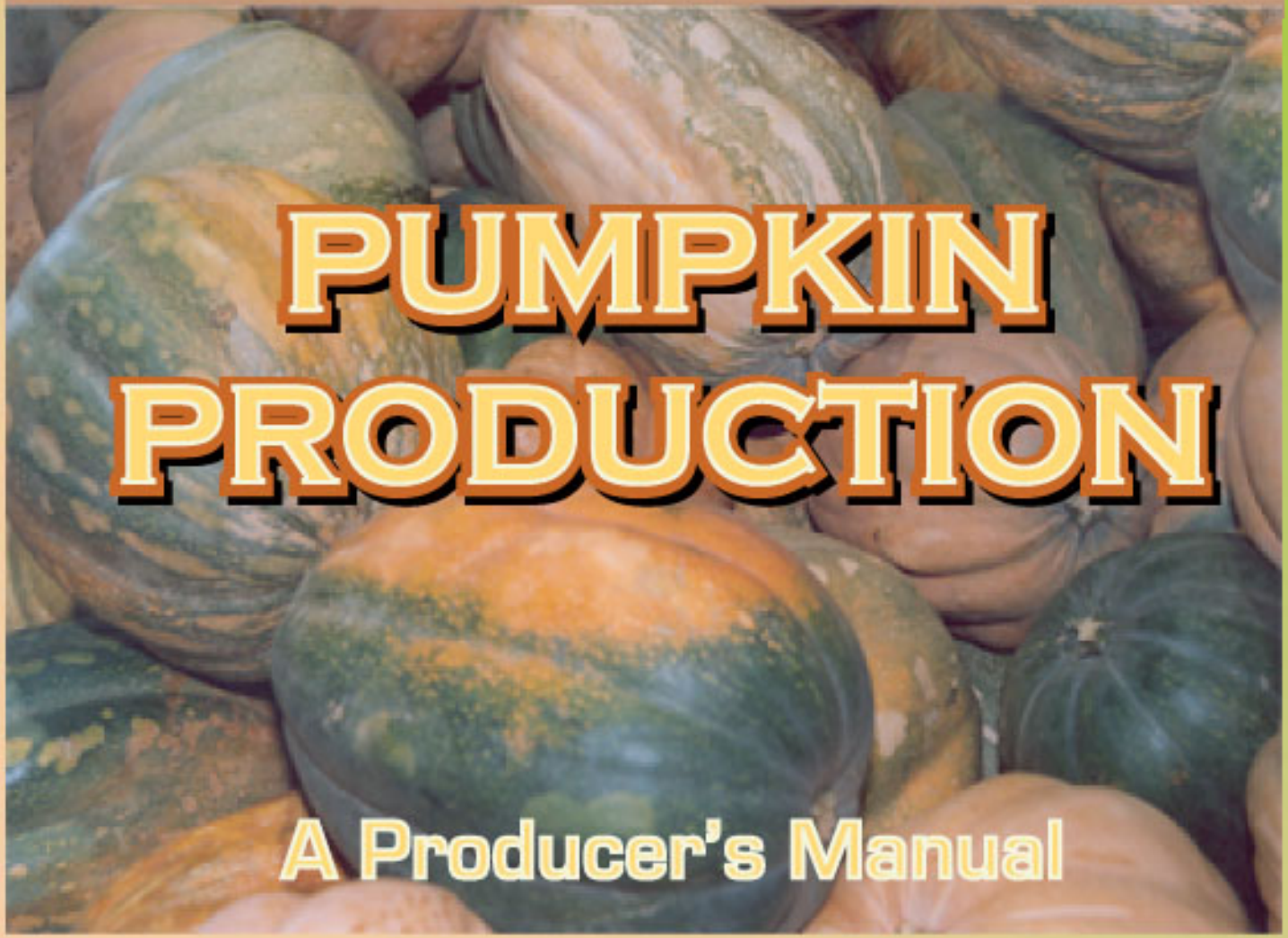
MINISTRY OF AGRICULTURE LAND AND MARINE RESOURCES



# PUMPKIN PRODUCTION

## A Producer's Manual

EXTENSION TRAINING AND INFORMATION SERVICES DIVISION



**MINISTRY OF AGRICULTURE LAND AND MARINE RESOURCES**

**TRINIDAD AND TOBAGO**

# PUMPKIN PRODUCTION

## A Producer's Manual

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Extension, Training and Information Services Division

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## Introduction

Pumpkin, *Cucurbita moschata*, belongs to the family Cucurbitaceae. This family of crops is characterized by plants with long stems that grow rapidly. These plants attach themselves to different kinds of support by tendrils. Typically, they bear fleshy fruits. Pumpkin is easy to grow and quite profitable.

