a plastic bag with a drain hole to reduce field injury. In these orchards the fruit is sold green, with a white crunchy flesh, and consumed like an apple.



Durian, *Durio zibenthinus*

In other countries the fruit are allowed to ripen. Ripe guava is extremely fragile and should be harvested when fully grown but half ripe. Larger varieties can be packaged in Styrofoam or other protective wrapping materials. In some cases, boxes with molded plastic inserts that keep the guava from touching each other or rolling around are used. Some small guavas are packed 2 or 3 layers deep in boxes, though this could lead to damage and bruising as the fruit ripen. After harvest the fruit should be held in a cooler or in the shade. Maintaining storage temperature is critical for guava. The fruit will last about six days if not chilled and up to 2 weeks when temperature and relative humidity are controlled. Large guava plantations in India and Australia are allowed to use a variety of chemicals, such as gibberellic acid, to retard decay and increase shelf life.

Jaboticaba

Myrciaria cauliflora

Jaboticaba has a notoriously short shelf life, less than one week, before decay occurs. Cooling the fruit immediately after harvest can mitigate this postharvest quality loss. Fruit are packed directly into clamshells in 2 or 3 layers or in small plastic bags. This packing is preferably done in the shade. The packed fruit are then pre-chilled in the field, which will add more than a week to the postharvest life of the fruit. Washing the fruit in cold water after harvest before packing will also help to extend postharvest life.

Jackfruit***Artocarpus heterophyllus***

Although edible at any stage of growth, the fruit is usually most enjoyed when ripe and sweet. It takes some practice to determine the best time to harvest, as this depends on the variety. Color change is not always an indicator. Sometimes a hollow sound will be apparent when the fruit is lightly tapped, which is a sign of approaching maturity but not always an indication of ripeness. Some growers will put 3 diagonal cuts in the stem above the fruit to drain latex, generally a few days prior to harvest. They feel this helps speed ripening. Generally using all of these indicators, including color change, softening of the skin, and sound, as well as draining the latex, will help to insure a high-quality fruit. Storage should be in a cool, well-ventilated area.

Langsat / Lanson / Duku***Lansium domesticum***

Langsat and duku require careful handling to avoid bruising and skin discoloration. Abrasion and impact injury, water loss, and chilling injury are the three major postharvest disorders. Mechanical injury (abrasion, impact, and compression) leads to skin darkening and browning. Chilling injury symptoms are pitting and brown scalding of the skin. Skin browning occurs rapidly if fruit

are stored at temperatures less than 54°F (12°C). Fruit generally are graded by size and color and are normally sold in single-layer fiberboard cartons of 4.85 lb (2.25 kg) with padding.

Lychee (litchi)***Litchi chinensis***

In Hawai'i, it is a constant battle to obtain high-quality lychee that has not been damaged by fruit flies or birds. As much as 80% of the crop can be lost in a poorly cared-for orchard. Using special bags to wrap the clusters of fruit will help to deter these and other pests. The white bags also diffuse and cut the amount of light, which will slow ripening and help the fruit to color evenly. The fruit grown in the bags usually have a much better, more even color and can be marketed for up to \$1.50 a pound more than the current season's price. Litchi should also be chilled as soon as possible after harvest, which significantly increases postharvest longevity.

Longan***Dimocarpus longan***

Although it does not suffer from as many pest problems as its cousin lychee, longan can greatly benefit from thinning the clusters and using protective fruit bags,



Jaboticaba, *Myrciaria cauliflora*



Jackfruit, *Artocarpus heterophyllus*

which will slow ripening and help increase sugar content. The fruit should also be chilled as soon as possible after harvest in order to increase postharvest life.

Mango

Mangifera indica

Generally color is an indication of approaching maturity, though every variety is different. In Hawai'i, coloration will be different in the same variety on different islands. You must know your tree to determine the best harvest time. In Japan, bags or nets are usually used to cover the individual fruit so they fully ripen on the tree and drop into the bag or net for harvesting. Mangos are packaged using a variety of methods. The two most common are placing them flat in a well-cushioned box and standing them end down with padding. Once harvested, mangos suffer postharvest losses from 7 to 70% caused by mechanical injury, lack of or too much chilling, and disease.

