

SHOP-RITE/CHECKERS SUPERMARKET EXPANSION INTO ANGOLA

Report on:

QUALITY IMPROVEMENT RECOMMENDATIONS

REPORT PREPARED FOR RAPID PROJECT/RCSA

By

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List of Acronyms

CLUSA: Cooperative League of the United States of America

Quality Improvement Recommendations

1.0 Introduction

In order for the smallholder farmers to capture and maintain a share of the high income markets such as supermarkets and fresh produce wholesalers, they need to produce high quality produce. There are a number of factors that influence produce quality and the growers will need to pay attention to these factors and introduce practices to improve quality.

Smallholders in Angola face a number of constraints with regards to horticultural production that affect the quality of their products. One such constraint is limited funds to purchase appropriate inputs such as good quality seed or irrigation equipment. They also need to improve their knowledge and skills of horticultural production in areas such as pest and disease management. Angolan smallholders have an advantage, however, in that they are able to respond more quickly to changes in the field or in the market. This flexibility enables them to exploit market or product niches. Generally smallholders are able to pay more attention to detail and so have the potential to produce and deliver a higher quality product. The most important factors influencing crop quality are highlighted below.

2.0 Quality Assurance Requirements

The activities under this objective include investigation into quality requirements and quality criteria of the major markets targeted by smallholders. This will then lead to the development of quality standards that can be utilised by all producers of fruits and vegetables in Angola.

The next activity will then be the development of methodologies that smallholders need to follow in order to meet the standards. These will be used to produce a quality assurance manual. The two areas that affect produce quality are the problems of poor grading and selection as well as the problem of hazards to human consumption. A quality assurance program should therefore be set up to address these two areas.

The quality assurance program should start with a risk assessment exercise to find production activities that may lead to possible contamination with pesticide residues or microbial organisms which are the two main hazards. Trained experts who have experience in this type of work should be brought in for this activity. The next steps will then be the development of a program to avoid, mitigate or eliminate these potential hazards. The methodologies that will need to be investigated include the possibilities for pesticide and microbial testing within Angola.

The quality assurance program will need to be introduced to the growers and the association who will be responsible for implementing it. The easiest way could be for the farmers association to set up a quality control committee that would be responsible for the running the program as well as making decisions on sanctions to be applied in the event members violate the standards. This is necessary for problems such as instances where banned pesticides are found being used and the association needs to protect the other members from losing their market. It is most likely,

however, that most corrective actions would involve training so that members become more efficient and skilled at implementing the quality program. Grading exercises should be regularly carried out, for example, since it will take growers some time before they become proficient at grading.

3.0 Variety Selection

It is important to remember that good post-harvest quality begins with good pre-harvest preparation and production. A poor quality product in the field cannot be improved after harvesting. Once a crop has been selected and the target markets have been identified, the next step is to choose the variety to grow. Many varieties are selected on the basis of yield performance and characteristics such as pest or disease resistance. Post-harvest handling characteristics should, however, also be taken into consideration. Many of the varieties being recommended by the CLUSA program are the open pollinated or proven hybrids that perform well in Angola's subtropical environment.

Many of the vegetable varieties being sold are the old open pollinated varieties that are not disease resistant or adapted to warmer climates. The tomato cultivar Roma is widely grown because it has good post harvest characteristics and shelf-life but has limited disease resistance. Texas Grano is the major onion variety grown but it has a limited shelf life; there are now many onion varieties with higher yield performance as well as better storage characteristics. Poor quality seed could have caused one problem that was observed. Some of the tomato fruit on display at Dengu were misshapen and had blotchy colouring. Further investigation revealed that the grower had purchased the seed locally. Poor quality seed is therefore a problem to be avoided since this will spread disease and produce a poor quality crop.

The best vegetable varieties for use under smallholder farmer conditions are the high dry matter varieties since they are firmer and will be less damaged by transporting along poor roads. Tomato varieties such as Rodade should do well since it should give a higher yield than Roma. The onion variety Texas Grano is high yielding but has poor storage characteristics. If onion storage is to be used as a technique for marketing during the off-season, then varieties such as Dessex or Pyramid should be used. The carrot variety Kuroda that is being recommended by agronomists is a good variety to grow because it has tolerance to *Alternaria*.

4.0 Field Preparation

Crop quality can be influenced by the way the crop is managed in the field. A good example is that of plant spacing. If the plants are spaced too close to each other this may reduce air movement which in turn favours increased disease incidence. In a crop like onion final bulb size is affected by spacing; if plants are grown with a wide spacing, the bulbs will be bigger, which is not desirable for some markets. The onions in Dungo were growing well although it could be noticed that they had variable sized bulbs. This was probably due to poor nursery management resulting in uneven sized seedlings.