- It is more resilient to pests and diseases when compared to other cucurbits (e.g. watermelon).
- It can withstand long dry periods.
- It can also be readily sold in both the local and export markets.
- The crop matures in about 3½ months with an expected yield of about 13,500–22,500 kg/ha (12,000–20,000 lb/acre)

## Uses of Pumpkin

Pumpkin is a good source of vitamins A, B and C and minerals.

All parts of the plant can be used as food.

The fruit:

- Can be steamed, boiled or baked
- Used in beverages, soups, curries, pastries and dessert
- Processed as a powder which can be used in drinks and soups
- Constitutes a major ingredient in tomato ketchup
- Used for animal feed

The leaves and flowers are cooked and eaten.

The seeds can be roasted and eaten.



A good-sized pumpkin

## Success Story

A farmer speaks: "I have been a large-scale pumpkin grower for many years. Last season, I encountered a serious problem in my field when I lost more than 30 % of my crop due to a fungal disease which affects the mature leaves closer to the root. Mr. Ram of the Extension Training and Information Services Division advised me on how to identify and successfully control this disease and to improve my harvest."



Mr. Kumar Ramnarine
in his pumpkin field

## Cultivated Varieties of pumpkin

**Open-pollinated varieties** are commonly used for growing pumpkin in Trinidad and Tobago. Most farmers select seeds from their own crop while some purchase from other farmers, exporters, agro shops and the Ministry of Agriculture Land and Marine Resources. The varieties readily cross-pollinate so that it is difficult to clearly distinguish them in practice.

Some common open-pollinated varieties grown locally are: Sweet Mama, Jamaican, Local Large, Iron Cap, Jack O'Lantern and Crapaud Back.

**Hybrid varieties** (e.g. Rupee F1) are also available from the agro shops.

**Open-pollinated varieties** are pollinated by natural mechanisms such as wind, insects and birds.
**Hybrid varieties** are controlled crosses between plants of the same or different species to produce desirable characteristics.

## Preparing Seeds and Producing Seedlings

Pumpkin can be either direct seeded or transplanted. Select seeds from pumpkins that are well formed, with a thick flesh and smooth skin and weigh about 10 kg (20–25 lb).

Wash the seeds and sun-dry for 3-4 days, and then dry in a shaded area for another 3–4 days. Ideally, the moisture content should be reduced to between 12-14%. Treat the dried seeds with an appropriate fungicide. If seeds are to be used for subsequent crops, label, double seal and refrigerate. Seeds can remain viable for 1–2 years if kept refrigerated.

When producing seedlings, remember to water adequately during the 3-5 day germination period. To encourage root development, apply a fertilizer solution high in phosphorous, 4-5 days after germination at a rate of 5 ml (1 tsp) per 4 L (1 gallon) of water. Only one application of this fertilizer is required.

Seedlings are ready for transplanting in about 10–12 days after germination. Harden the seedlings by allowing gradual exposure to full sunlight over 3–4 days before placing in the field.

It is important to select healthy seedlings for transplanting. A healthy pumpkin seedling should have a lush green appearance, approximately 3–4 leaves, about 10 cm (4 in) height, a healthy root system and no sign of insect or disease attack.



A healthy seedling

## Land Preparation

Have the soil tested before planting. The soil test report will indicate the type of soil, its acidity or alkalinity (pH), fertilizer and other requirements. This service is available free of charge from the Ministry of Agriculture Land and Marine Resources.



Land prepared for planting

Pumpkin can be cultivated on almost any fertile, well-drained soil. It grows best within a pH range of 5.5 - 6.8.

Proper land preparation is very important for:

- Strong root development
- Efficient water and nutrient uptake
- Adequate drainage and water retention
- Good aeration of the soil
- Effective control of pest and disease organisms as well as weeds.

> pH is a measure of acidity or alkalinity of the soil. Uptake of some nutrients is hindered in very acidic soils (pH less than 5.0)

Prepare land as follows:

- Clear land either by brush cutting or spraying with a Glyphosate weedicide or both.
- Plough the soil
- Apply agricultural lime to reduce soil acidity if necessary.
- Apply cured manure to improve the soil if necessary.