Mangosteen

Garcinia mangostana

The fruit from this slow-growing tree is highly sought after and considered the "Queen of Fruits." Priced from \$3 each to more than \$28 per pound, it can yield a considerable profit for those willing to wait sometimes as much as 20 years, normally 8 to 12 years, before the tree produces. The mangosteen changes from white to dark purple when ripe. Generally it can be picked

when it's mostly a light purple color. The thick, fairly durable skin allows the fruit to be boxed in layers 3 or 4 deep. The fruit should be chilled as soon as possible after harvest.

Mountain Apple / Wax Apple / Water Apple

Syzygium malaccense / *S. samarangense* / *S. aqueum*

The *Syzygium* genus of fruit are highly perishable, and the fruit need to be chilled in the field at harvest in order to gain the longest possible postharvest life. The mountain apple in Hawai'i is the most perishable. Wax apple or wax jambu and water apple are firmer fruit and will last somewhat longer than their mountain apple cousin. The fruit come in a variety of colors and shades of red, pink, green, and white. Depending on the tree, the fruit ripens and changes color from white to red or pink. Green and white fruit will show only slight color changes and some dulling. The fruit should be carefully packed only a single layer deep so as not cause bruising. Foam or other padding materials are used between the fruit. Sizes of fruit vary greatly, and each box should have similar-sized fruit.

Papaya

Carica papaya

The degree of ripeness for harvesting depends upon distance to markets. Fruit may be one-quarter to one-half ripe when harvested for local markets. Fruit to be



Langsat, *Lanslum domesticum*



Lychee, *Litchi chinensis*



Longan, *Dimocarpus longan*



Mountain apple, *Syzygium malaccense* papaya

transported long distances or exported are harvested at color break to one-quarter ripe, depending upon the cultivar's ripening characteristics and season. Fruit maturity is based on skin color and internal flesh color development. Skin color assessment is based upon the judgment of pickers. The Hawai'i grade standard requires fruit to have 11.5% total soluble solids, with the color-break stage normally meeting this standard. Green immature fruit do not ripen well and have a total soluble solids value that is frequently less than 10%, giving a bland flavor.

Incidence of storage diseases can be reduced by field spraying and proper care in harvesting and handling to avoid wounding and bruising. Skin injury is a major problem and is caused mostly by impact and abrasion during harvesting and handling. The latter is mainly caused when harvested fruit are dropped into field bins with rough side walls and bottom. Careful handling is essential to avoid these unsightly blemishes, which also provide invasion sites for postharvest rots.

Passion Fruit *Passiflora edulis*

The passion fruit or lilikoi comes in a wide variety of shades of red, purple, and the more common yellow *flavocarpa* variety. All of the fruit are initially green and should be harvested when they are at least half or more yellow or purple in color. Fruit should be packed in cartons with only two or three layers of fruit, with protection provided to stop the stems from damaging other fruit in the carton. Holding the fruit at low temperatures after harvest lengthens postharvest life.



Papaya, *Carica papaya*

Pineapple *Ananas comosus*

The fruit should be handled carefully, as both the crown and fruit readily show mechanical injury. Mechanical injury to the fruit leads to leakage and fermentation if the fruit have translucent flesh.

Fruit to be transported to distant fresh fruit markets is picked when full sized and mature with flat "eyes" but still green (no yellow color) to a quarter colored. Fruit maturity is also evaluated on the percentage of acidity to total soluble solids (TSS) measurements. Consumers similarly judge fruit quality by skin color and aroma. A minimum reading of 12% total soluble solids (TSS) is required for fresh fruit in Hawai'i, while others have suggested 14%. A sugar-to-acid ratio of 0.9 to 1.3 is recommended.

