

PASSION FRUIT PRODUCTION IN GUYANA

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Introduction

A native to South America, from Paraguay, Brazil and Argentina, Passion Fruit is (*Passiflora sp*) a choice crop of the tropical and sub tropical belt because it is one of the few fruits that comes into production within a year and is referred to as the 'fruit cash crop'. It yields a sprightly juice rich in vitamins A, B5 and C. Passion Fruit, a woody perennial climber (vine) belongs to the genus *Passiflora*, which includes four hundred varieties but only a few are considered for commercial cultivation: the Purple, Yellow, Kaveri and Noel Special.

The Passion Fruit is one of the few fruit plants that comes into production within a year unlike other fruits that take 3 – 5 years. It is therefore often referred to as the fruit cash crop offering quick returns. Furthermore it is fairly easy to grow with few pests or disease problems and markets with processors are coming on stream.

In Guyana, the most popular variety cultivated is the yellow variety. The plant is generally propagated through vegetative means, and seedlings and grafts have been found to be more vigorously growing than the cuttings.

The yellow type is better adapted to tropical lowland areas and is the principal type produced in Guyana. The fruit is widely distributed in the domestic market and small volumes are exported to Barbados and Canada. The purple type is better adapted to tropical highland areas of production. The most popular passion fruit for export is the purple type, although the yellow type is acceptable in some markets. The purple fruit is less acidic, has a better aroma and flavor, and normally has a slightly higher juice content. The yellow passion fruit has a more vigorous vine, and the fruit is normally larger than the purple type with a thicker fruit wall. Both types of passion fruit make excellent juice blends.

At the National Agricultural Research Institute passion fruit plants are mainly grown from seeds taken from healthy mature fruits selected from plants with good yield record.

Seeds are separated from the pulp, washed and dried at room temperature. The seeds are planted in prepared seed boxes or beds and are transplanted when 10 – 15 cm into individual plastic plant bags.

Varieties

Purple passion fruit *Passiflora edulis sims* is a robust, precocious bearer and has stems, tendrils and leaves that are clear green, without any trace of reddish or pinkish colour. The fruit is round or oval in shape, 3 – 5 cm in diameter and a deep purple when ripe. Within the hard leather rind, there are numerous small blackish seeds, each enclosed in a yellowish aromatic juicy pulp. The purple passion fruit is susceptible to a number of diseases such as collar – rot, wilt and brown leaf spot and nematode attacks.

Yellow passion fruit

Passiflora edulis flavicarpa is a more vigorous grower than the purple. It is distinguished by the suffusion of reddish, pinkish or purple colour in the stem, leaves and tendrils. The average fruit is slightly larger than the purple type with a bright canary yellow rind. The pulp is more acidic than the purple and the seeds are dark brown. This variety is free from most pests and diseases.

Kaveri is the hybrid passion fruit presently marketed grafted on rootstock of the yellow variety. It is very vigorous and high yielding. Its fruits are a blend of purple and yellow varieties but having the size of the yellow variety. The pulp is less acidic than the yellow variety. This variety is resistant to collar rot, wilt and brown leaf spot diseases and nematodes.

Noel Special is a promising variety that has been found to be tolerant to Alternaria disease. This precocious bearer comes to yield as early as one year after planting. This promising variety is however, self-incompatible and it needs a pollinator for satisfactory fruiting.

Cultivation

Propagation

Passion Fruit plants are normally available at the NARI Plant Nurseries but they can be easily propagated by seed.

Seeds should be taken from mature fruits selected from healthy high bearing plants. They are separated from the pulp, washed and dried at room temperature away from direct sunlight. After drying the seed would remain good for about 1 month if stored in a cool dry place.

Sowing of the seeds can be done in prepared seedbeds, boxes or plant bags. The seed should be planted about 1 cm below the surface and covered with a thin layer of soil.

During germination and early growth, the seedlings should be shaded and receive adequate but not excessive water.

The seedlings are ready for planting out in the field when they are 25 – 30 cm tall.