- Refine the soil using a rotavator. This gives the soil a finer tilth and allows the manure and lime to be incorporated into it.
- Create beds by forming drains 3.0– 4.2 m (10–12 ft) apart, using narrower beds for clay soils and wider beds for sandy soils. Note however that pumpkin cannot tolerate water logging.

> Based on the results of the soil test, agricultural lime (up to 50 bags/ha or 20 bags/acre), and cured manure (up to 250 bags/ha or 100 bags/acre) may be added to the soil.

- If lime is used, wait for one month before planting. This will allow the lime to react with the soil so that the crop will get the full benefits of the lime.
- Another application of a weedicide may be necessary before planting as weeds may grow within this one month period.

For wet season planting, the beds should be raised along the middle (cambered) to allow good drainage.

On steep hillsides, tillage is not done. The crop is planted on hand-made mounds in contour fashion (across the hill) to conserve the soil and allow easier access for growing and harvesting operations.

## Good Agricultural Practices (GAP) Protocol

In order for Trinidad and Tobago to benefit from free trade in international and regional markets, agricultural produce must meet certain quality standards. This is to ensure that consumers' demand for safe food is met. Therefore, food safety standards have been developed to address three major areas of concern:

- Produce must have good post harvest quality with regard to maturity, handling, storage, bruises, cracks etc.

- Produce must be free from microbial contamination that can be injurious and even fatal to humans, for example; *Salmonella spp* and *Escherichia coli 0157: H7.*
- Produce must be free from pesticide residues that have been deemed to be harmful to human health and the environment.

> Note that these quality standards are applicable to both the interior and exterior of the produce.

The criteria set to ensure achievement of the above are commonly referred to as the GAP Protocol.

If these standards are to be met, recommended practices must be adopted from the start of production of the crop until it reaches the market.

This is particularly important for pumpkin, which is a major export crop.

Some important components of GAP during production of pumpkin are:

- Personal hygiene
- Quality of water
- Care with use of manure
- Safe use of pesticides
- Harvesting, handling, transport and storage

It is important to follow hygienic practices such as washing your hands with soap before handling the fruits. This means that there must be potable water and sanitary toilet and washing facilities close to the farm.

Irrigation water should be clean and free from contaminants such as faecal matter (from both humans and livestock) and industrial waste.

Manure should be placed in a pile and covered for 4–6 months to allow composting (curing). This allows natural decomposition of the manure.

The manure should be stored away from the field and must be contained by brick walls and cement floors to prevent contamination to surrounding areas.

Cured manure should be applied 2–3 weeks before planting and incorporated during the rotavating process.

Persons handling manure can be infected with the tetanus organism if they have exposed wounds and are not vaccinated.

Proper washing is important to prevent illnesses that may arise from handling manure.

## Planting

Plants can be grown using seedlings or by direct seeding on the ground. However it is better to use seedlings to get a more uniform crop and to reduce the length of time spent in managing the crop in the field.

### Planting using seedlings

If seedlings are used, it is better to plant late in the afternoon to prevent them from wilting.

- Mark points along the middle of the bed at the desired plant spacing. Create a circular mound around each point about 1 m (3 ft) in diameter and 0.3 m (1 ft) high). Make a planting hole in the middle of each mound. The hole should be made to a depth of 5.0 to 7.5 cm (2–3 in) but wide enough to plant 3 seedlings. Alternatively, three small holes may be dug in triangular fashion in the middle of the mound. Use of a high phosphate fertilizer in the planting hole (e.g. 12:24:12) is optional. If used, apply fertilizer at 5g (1 tsp) per hole and cover with 5 cm (2 in) of soil.