Crown size is a crucial grade component, with a minimum size and a set ratio of crown to fruit length (0.33 to 1.5) for the higher grades. Crowns that develop during the summer in Hawai'i tend to be larger and may require "gouging" at harvest to meet the standard. This "gouging" leaves a wound for possible disease entry and detracts from overall appearance. "Gouging" two months before harvest to limit crown growth avoids visible scarring.

With large operations, the fruit are waxed after washing, frequently with polyethylene and paraffin or carnauba and paraffin waxes. The selected wax reduces the internal browning symptoms of chilling injury, reduces water loss, improves fruit appearance, and assures a more even application of fungicide used to control rots.



Pineapple, *Ananas comosus*

Pitanga (Surinam Cherry)

Eugenia uniflora

A very soft-skinned fruit, the Surinam cherry should be harvested when at least three-quarters ripe. The common red variety or the newly available black varieties like 'Kawahara', 'Stermer', and 'Zill' are usually different sizes. It's best to package similar-sized fruit in vented clamshell containers, no more than 2 layers deep. Placing the clamshells in a cooler in the field can lengthen shelf life by as much as 10 days depending on the stage when picked. The fruit should also be carefully inspected for damage from birds and fruit flies.

Poha (Cape Gooseberry)

Physalis peruviana

Poha was first reported in Hawai'i in 1825 and has since become part of Hawaiian regional cuisine. Poha should be harvested every few days when the husks (calyx) are dry and turn to a straw color. It's often picked in the afternoon when there is less moisture. Usually grown in raised beds, the bushes are shaken so that the ripe husks fall onto a plastic sheet placed under the plant. In Israel and other producing countries, the plant is trellised, making harvesting less time consuming. Chefs and grocery stores prefer de-husked fruit, which adds considerably to the labor involved. Removal of the husk also reduces postharvest life. Once the husk is removed the fruit should be packaged in a clamshell no larger than a pint and chilled as soon as possible. Growers should carefully examine their



Poha, *Physalis peruviana*

cost of production, as the fruit is often sold at under the cost of producing it.

Pummelo (Jabon)

Citrus maxima

As the pummelo fruit matures, the skin changes from a dull gloss to shiny, starting at the base of the fruit. When full gloss is achieved the fruit is ready to harvest, six to seven months after flowering. Often fruit are left on the tree and not harvested until eight months, before the flesh becomes dry and corky at the stem end. In Thailand, the minimum grade standard for total soluble solids is 8% for 'Thongdee' and 7% for 'Kao Namphung'. A sugar-to-acid ratio of 8 is desirable in both varieties.

Fruit can be cut from the tree with clippers or broken off by pulling. At packing sheds, the fruit are washed, graded, and packed into cartons. Grading is done to remove fruit with surface blemishes, sunburn, sooty mold, external damage caused by insects and disease, misshapen fruit, thick peel, puffiness, and peel color that is more yellow than green. As a non-climateric fruit, it must be handled carefully during harvesting and handling to minimize fruit damage and postharvest decay development.

Rambutan

Nephelium lappaceum

The durable rambutan should be harvested when about 90% ripe. Ripeness indicators are usually based on color and total soluble solids. As a number of varieties



Pummelo, *Citrus maxima*

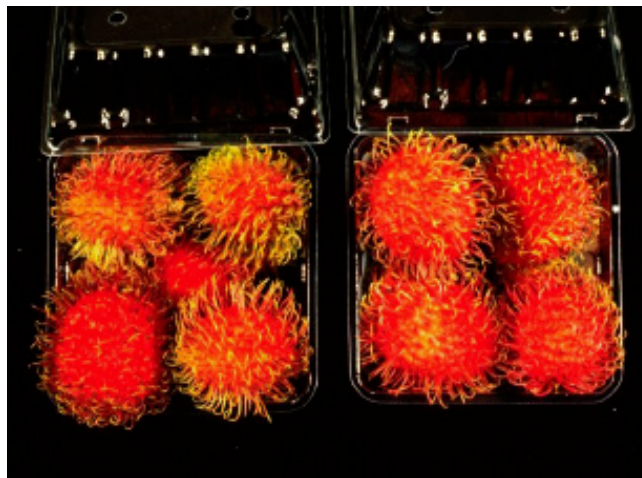
are grown in Hawai'i, growers must know their tree and its fruit to determine what coloration indicates full ripeness. The fruit can be harvested in bunches or individually. The fruit can be hydrated or soaked after harvest and then chilled to maximize postharvest life. Rambutan is usually packed in 10-pound vented clear plastic bags, with 2 bags to a box, or in clamshells. At farmers' markets, rambutan is sold in bunches or as individual fruit. Some growers will mist the fruit to keep it hydrated on the stand.