Site Selection

Passion Fruit can grow in almost any soil type provided that there is adequate drainage.

Trellising

For optimum growth and yield the passion fruit vines should be trained to grow on trellises. These trellises should remain for the life of the vine and therefore must be securely erected.

A Single Row Trellis system is recommended where a single row of wooden fence posts around 2.4 m in length is used. These poles are driven some 0.6 m into the ground and stout fencing wire is then stretched along the top of the poles anchoring at both ends of the row to prevent sagging.

The spacing of the Passion Fruit plants is directly related to the spacing of the poles of the trellis. As such, the poles are to be placed in such a way that there are two plants, spaced 3 metres apart, between the poles.

Under heavy fruiting, excessive sagging might occur and it will be necessary to use intermediary poles to prop up the wire.

Also, in arranging the trellis, consideration should be given to the direction of the wind and wherever possible the rows should be parallel to the direction of the wind

The distance between the rows is largely dependant on any mechanical implement used in the control of the weeds between the rows. However, it is usually 2 to 3 metres.

Planting

As indicated before, the plants are spaced around 3m apart so that two of them fall between two poles. Planting holes are dug to a size to accommodate the plant in the bag but usually around 30 cm in length, width and depth.

The topsoil removed in digging the plant hole could be mixed with rotted pen manure, compost or some phosphate fertiliser. Some of this mixed soil is then returned to the planting hole before putting the plant.

The plant bags in which plants are usually supplied should be carefully removed so as to keep the rootball intact. The plants are then placed in the holes following which the balance of the topsoil is returned to fill the holes and thoroughly compressed. If conditions are dry the plants should be watered.

AFTER CARE

Training and Pruning

To maximise production, the passion fruit plants need training and pruning. Essentially this procedure consists of permitting only two vines of each plant to grow and run along the trellis wire as main vines, one in each direction. Laterals from these main vines then grow downwards bearing the fruits.

WHAT IS TRAINING?

The training of Passion Fruit Vines begins at an early stage by encouraging 2 – 3 main stems as leaders to grow upward to meet and then continue to grow on the top wire of the trellis. This is necessary for good growth and subsequent production.

These leaders are trained to grow upwards by appropriately tying and/or wrapping them on a support string or rod. At this time the plant tendrils are usually not strong enough to support the vines by themselves.

WHAT ABOUT PRUNING?

Pruning is the removal of unwanted shoots and vines to permit systematic growth and improved production. There are four types of pruning: Early Selective Pruning, Light Pruning, Further Selective Pruning and Severe Pruning.

SELECTIVE PRUNING

Early selective pruning is conducted in conjunction with the training and is the removal of the lateral shoots that develop from the selected leaders as these leaders grow towards the top trellis wire.

Without the removal of the laterals several of them would develop and tangle up with the leaders, eventually leading to a situation called entanglement or bunching up.

When the leaders reach the top wire, only the two strongest are permitted to continue growing on the top wire, on either side. These leaders are then wrapped around the wire and tied in position.

At this stage the lateral shoots are produced from these leaders. These lateral shoots are permitted to grow in a downward position and must be prevented from entanglement with the leaders and with each other as far as possible.

LIGHT PRUNING

The downward growing secondary shoots will be producing fruit as they approach the ground, but must not be permitted to trail along the ground.

If they do trail on the ground, there is a great temptation to pick them up and put them on the top wire. This is to be avoided as it defeats the purpose of any earlier disentanglement of the vines.

Light Pruning is the practice whereby these secondary shoots are kept cut 15 cms. (about 6 ins.) above the ground.

FURTHER SELECTIVE PRUNING

As the main secondary shoots grow downwards bearing fruit, they produce more laterals which are also encouraged to grow downwards producing fruit and without entanglement as far as possible.

However, there comes a time when some of the older shoots would be producing less and less fruit and removal of these shoots to make way for the development of younger shoots would be more desirable.