- Apply a soil fungicide as a drench in the planting hole to prevent attack by fungi and a soil insecticide to prevent attack by cutworms and mole crickets.
- Plant 3 healthy seedlings per mound and water thoroughly. The table below shows the number of seedlings that will be required per hectare or acre.

| Width of bed | Number of seedlings required if planted 3.0 m (10 ft) apart | Number of seedlings required if planted 4.2 m (12 ft) apart |
|---|---|---|
| 3.0 m (10 ft) | 2965 / ha or 1200 / acre | 2500 / ha or 1000 / acre |
| 4.2 m (12 ft) | 2500 / ha or 1000 / acre | 2060 / ha or 835 / acre |

## Planting by direct seeding

If the crop is planted by direct seeding, place 5 seeds in one hole in the middle of the mound. You will require about 5000 seeds/ha or 2000 seeds/acre if the space between plants is 3 m (10 ft). For direct seeding, you may plant at any time of the day. Unhealthy seedlings may be thinned out to leave 3 healthy seedlings per mound. Follow previous guidelines for managing seedlings as seeds germinate and grow.

## Irrigation

Although pumpkin is drought tolerant it still requires adequate and uniform watering to produce well. Choose any one of the following irrigation systems depending on the volume and source of water, size of operation and financial resources:

- Drip system
- Overhead sprinkler

*(continued on page 11)*

# PUMPKIN
# FROM SEEDLING TO HARVEST

( A two-page spread: pages 9 and 10 )



NURSERY

GROWTH

10– 15 DAYS

1–5 WEEKS (1-35 DAYS) AFTER TRANSPLANTING

# PUMPKIN
# FROM SEEDLING TO HARVEST

( A two-page spread: pages 9 and 10 )





CONTINUOUS GROWTH,
FLOWERING AND FRUITING

FIRST
HARVEST

SECOND AND
THIRD HARVESTS

5-14 WEEKS (35-100 DAYS)
AFTER TRANSPLANTING

14 WEEKS
(100 DAYS)

15-17 WEEKS (120 DAYS)
AFTER TRANSPLANTING

*(continued from page 8)*

- "Spray-up" or "fountain tubing", which may also be turned upside down.
- Flood irrigation which involves flooding of the drains along the bed once or twice per week according to the weather conditions. Use a pump and PVC lines or hose for this purpose.
- Direct watering of the plants



Irrigation of pumpkin

## Moulding

Moulding is important in order to:

- Loosen the soil for root penetration
- Facilitate fertilizer application
- Allow for fertilizer and water uptake
- Control weeds

Mould the plants just before the vines start to spread. This is done by using a garden hoe and loosening and heaping the soil around the plants in the mound area. Care must be taken not to damage the roots and young vines.



A mound showing moulding and fertilizer placement

## Weed Control

Effective control of weeds in the first five weeks of the crop is critical in order to give it a good competitive advantage. Control of the weeds around the field also helps to deter other pests. Use one or more of the following weed control measures:

- Use a pre-emergent herbicide before planting seedlings to kill the emerging weeds.
- Manually remove the weeds
- Rotavate the soil along the beds before vining to control weeds and loosen the soil.
- Use contact herbicides if necessary before the plant starts to spread, but care must be taken to avoid spray drift on the pumpkin crop.
- Use selective herbicides which kill the grasses but do not damage the crop.

> *Tip:* Pre emergent herbicides cannot be used if seeds are planted directly in the soil.

## Fertilizer Application

Fertilizers are sold in standard formulations of Nitrogen (N), Phosphorus (P) and Potassium (K). Ideally, one should apply fertilizers based on the results of a soil test and the nutritional requirements of the plant in relation to its stage of growth. Apply fertilizers about three times during the entire crop. Apply fertilizers in a circular band around the plants in the mound area.

- Apply 25g (5 tsp) of a high phosphate fertilizer (e.g. 12:24:12) to each mound within 1 week after transplanting if a pre-plant fertilizer was not used.
- About 5 weeks after transplanting, apply 50 g (10 tsp) of Calcium Nitrate mixed with 13: 13: 21 + 2 or 12: 12: 17 + 2 at a ratio of 1:1.
- About 9 weeks after transplanting, apply 75 g (5 tbsp) of either 13: 13: 21 + 2 or 12: 12: 17 + 2 per mound. This last application may not be necessary according to the health of the crop.

All of the above blends can be applied using the "wet-salting" method. "Wet-salting" is recommended during extended dry conditions. Dissolve 4 kg (10 lb) of fertilizer in a 180 litre (45 gallon) barrel of water. Apply 250 ml (1 cup) of this mixture to each mound in the root area. Irrigate the plants immediately after "wet-salting" to avoid fertilizer damage.

A calcium fertilizer is used to prevent blossom end rot and enhance fruit quality. This can be applied as a granular fertilizer along with the fertilizer application as already mentioned. Alternatively, one can apply calcium as a foliar spray at weekly intervals from flowering to fruit set.