Salak or Snake Fruit

Salacca zalacca

Harvest indices have not been set up, though harvesting is delayed until the astringency and acidity have reached a minimum, about 160 days from flowering. The mature fruit's skin color starts to change from dark brown to reddish-brown and its flesh from white to yellowish-white. The flesh color of the Thai varieties, when immature, is yellowish-white changing to creamy or yellowish-orange. Seed color also changes to black to blackish-brown. Firmness and ease of fruit detachment have been used as harvest indices. Overripe fruit is tasteless and has an off-odor.

Fruit are harvested by cutting the fruit bunches. Fruit can be washed in water or brushed with a dry brush. Good, undamaged fruit should be selected and graded, then packed in single-layer trays or in plastic clamshells.



Rambutan, *Nephelium lappaceum*

Sapodilla (Chiku/Chico)

Manilkara zapota

Maturity for a particular chiku variety is judged by size and appearance. Rubbing the brown powdery scruff or bloom off the skin to determine if there has been a change from the underlying green of immature fruit to the light greenish-yellow of mature fruit is not always successful as a maturity index. Waiting for the first ripe fruit to fall and then harvesting the largest fruit is more reliable. If little or no latex comes from the skin when it is scratched, this is another indicator. Alternatively, with experience, the changes during fruit abscission can be judged and used as a measure of maturity and ripeness. Some varieties shed the scruffy coat when mature.

Chiku starch content and tannin content decline with maturity during the last 4 months of fruit growth. This coincides with the increase in sugar, fruit softening, and eating acceptability. After harvest, the stalk is pruned to allow latex to drain into water. Harvested immature fruit shrivel as they soften, without ever attaining the full sweet taste. Fruit are normally packed in single-layer trays with padding between individual fruit.

Sugar Apple

Annona squamosa

Sugar apple fruit are harvested when fully mature and firm. The skin color changes as the fruit approaches maturity from greyish-green to yellow-green or pink/



Sapodilla, *Manilkara zapota*

red at maturity. The adjacent carpels of the fruit toward the blossom end commonly separate, exposing the white pulp (“creaming”).

Harvested fruit should be handled with care to prevent bruising of the skin. Normal ripening occurs at temperatures between 59 to 86°F (15 and 30°C), and storage temperatures below 59°F (15°C) cause chilling injuries and a failure to develop full flavor. Fruit harvested early in the season will have lower sugar content but stores better than fruit harvested late in the season.

**Tropical Apricot / Kitebilla /
Ceylon Gooseberry
Dovyalis abyssinica x *hebecarpa* /
*Dovyalis hebecarpa***

Both the tropical apricot and kitebilla are very soft-skinned fruit. The tropical apricot turns fully red when ripe and the kitebilla turns dark purple. They can be harvested when half ripe. They should be packed in clamshells no more than 2 layers deep and chilled in a cooler in the field at the time of harvest. Rapid cooling after harvest extends the postharvest life by as much as a week.

White Sapote

***Casimiroa edulis* Llav. et Lex.**

This soft-skinned citrus relative is highly perishable, which has prevented its being utilized by most chefs or sold outside of farmers’ markets. There are many varieties and seedlings in Hawai‘i that color to different hues of green or yellow-green, making it important for a grower to know the individual tree. The fruit should be harvested when three-quarters ripe and packaged only in one-layer trays. Using foam padding around each fruit is essential to prevent bruising and skin damage. The fruit should be chilled in the field or as soon as possible after harvest.