Further Selective Pruning is therefore the removal of the older uneconomic shoots. It should not be considered before 2 years of production when some decline of yields might be apparent.

Also, depending on previous pruning practice, it may be necessary for the disentanglement or unbunching of the shoots before the pruning could be accomplished.

SEVERE PRUNING

Severe Pruning is practiced when:

- a. Good pruning practices were neglected and/or
- b. When vines are old and might be rejuvenated by pruning.

Severe Pruning entails the removal of all secondary shoots approximately 20 cm. below the leader.

Fertilising

Fertiliser needs are directly related to the type and nutrient status of the soil. It is necessary therefore that a soil analysis be conducted to determine these factors for the particular location.

In the absence of a precise soil analysis, a compound fertiliser (normally 12:12:17:2) could be used. It is usually applied twice per year (at the beginning of each wet period) at a rate of 100 gm to 1 kg per plant depending on the size and age of the plant.

Alternatively, use can be made of composted material.

Weed Control

The control of weeds is highly desirable to reduce competition for nutrients and the incidence of unwanted pests and diseases.

Manual weed control is usually conducted around the plants while between the rows weed control is accomplished by the following, singly or in combination:

- Manually
- Chemically
- Mechanically by the use of brushcutters and/or mowers

For chemical control, Glyphosate (Round Up) or Paraquat (Gramoxone, Millquat) at a rate of around 2 pints /acre (2.8 litres/ hectare) or .5 pints (280 ml)/ 5 gallon (20 L) sprayer could be used.

In applying these herbicides, care should be taken to avoid “spray drift” onto the plants or severe damage might occur. To minimize the risk of drift, it is recommended that a “spray shield” be used and the spraying of very tall weeds be avoided.

However, where only grass weeds are present, the herbicide Fusilade (Fluazifopbutyl) or Nabu (Sethoxydim) can be used, at half the rate of Paraquat, without a shield as only grasses are affected.

Pest and Disease Control

In Guyana, no severe pest or disease problem has been reported in Passion Fruit, but isolated cases of leaf-spotting diseases do occur.

These are usually controlled by the removal of the diseased parts and the application of an appropriate copper fungicide such as Kocide or Cupravit at a rate of around 2.5 pounds/acre (2.8 kilograms/hectare) or around .5 pound (225 grams)/ 5 gallon (20L) sprayer.

Occasionally however, there are sporadic attacks by caterpillars on the vine and these can be controlled by the application of an appropriate insecticide at the recommended rate.

Harvest Maturity Indices

Several different indices may be used to determine harvest maturity of passion fruit, including the length of time after transplanting and external skin colour.

Initial fruit harvest from seeded yellow passion fruit plants normally begins about 10 months after transplanting, with full production occurring after 18 months. Grafted passion fruit plants begin initial production earlier, after about 7 months. The timing of initial harvest depends on the vigor of the plant and environmental growing conditions.

The fruit matures in about 75 days after flowering and will naturally fall to the ground when fully coloured and mature. A mature passion fruit vine normally produces two to three crops annually; one main harvest followed by several smaller crops. Therefore, passion fruit are usually available for harvest year round.

The minimum ripeness stage for initiation of harvest should be when at least 50% of the fruit surface has turned yellow or purple. Fruit quality will improve if the fruit are allowed to completely change colour and ripen on the vine. Passion fruit will turn a deep purple or yellow colour when ripe and eventually fall to the ground after full colouration. Colour changes in the fruit begin 7 to 21 days before the fruit abscise, depending on cultivar and environmental conditions.

In order to optimize flavor quality and storage life, passion fruit intended for export should be harvested with 75% purple or yellow colour (Figure 1). Fruit harvested at this stage of ripeness will have a longer storage life and are less likely to spoil than fruit picked at more advanced stages of ripeness. However, full yellow or purple coloured



Fig 1. Ideal harvest stage (75 percent yellow colour) for harvesting fruit for export.

passion fruit can also be picked for export if the fruit is still firm (Figure 2). Export market destined fruit should be harvested twice a week, before the fruit falls naturally from the vine.



