POSTHARVEST ISSUES IN HOT PEPPER PRODUCTION

Ayoub Mohammed (BSc. M.Phil.)

INTRODUCTION

Hot peppers continue to be an important crop both for both the local market and as the most important non traditional crop exported to foreign markets. Most of the hot peppers that are grown locally are scotch bonnets with smaller acrages cultivated under Habaneros especially the variety Caribbean Red. A number of handling problems continue to result in varying degrees of post harvest losses. Postharvest losses have been estimated between 26-35 % for locally marketed fruits and as high as 50 % for exported fruits In addition, with the demand for safer foods, food safety issues such as Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP) and Hazard Analysis Critical Control Points (HACCP) have all become an integral part of the postharvest handling system for hot peppers. Many of the problems that affect quality are discussed as components for the sake identifying the major handling issues. It is however important to appreciate that correcting handling problems must be seen as part of an integrated systematic approach aimed at improving the quality of the final product.

Key Steps in the post harvest handling

Harvesting and field handling.

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Transportation.

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Packhouse operation.

Field hazard control points

Worker health and hygiene

Container and equipment sanitation

Irrigation water

Use of animal manure

Sanitation of transportation vehicle.

Postharvest handling practices that impact on quality

A number of poor handling practices often result in substantial postharvest losses. These may be summarised as follows.

1. Inappropriate maturity indices.
2. Inappropriate harvesting techniques.
3. Use of inappropriate field packaging receptacles.
4. Poor transportation

Maturity indices and harvesting techniques.

Hot peppers should be harvested at the cooler times of the day (early on mornings or late on evenings) when they are most turgid. Turgid fruits snap easier and maintain their quality much better than fruits harvested during the hotter times of the day.

Hot peppers start to mature between 31/2 to 4 months after planting. Depending on the market requirements fruits may be harvested mature green, just turning, fruits with more green than colour , more colour than green or full colour. There is a tendency that if market demands are

high , for immature fruits to be harvested. Immature fruits are cream to very light green in colour.

Even under the best handling systems, these fruits will not have good shelf life and marketability and will shrivel due to moisture loss and are very susceptible to postharvest decay. One of the first symptoms of loss of quality is shrivelling. Shrivelling normally starts at the stem end of the fruit and is well correlated with a moisture loss of 4% or greater. Within 12-24 hours of harvesting moisture loss becomes quite significant in immature fruits concomitant with the first signs of shrivelling. Physiologically these fruits lack the natural wax which develops at full mature green. The absence of this wax exarcerbate rapid moisture loss and subsequently quality loss.

Quite often the wrong harvesting techniques are employed when harvesting hot peppers. Sometimes the entire bunch of peppers are held and pulled from the tree while in other instances individual fruits are held and roughly pulled from the tree. These practices are not recommended as they result in damaged calices and pedicels. Damaged stems provide an entry point for bacterial and fungal organisms which can cause severe rotting during storage

The recommended technique is to remove the fruits by holding the pedicel and turning in the opposite direction to the angle of repose of the fruit. This technique results in fruits snapping along its natural fracture line (natural abscission layer) . There are several advantages of using this technique.

1. The ease of detachment is a good indicator of fruit maturity
2. Fruits harvested along its natural abscission layer will be sealed thus being less susceptible to decay.
3. No ruptured pedicels on the plant therefore reducing pest and diseaese on the plant

INAPPROPRIATE FIELD PACKAGING.

The use of polypropylene bags or "feed bags" continue to be the packaging material of choice in moving peppers from farm to packhouse. Polypropylene bags are inappropriate and can lead to extensive damage to the peppers for several reasons.

1. Peppers are tightly contained resulting in compreesion damage and mechanical damage that only manifest themselves along the marketing chain.
2. The temperature in the bags can get to as high as 50 C which leads to rapid moisture loss and shrivelling.
3. The bags are stacked on top of each other during transportation resulting in futher fruit damage during transportation.
4. Polypropylene bags may compromise food safety since they cannot be sanitized and are often not stored under conditions that ensure food safety.
5. The netted nature of the bags can severely bruise the fruits that are in direct contact with the bags.