Further Reading

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Table 1. Recommended storage conditions for the tropical and subtropical fruit outlined in this publication.

Note: The objective is to achieve maximum postharvest storage duration without significant loss in quality. Most tropical fruit show chilling injury (skin darkening, pitting of the skin, failure to ripen fully, increased disease) after varying durations below 50 to 59°F (10 to 15°C). Exposure to ethylene can lead to rapid fruit ripening and a loss of postharvest life; however, many tropical fruits' sensitivity to it is unknown.

		Storage Temperature	Relative Humidity	Maximum Postharvest Life (Days)	Ethylene Sensitivity
Abiu		54°F (12°C)	90%	7 days	
Acerola		32°F (0°C)	85–95%	40–50 days	
Atemoya / Cherimoya		54°F (12°C)	90%	14–21 days	Sensitive
Avocado (Sharwil)		46–54°F (8–12°C)	90%	14–21 days	Sensitive
Banana	Green Yellow	54–57°F (12–14°C) 55°F (13°C)	90–95% 90–95%	14–21 days 4–5 days	Sensitive
Bilimbi		50°F (10°C)	90%	9 days	
Breadfruit		57°F (14°C)	85–95%	10–14 days	
Carambola (Star Fruit)		41–45°F (5–7°C)	90–95%	43°F (6°C) 90%, 21 days	Low
Coconut		34°F (1°C)	85–95%	30–60 days	
Dragon Fruit		57°F (14°C)	90–95%	14 days	Low
Durian		39–43°F (4–6°C)	90–95%	40 days	
Guava		46–50°F (8–10°C)	85–95%	14–21 days	Sensitive
Jaboticaba	Unwaxed Waxed	55–59°F (13–15°C) 54°F (12°C)	90–95%	4–5 days 14–21 days	
Jackfruit		55°F (13°C)	90–95%	7–14 days	Very low
Litchi		36–43°F (2–6°C)	90–95%	41°F (5°C) 90% 25–40 days	Very low
Longan		36°F (2°C)	90–95%	21–35 days	Very low
Mango		50–57°F (10–14°C)	85–90%	54°F (12°C) 85%, 14–21 days	Sensitive
Mangosteen		39–43°F (4–6°C)	85–90%	5°C 90%, 40 days	Very low
Mountain Apple/ Wax Apple / Water Apple		50–59°F (10–15°C)	90–95%	10–15 days	Low
Papaya		46–50°F (8–10°C)	90–95%	14–21 days	Moderate
Passion Fruit	Purple Yellow	41°F (5°C) 41–46°F (5–7.5°C)	80–90%	20–30 days 7–10 days	Sensitive
Pineapple		46–50°F (8–10°C)	90–95%	14–21 days	Low

Table 1, cont'd. Recommended storage conditions for the tropical and subtropical fruit outlined in this publication.

	Storage Temperature	Relative Humidity	Maximum Postharvest Life (Days)	Ethylene Sensitivity
Pitanga (Surinam Cherry)	46–50°F (8–10°C)	90–95%	6–8 days	
Poha (Cape Gooseberry)	54°F (12°C) (with calyx)	90%	30–60 days	
Pummelo	54–59°F (12–15°C)	90–95%	80 days	Low
Rambutan	50°F (10°C)	90–95%	50°F (10°C), 90%, 7–14 days	Very low
Salak / Snake Fruit	59°F (15°C)	90–95%	25 days	
Sapodilla (Chiku)	57–59°F (14–15°C)	90–95%	14–21 days	Sensitive
Star Apple	37–43°F (3–6°C)	90%	21 days	
Sugar Apple	50°F (10°C)	90–95%	7–14 days	Sensitive
White Sapote	68°F (20°C)	85–90%	14–21 days	