Fig 2. Firm and fully coloured fruit of high quality ready for harvest.

Fruit intended for the fresh market should not be allowed to drop to the ground, particularly if it is destined for export (Figure 3). Dropped fruit will suffer impact bruising and scarring of the skin tissue. Postharvest deterioration of dropped fruit will be significantly higher than picked fruit. The fruit will soon shrivel and brown spots will develop on the damaged area of the skin, lowering the market quality. Fallen fruit quickly lose moisture, which typically results in a 10% to 20% loss in original fresh weight within several days. In addition, freshly fallen passion fruit are very susceptible to

sunburn damage.



Fig 3. Avoid postharvest deterioration of dropped fruit by picking before abscission.

Non-export fruit intended for immediate processing in the domestic juice market may be allowed to fully ripen on the vine and naturally abscise, falling to the ground. The fruit should be collected off the ground on a daily basis and processed as soon as possible.

Harvest Methods

Passion fruit is harvested manually by cutting or clipping the fruit off the vine. The recommended harvest tools are a sharp knife or clippers with a sharp edge (Figure 4).

Fruit should be picked at the stricture in the stem and not close to the shoulder of the fruit. A short piece of stem, approximately 4 cm (1.5 inches) in length should be left attached to the fruit to help prevent water loss and fungal development (Figure 5). The fruit should not be pulled from the plant.

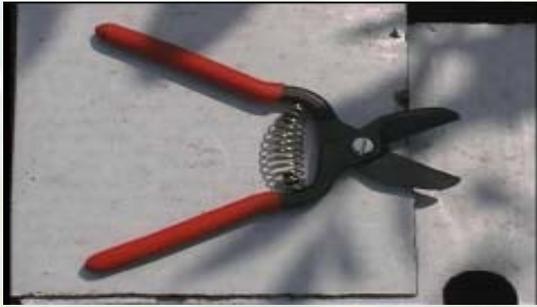


Fig4. Sharp-edged clippers ideal for harvesting passion fruit.



Fig5. Yellow passion fruit with short length of stem ready for clipping off the vine.

All the fruit on the trellis should be reachable from the ground. The fruit should be harvested with care and put in a plastic bucket or field container without dropping or throwing. The fruit should always be handled gently to avoid bruise damage and the inner surface of the field container should be lined with newspaper or padding to minimize fruit scarring. No more than 15 kg (30 lbs) of fruit should be put in the harvest container in

order to avoid compression bruising of the fruit. The field container should be strong and capable of being stacked without damaging the fruit.

The initial sorting of marketable versus unmarketable fruit should be made in the field at the time of harvest. Severely damaged, decayed, over-ripe fruit, or unmarketable fruit should be put into a separate container and discarded in a location away from the passion fruit vines to minimize the build-up of decay-causing microbial inoculum in the field.

The field containers with marketable fruit should be put in the shade to avoid overheating of the fruit prior to transport to the packing area.

Passion fruit should never be harvested when wet, as this will encourage the spread of disease. Fruit harvested when wet and stored in unventilated crates or sacks will rapidly spoil.

Preparation for Market

Ideally, the harvested passion fruit should be transported to the packing area during the coolest time of the day in order to minimize heat build-up. Upon arrival at the packing facility, the harvest containers should be unloaded with care and stacked in a shaded well-ventilated area. The fruit should be handled as little as possible to avoid unnecessary damage. Various steps should be followed in preparing passion fruit for market. These involve cleaning, possibly waxing, sorting/grading, and packing. These operations should be carried out in an easily accessible, shaded area which is protected from rain.

Cleaning

The initial step in preparing passion fruit for market is to clean the surface of the fruit and remove any dirt, surface stains, sooty mould, or adhering leaf tissue. Remains of the calyx left attached to the fruit are unsightly and can be a source of fungal decay.