Blossom-end rot

Various bio–stimulants are available and may be used as recommended to further enhance the growth and yield of the crop.

## Placement of fertilizers

- In the first application of fertilizer after transplanting, place granular fertilizers about 5–10 cm (2-4 in.) away from the plants.
- As the plants grow, apply these fertilizers 30-60 cm (12-24 in.) in a circular band around the plant within the mound area.
- Take care to avoid damage to the crop from fertilizer contact and field operations.

## Pest and Disease Management

An Integrated Pest Management (IPM) approach to control pests and diseases is recommended. This entails the practice of combining several methods of pest control that are economically viable, while ensuring minimal damage to human health and the environment.

There are three major methods used in IPM namely; Cultural, Biological, and Chemical control.

## Cultural control

Cultural control involves the best use of practices such as irrigation, drainage, fertilizer application, field sanitation, soil amendments, removal of the crop residues, crop rotation and early removal and disposal of diseased plants and other field practices. These measures reduce the levels of pests and costs of control.

## Biological control

This aspect of pest and disease management involves the use and encouragement of beneficial organisms to control pests and diseases. Some common beneficial organisms are ladybird beetles, wasps, spiders and frogs. There are also plants which are known to repel pests e.g. Marigold and Neem.

## Chemical control

This includes use of various synthetic pesticides such as fungicides, weedicides, insecticides, and nematicides etc. There are many pesticide formulations available. Select and use appropriate pesticides that are acceptable under the GAP protocol previously mentioned. Use pesticides only when needed and as recommended on the label. Monitor the crop for pests and diseases and then spray as necessary. This is recommended as opposed to routine application. The goal is to reduce pesticide use resulting in financial savings and protection of human health, beneficial organisms and the environment.

# Pesticides are Dangerous

**Here are some guidelines to follow for the safe handling of pesticides:-**

- *Only purchase pesticides in labelled containers.*
- *Choose the right pesticides for the job.*
- *Buy and use the least toxic pesticide.*

**When Using Pesticides:**

- *Carefully follow all instructions on the container.*
- *Wear protective clothing, mask, and eye protection when spraying.*
- *Choose a calm, wind-free time of the day to spray.*
- *Do not spray near children and pets. Keep them away from sprayed areas.*
- *Follow the restricted time for re-entering an area after a pesticide has been applied.*

## After Using Pesticides:

- *Wash hands and face thoroughly. Wash all clothing used.*
- *Keep all pesticides locked up, out of sight and reach of children and pets.*
- *Keep the pesticide stored in its original container - do not transfer a pesticide to a food or drink container.*
- *Store pesticides away from food, including pet food and livestock feed.*
- *Dispose of empty pesticide containers and unused pesticides properly.*

## In Case of Poisoning:

- *Contact your Doctor or nearest health centre immediately if a pesticide comes in contact with your skin, is inhaled or swallowed.*
- *Carry the pesticide container with you if you have to visit a doctor or health facility.*

# Use Extreme Care Always!

## Major Pests of Pumpkin

| PEST | SYMPTOMS | CONTROL |
|---|---|---|
| Thrips (*Thrips palmi*)<br><br>Scarring of fruit caused by thrips | • Discoloration, scarring, silvering, bronzing and deformation and dropping of leaves, flowers and fruits. | • Adjust the time of planting to the wetter periods of the year if possible<br>• Ensure adequate weed control<br>• Use overhead irrigation if available<br>• Mulch<br>• Practice crop rotation<br>• Use appropriate insecticides |
| Fruit Piercing Bugs (*Nezara spp*)<br> | • Premature ripening of fruits with corky blotches.<br>• Hollow rotted fruits | • Protect beneficial wasps by avoiding improper use of insecticides<br>• Use an appropriate contact insecticide |

| PEST | SYMPTOMS | CONTROL |
|---|---|---|
| Pumpkin Caterpillar (*Spodoptera spp*)  | • Holes on the leaves<br>• Punctures on the young fruits | • Monitor the crop for early detection<br>• Spray with an appropriate insecticide |
| Striped Cucumber Beetle (*Acalymma vittatum*)  | • Seedling death<br>• Holes and scarring of leaves, flower and fruits | • Use insecticides that do not have a long residual effect |