Harvesting crates

Harvesting crates are much more appropriate than polypropylene bags. High density polythyene (HDPE) crates can go a long way in maintaining the quality of hot peppers for the following reasons:

1. They bear the weight of the product as opposed to feed bags where the peppers bear the weight causing severe damage .
2. They can be easily sanitized.
3. Temperatures are much lower on arrival at the packhouse (28-34 C).
4. They are much easier to transport and are better able to maintain the integrity of the fruits.
5. Bruising , compression and friction is kept to a minimum.

One should always choose light coloured ventilated crates. Ventilation prevents temperature bulid up and light coloured crates will reflect more light both of which result in better quality fruits.

Harvesting crates can be easily sanitised using the steps outlined below:

Wash crates with running tap water

Scrub with detergent

Rinse

Dip in food grade sanitiser

Store.

Vehicle used for transporting hot peppers.

Vehicles should be clean with covered trays. Placing crates in covered trays significantly reduces the impact of sunlight on peppers. Vehicles used for carrying hot peppers must be fitted with good tyres and should have good suspension so as to reduce the impact of bruising caused by friction to the peppers. Vehicles used for transporting fresh produce should not be used for carrying other materials that may compromise the food safety of the peppers.

Proper field handling

Harvested fruits can be collected in smaller plastic containers which can then be transferred to harvesting crates kept in a cool part of the field. Hot peppers which are too ripe can be placed in a separate container as these can be sold for processing. Other fruits which do not meet the requirements of the buyer should be culled and sorted before leaving the field. This prevents having to take them to the packhouse where they will be rejected in any case. Decaying fruits should never be placed in the harvesting crates since they will result in transfer of diseases from diseased fruits to sound fruits. It cannot be over emphasized that care must be taken during harvesting and through the rest of the operations because every damage or puncture are potential sites for fruit decay. Harvesting crates should be light coloured ventilated and shallow. During transportation the use of light coloured covering will also go a long way in ensuring quality maintenance during the rest of the postharvest operations.

For local market, hot pepper can be field packed once the following conditions can be guaranteed.

- Proper washroom facilities for workers.
- A clean well ventilated small packing facility bult away from the field.
- The packhouse area must never be used to store pesticides and other agro chemicals.
- The area must be away from other field activities and not at risk of being contaminated with manure etc.
- The fruits entering the facility are free from free moisture.

There are a number of advantages to field packing

- The quality of the product can be maintaned far better because of reduced handling steps.
- Culled fruits are left on the field
- Better coordintion between harvesting and packing operations.

Field packing is also beneficial to the exporter since it facilitate a total quality management approach from field to final strage. Exporter confidence in the such farmers can result in increased business and farm profitabilty.

Packhouse operations.

Importers demand a high quality product given that they pay premium prices for the product.. The quality criteria demanded by importers are as follows:

Hot peppers must be whole.

Fresh in appearance.

Must be representative of the colour demanded .

Free from soil .

Free from decay.

Free from disease.

Free from injuries.

Free from sunburn foreign matter off odour.

Free from banned pesticides.

Two classe are suggested to be used in further grading quality especially for export purposes Class 1 and Class 2.

Class 1

These comprise peppers of very good quality and should possess the following qualty characteristics.

- Of normal shape development and colour of the variety.
- Representative of the degree of ripeness demanded
- Virtually free of blemishes
- Attached stem and calyx

Class 2

The essential characteristics are preserved with the following acceptability:

Show slight defect in shape and development.

Slight injuries not exceedind 1cm 2 per fruit.