Depending on the volume of fruit to be cleaned, the process can be done manually or automatically. Small scale operations usually choose to clean the individual fruit by wiping them with a damp cloth just prior to grading. Larger volume operations may choose to use a water dump tank or overhead spray wash system to clean the fruit.

In order to avoid the spread of disease, the wash water should be clean and regularly sanitized by maintaining a 150 ppm sodium hypochlorite concentration (or household bleach) and a water pH of 6.5. 150 ppm is equal to 2 oz of household bleach (such as Marvex) per 5 gallons of water, or .3 liters of bleach per 100 liters of water. The chlorine level and pH of the wash water should be checked at least hourly during the day with paper test strips or portable meters. Trimming of the fruit stem to an appropriate length should be done at the time of washing (Figure 6). Stem length is typically 4 cm (1.5 in) for export destined fruit, but trimmed to shorter lengths for domestic marketing. Following washing, the fruit should be placed on a flat surface to air dry prior to grading/ sorting, possibly waxing, and packing.

Grading/Sorting

Pre-sorting of fruit should be carried out in the field, and additional grading performed at the packing area to remove fruit that does not meet market requirements. Passion fruit must be sorted and graded according to various external quality characteristics prior to packing. The main characteristics used in grading passion fruit are size, skin colour and uniformity, shape, firmness, and the amount of surface blemishes. Fruit marketed domestically should be clean, firm, free from visible signs of disease, mature, uniformly coloured, and free from damage which detracts from the appearance or edibility of the fruit (i.e. bruises, cuts, healed or open cracks, insect damage, sunburn, etc.). At least 90% of the fruit in any lot should have a glossy appearance and not be soft or shriveled.



Fig 6. Washing and stem trimming of yellow passion fruit for the domestic market.

Three different grades have been established by the National Bureau of Standards for domestic marketing of passion fruit (Grade 1, Grade 2, Grade 3). Grade 1 passion fruit are the highest quality. All Grade 1 fruit shall be firm with a shiny appearance, absent of any signs of shriveling, free from visible evidence of insects, disease, and surface blemishes. Grade 2 passion fruit must be of good quality, although 10% of the fruit in this grade may be soft or show signs of shriveling, and not have a glossy appearance. Grade 3 passion fruit do not qualify for inclusion in the higher grades, but should be clean, mature, free from pests and disease, and have similar colour, shape, and size. Tolerances with respect to quality and size shall be allowed in any lot for product not satisfying the requirement of the grade. A total of 5%, 10%, and 15% by number or weight of passion fruits not satisfying the requirements of grades 1, 2, and 3, respectively, shall be allowed.

However, the fruit not meeting the minimum grade requirements must not be rotted or affected by another type of deterioration rendering it unfit for consumption. The quality standards of export grade passion fruit should meet the minimum requirements of Grade 1 fruit. Export quality fruit must be firm, uniformly coloured and shaped, and free of insect damage, physical injury, disease, brown discoloration, and other surface blemishes (Figure 7). The skin colour should be at least 75% yellow or purple, depending on type. The pulp should be juicy and without air cavities. The fruit should have a smooth, shiny external appearance, and should be either round or eggshaped.



Fig 7. Passion fruit with surface scarring and slight decay is not suited for export.

Passion fruit should be separated into 3 different size categories (small, medium, large), based on fruit diameter. Marketable fruit sizes typically range from 4 to 9 cm (1.5 to 3.5 in) in diameter and 4 to 12 cm long (1.5 to 4.7 in). The average diameter for fruit classified as small size is 5 cm (2 in), for medium size is 6.5 cm (2.2 in), and for large size fruit is 8 cm (3 in). A 1 cm (½ in) variation above or below the specific diameter is acceptable. Yellow passion fruit generally have a larger size and weight 50 to 150 gm (2 to 5 oz) than purple passion fruit 25 to 50 gm (0.8 to 2 oz). In small-scale operations, passion fruit are usually sized manually by one or more workers. Sizing rings made of wire or wood and having the diameter of the 3 different size categories should be available to the workers to check the fruit when necessary. Larger-scale operations can use various types of sizing equipment to automate and speed up the grading process.