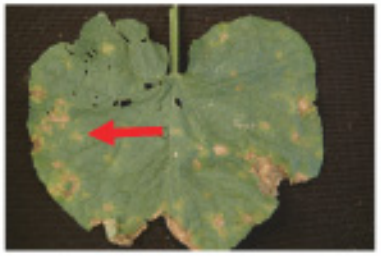
| PEST | SYMPTOMS | CONTROL |
|---|---|---|
| Cucumber Worm (*Diaphenia nitidalis*)  | • Holes on fruit<br>• Frass deposited outside holes | • Use an insecticide that is safe to apply on fruits |

## Major Diseases of Pumpkin

The major diseases of pumpkin are caused by fungi. Control fungal diseases by using cultural control measures as follows:

- Ensure proper field sanitation to reduce residual pest populations.
- Use recommended plant spacing to allow air flow through the crop.
- Correct the soil acidity since fungi and bacteria thrive in acid soils.
- Ensure good drainage as wet conditions favour fungal growth.
- Treat seeds with an appropriate fungicide.
- Remove diseased plants as soon as detected.

Chemical control can be achieved by using a systemic fungicide alternated with a contact fungicide at fortnightly intervals. Ensure that the fungicides selected can treat the problem diagnosed. Stop all fungicide applications at least two weeks before harvest.

| DISEASE | SYMPTOMS | CONTROL |
|---|---|---|
| Gummy Stem Blight (*Didymella bryoniae*)  | • V- shaped yellowing and browning at the leaf margins.<br>• A gummy substance exudes from lesions or cracks in the stems and fruits. | • Seed treatment with fungicide<br>• Practice general recommendations as previously listed. |
| Downy Mildew (*Pseudoperonospora spp*)  | • Pale green to yellow spots on the upper and lower leaf surface.<br>• These spots enlarge, coalesce and cause a dried/burnt appearance, eventually killing the plant | • Practice general recommendations as previously listed |
| Cercospora Leaf Spot (*Cercospora spp*)  | • Reddish brown/yellow spots are seen on the leaves.<br>• The centre of the spot may fall out leaving holes in the leaves<br>• These spots merge and cause leaf drop | • Use copper based fungicides<br>• Practice general recommendations as previously listed |

| DISEASE | SYMPTOMS | CONTROL |
|---|---|---|
| Powdery Mildew (*Erysiphe spp*)  | • White powdery growth on the leaves.<br>• It generally appears on older leaves which may wither and die.<br>• This fungus thrives under dry conditions | • Practice general recommendations as previously listed |
| Southern Blight *(Sclerotium spp)*  | • Leaves turn yellow and wilt.<br>• A white fluffy mass appears on the stem near the soil line | • Use soil fungicides at planting<br>• Practice general recommendations as previously listed |

## Harvesting and Post Harvest Practices

Pumpkin matures in about 3½ months. You can tell that your crop is mature when:

- The overall colour of the peel (rind) changes from shiny green to pale yellow. The colour of the rind that is in contact with the soil darkens.
- The stem and tendril close to the fruit begin to dry.

- A distinct abscission layer appears between the stem and the fruit.
- The blossom end (opposite the stem) of the fruit is fully expanded.
- There is an absence of latex flow when a small incision is made at the stem end of the fruit. If you are using this method, make this incision small enough so that the rind can heal.

Good Agricultural Practices (GAP) also apply to harvesting, handling, transport and storage of pumpkin.

Make a sharp clean cut when harvesting. Cut as close as possible to the fruit and ensure that the stem does not break off from the fruit. Fruits without stems will not store long. Fruits cut with long stems will damage other fruits mainly while transporting. Remove any soil from the fruits.

Harvested fruits must immediately be taken to a shaded area to allow quick cooling. Transport fruits in the cooler periods of the day. This will prevent high internal fruit temperature which affects the quality of the fruits.

Vehicle trays should be properly washed especially if they have been used to transport manure or pesticides.

The base and sides of the transport vehicle must be cushioned to prevent bruising and other physical injury to the pumpkin. Bruised fruits are rejected by exporters and this has been shown to cause losses of up to 25%.

Pumpkin can be stored at room temperature and at a relative humidity of 65–70% for up to 6 weeks if necessary.

For the export market, pumpkin should be washed in running tap water, immersed in a sanitizing dip for about 1-2 minutes, air dried and then packaged in ventilated netted bags.