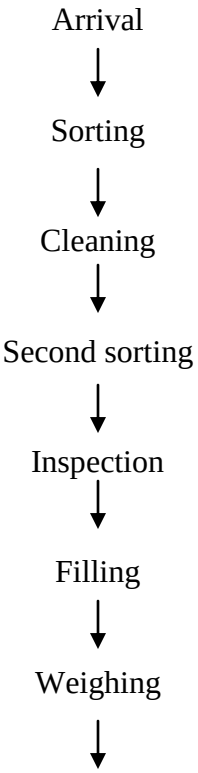
Slight damage to the stem.

The use of a grading system provides a mechanism for further marketing fruits. Grade 1 fruits can be sold at a better price than grade 2 fruits encouraging growers to pay far greater attention to handling since the price which will be paid would more than compensate for the extra effort involved in harvesting and handling

Steps in packing produce for regional and international markets

The information presented here uses the procedure developed bythe National Agricultural Marketing Development Corporation (NAMDEVCO).

The flow chart of the procees used at the packhouse is given below.



On arrival hot peppers are crated weighed and taken into the packhouse. In some cases if the peppers require cleaning because of the presence of water splashes they are taken to a separate sorting table. There are sorted and culled. The following categories of hot peppers are removed from the packing lines

1. Cracked fruits
2. Fruits with anthracnose damage
3. Fruits with compression damage.
4. Fruits whose colour do not meet the requirement of the intended customer
5. Immature fruits.
6. Sun burnt fruits

Fruits are then cleaned in a cleaning and sorting machine eqipped with a moistened roller brushes which are continually cleaned with water fruits are never subjected to running water since this will result in water soaking and fruit rotting. These cleaned fruits are collected, placed in sanitised harvesting crates and stored of the ground on sanitised plastic palettes.

They are then taken to a second sorting table where they are inspected for Mites and Thrips . Once cleraned they are place in fibreboard boxed weighed and sealed. They are then labelled and placed in chillers kept between 12-14 C. This pre cooling steps is critical to hot pepper quality. Hot Peppers have a high respiration rate. If this respiration goes unchecked it will rapidly deteriorate the product. Heat damage is indicated by a bleached appearance on the pericarp of the fruit normally seen in fruits kept at high ambient tempearture for more than 5 hours. Fruits which are not pre cooled at all will show symptoms of heat damage within 1 day of harvesting.

POSTHARVEST DISEASES

Bacterial soft rot

Bacterial rots are caused by *Erwina sp.* While rotting expresses itself in the postharvest environment during storage the pre requisites for this disease actally occur during harvesting and subsequent handling. Bruising ,damaged stems , finger nail damage etc .In fact any kind of damage to the pericarp or stem increase the susceptibility of the fruits to be invaded by bacterial organism which will cause rotting. The application of chlorinated sprays at a rate of 50-75 ppm or Milton at a rate of 500 ppm have been shown to significantly reduce postharvest bacterial rotting.

Anthracnose

This is a problem that starts on the field . Anthracnose is a fungal disease that are seen mainly on the pericarp of the fruits. The predominant symptom is concentric black spots. Fruits that have just started to turn show these symptoms more readily than mature green. The presense of these symptoms on turning fruits may indicate that the mature green fruits might also be innoculated but the visible symtoms only express itself during storage. A proper field management programme using the principles of integrated peast management is the best way to manage this disease.

FOOD SAFETY ISSUES

Regional, international local hotels and supermarkets have started to make greater demands on the safety of the food they provide to their customers. The protocols which best address these concerns are the Good Agricultural Practices protocols. This is a series of guidelines which are to

be adopted on the farm. Adoption of these practices can substantially reduce the risk of physical, chemical and biological contamination of foods. The major issues that are addressed in the protocols are

Site selection
Worker health and hygiene
Management of animal waste
Water quality
Pesticide usage and maximum residue levels
Equipment and transportation sanitation
Field container sanitation

Two models which have been around are the Europen model (Eupopegap) and the american model simply called GAP. The level of adoption in the local agricultural sector is at a very early stage and steps must be taken to fast track the adoption.