External colour is another important fruit quality characteristic used in sorting passion fruit. It is important to pack only uniformly coloured fruit in each container. The fruit should have a minimum of 75% of the surface area coloured to type (i.e. yellow or purple). Firm, fully coloured fruit are ideal for marketing. Totally green coloured fruit are not ripe and should not be packed, especially for export (Figure 8).

Other external appearance parameters important in classifying passion fruit include shape, firmness, and amount of surface blemishes. Round fruit are normally preferred to oval-shaped fruit, particularly in export markets. The fruit should be symmetrical and not misshaped. Also, the skin of export market destined fruit should not be wrinkled or show any signs of shriveling (Figure 9).

Internal fruit quality should be checked on randomly selected fruit. Soluble solids content (SSC) of marketable fruit should range between 10% and 18% for yellow passion fruit and between 10% and 20% for purple passion fruit.

Passion fruit with less than 10% SSC should not be packed for market due to its inferior flavor quality.

Acidity of the pulp should range between 3% to 5%, with yellow passion fruit generally having more acidity than purple passion fruit.



Fig 8. Separation of green from coloured fruit is important when grading passion fruit.



Fig 9. Passion fruit showing signs of shriveling should not be packed for export.

Waxing

Passion fruit may benefit from a postharvest wax application. Much of the fruit's natural wax is removed during washing, so it should be replaced. Waxing enhances the shine and external appearance of the fruit, reduces postharvest weight loss, minimizes shriveling, and extends market life. A carnauba-based wax is preferred for passion fruit. The simplest ways to make the wax application are as a manual rub or an overhead spray of water-emulsion wax as the fruit are rotating on a bed of soft brushes made of horsehair or equivalent grade. A liquid paraffin wax dip may also be used, but it is more costly and does not impart a shine on the fruit surface. After waxing, the fruit is packed for market.

Packing

Passion fruit should be packed in strong, well-ventilated containers capable of being stacked without damaging the fruit. The fruit surface should be free of moisture before packing. Passion fruit in Guyana are typically packed in large synthetic mesh sacks for both the domestic and export market (Figure 10). This type of package provides little or no protection to the fruit, and the sacks are typically overstuffed with product.

Compression bruising of the passion fruit often occurs when the sacks are piled on top of each other, resulting in deformed or split fruit.

Wooden containers or durable plastic crates are preferred for the domestic market. The preferred export package for passion fruit is a single-layer fiberboard carton containing either 2 or 3.5 kg (4 to 7 lb) of fruit (Figure 11). The cartons should be strong and selflocking so they can be stacked. Ventilation holes are needed for horizontal air movement and efficient cooling. If sea shipment is used, the carton should



Fig 10. Passion fruit packed in large mesh sacks for export to Barbados.



Fig 11. Purple passion fruit packed in 2 kg carton for the U.K. market.

Only fruit of the same size category and stage of ripeness should be packed in the same carton. Product uniformity is essential. The carton should have a plastic liner moulded with individual cells to protect and separate the fruit (Figure 12). Larger-fruited oval shaped passion fruit should be oriented in a horizontal position, with the stem either protruding above the adjacent fruit or below (Figure 13).



Fig 12. Plastic liner with individual cells for passion fruit inside fiberboard carton.



Fig 13. Passion fruit with stems protruding above adjacent fruit in export carton.

The fruit are packed according to individual fruit count (i.e. size) and the most common number of counts per 2 kg carton is 24 and 28. The most common number of counts per 3.5 kg carton is 24, 36, and 48 (Figure 14). A 24-count fruit is considered to be a large size, 36-count a medium size, and 48-count a small size.

Temperature Control

The ideal storage temperature for passion fruit differs between yellow and purple-fruited types. Maximum postharvest life of yellow passion fruit is obtained at 7°C (45°F) storage, while purple passion fruit should be stored at 4°C (39°F) Passion fruit held at temperatures above optimum will ripen more quickly and lose more weight. Below the optimum storage temperature the fruit will

suffer from low temperature chilling injury. At the ideal storage temperature, partially ripe yellow passion fruit will have an average market life of 2 to 3 weeks and purple passion fruit will have a 4 to 5 week market life. Partially ripe fruit may be exported by marine container if transport time is less than 2 weeks and the container is kept at the recommended temperature for the specific type of passion fruit.

Passion fruit picked fully ripe will have only about a 7 to 10 day market life. The sooner the optimum storage temperature is obtained, the longer fruit quality can be maintained and water loss minimized.



Fig 14. Purple passion fruit (48-count size) packed in 3.5 kg carton for export.

Relative Humidity

Passion fruit will lose a significant amount of moisture if held under low relative humidity (RH) conditions. This may result in noticeable shriveling of the peel and unsightly appearing fruit, making it difficult to market the product (Figure 15). In order to avoid peel desiccation and excessive weight loss, passion fruit should be stored at 90% to 95% RH. Also, water loss can be prevented if the time between harvesting and packing is kept to a minimum.

Storage of the fruit in perforated plastic bags or in containers lined with perforated plastic film will reduce postharvest weight loss and minimize fruit shriveling. Peel shriveling does not adversely affect the edible quality of the pulp. In fact, partially shriveled fruit are typically sweeter.



Fig 15. Passion fruit held at a low RH for several weeks become noticeably wrinkled.

Principal Postharvest Diseases

Passion fruit are susceptible to a number of postharvest diseases. Infections normally originate in the field and disease development is accentuated with tissue injury. Using inappropriate harvesting techniques, dropping fruit, overfilling containers, and allowing stems to rub against adjacent fruit during handling and transport may result in punctures and bruising injury. During storage and ripening, these damaged areas serve as an entry point for fungal infection.

Postharvest decay can be reduced by using good field sanitation practices, pruning to open the canopy of the plant, pre-harvest fungicide applications, careful harvesting and handling practices to avoid injury to the fruit, proper wash water sanitation, and holding the fruit at its ideal storage temperature (7°C or 45°F for yellow types and 4°C or 39°F for purple types). The principal postharvest diseases of passion fruit are caused by various fungi, including brown spot, *Phytophthora*, and *Septoria*.

Brown Spot

Brown spot, caused by the fungus *Alternariapassiflorae*, and is the worst postharvest disease of passion fruit. The disease is most severe during the rainy season.

Symptoms of brown spot first appear as tiny spots, which enlarge into sunken circular lesions with brownish centers. Eventually the rind around the diseased area becomes wrinkled and the fruits shrivel and drop.

Phytophthora Fruit Rot

Fruit rot, caused by the soil-borne fungi *Phytophthora nicotianae* var. *parasitica*, can be a serious postharvest disease of passion fruit produced on poorly drained soils. Symptoms appear as water-soaked, dark-green patches that dry out.

Septoria Spot

Septoria spot, caused by the fungus *Septoria passiflorae*, typically infects fruit while on the plant but may be overlooked at the time of harvest. Initial symptoms of infection appear as tiny irregular light brown spots on the fruit surface. The spots eventually develop into blotches filled with minute black fruiting bodies of the fungus. These blotches often coalesce to cover large areas of the fruit. Infection results in uneven ripening and a mottled fruit colouration.

Postharvest Disorders***Chilling Injury***

Passion fruit are sensitive to chilling injury (CI), which is a low temperature physiological disorder that occurs below 7°C (45°F) in yellow types and below 4°C (39°F) in purple types. Symptoms of CI include pitting and sunken lesions on the fruit surface, uneven skin colouration, internal darkening of the pulp, off-flavour development, and decay. The amount of tissue damage caused by CI depends on the temperature and duration of exposure, with lower temperatures and longer durations of exposure causing more injury. Postharvest decay rapidly develops when chilling injured fruit are transferred to ambient temperature for marketing.