5.0 Soil Fertility

The fertility level of a soil can affect post-harvest characteristics of vegetables. With tomatoes, for example, excessive nitrogen application will encourage vegetative growth at the expense of fruit growth, resulting in fruit that are soft and easily damaged and do not store well. These fruit are usually poorly coloured. A good pH balance is also important and the granitic sands common in Huila province are susceptible to low pH problems and may need to be limed every few years. This is important because a good pH balance improves the availability of calcium which is needed for post-harvest characteristics such as fruit firmness. One or two examples of blossom end rot (a sign of calcium deficiency) in tomatoes were observed and so soil pH may need to be looked into (although blossom end rot is also related to poor water management). Many farmers in the areas visited use a combination of animal manure and fertilizer for soil nutrition and this is always beneficial. The black soils around Dungo in Bengo province are said to be rich and so only a light application of fertilizer is required, in fact most crops looked healthy. The tomato crop in a field nearby with sandy loam soil showed signs of mineral deficiency indicating some adjustments need to be made to fertility recommendations. A nutrient balance is therefore very important and micronutrients should also be available. Boron deficiency, for example, can result in splitting of carrots and brown cauliflower curds, thus reducing their quality.

6.0 Crop Protection

The control of pests and diseases is a major activity when growing any crop because they significantly reduce yields. Some pest problems cause cosmetic damage that makes the product unattractive to the customer. The main problem observed during the visit to Huila and Bengo provinces was that of inappropriate pest control practices. A consignment of tomatoes that had been harvested and were on display had pesticide residues that were clearly visible. This is a major concern for many markets since it indicates that the food may be unsafe to consume. The growers in the program will therefore have to put more effort into ensuring they produce safe, wholesome fruits and vegetables. They will also have to introduce mechanisms to prove that they have produced a product that is not contaminated with microbial organisms or pesticide residues.

A related problem is the use of non-registered chemicals that also results in dangerous pesticide residues on fruits and vegetables and may cause an increase in disease incidence since they are often not effective in controlling the organism in question. The failure to observe application to harvest intervals also results in pesticide residues and the risk of poisoning to consumers.

In order to prevent some of the problems highlighted above, several practices should be introduced. The first is the use of integrated pest management methodologies for crop protection. These include the use of cultural practices for disease prevention and scouting techniques for regulating pesticide application. Keeping records of all pesticide applications needs to be introduced so that they are available for inspection by purchasers who want to be assured that proper crop protection methods are in place. There are a number of pesticides that have been banned by the WHO and the

United States Environmental Protection Agency, and it is suggested that the association representing the farmers prohibit the purchase of these chemicals.

7.0 Crop Management

A well-managed crop will yield good quality produce at harvest. If weeds are removed then competition for nutrients will be reduced and the crop will be healthier and the fruits and vegetables will be of better quality. Some examples of poor weeding were observed and CLUSA staff indicated that they were encouraging growers to cultivate smaller fields that can be better managed.

Many of the farmers visited have access to water and are going into year round production, having invested in water pumping and irrigation systems. Some farmers said they plant three potato crops in a year. The irrigation systems currently being used include gravity fed flood systems and petrol driven water pumps, also using flooding to deliver the water. Flood irrigation has the advantage that the foliage is not wetted which reduces the incidence of many diseases, such as Late Blight. The problem is that there is a greater danger of leaching of nutrients (especially for those placed on the surface). A few tomato fruits had signs of calcium deficiency (blossom end rot), more likely resulting from poor water management; this needs to be improved if high quality fruits are to be obtained consistently.

8.0 Harvesting and Handling

Discussions held with retailers highlighted a major concern they have when dealing with smallholders. They indicated that growers sometimes harvest produce prematurely. This practice results in a product with a very short shelf-life. Potatoes, for example, need to have the tops cut two weeks prior to lifting so as to allow the peel, which protects against transpiration and mechanical injury, as well as pathogens, to thicken and the starch levels to increase. Potato tubers harvested prematurely will bruise easily and be more susceptible to disease infection. Determining maturity is not always easy and growers may be anxious to sell their crop so as to bring in some cash. In the case of green peppers for example, the full size of the fruit may lead some to think the crop is ready but in fact the proper indicator is the firmness of the fruit which may take up to two weeks to show. An immature green pepper will shrivel within a few days and has a bitter taste.

Post-harvest techniques are determined by the characteristics of the products being handled. The most important consideration is the fact that fruits and vegetables are metabolically active and so are undergoing rapid changes in respiration and physiology. Slowing down these changes will therefore extend post-harvest life.

Conditions that slow down respiration include keeping the product in a cooler environment. Each commodity has an optimum temperature which could maximize its storage life provided other conditions are favourable. Optimum temperatures are usually around 12 °C for commodities of tropical or subtropical origin such as tomatoes or 0 °C for a product like carrots. The introduction of cold-rooms and other

requirements needed to maintain a cold chain is expensive but a significant drop in temperature can still be achieved by following some practical steps.

One such technique is to have a structure in the field to provide shade to harvested produce. Keeping produce in shade can reduce surface temperatures by half. A commonly recommended practice is to harvest during cool periods such as early morning or evening. Keeping a vehicle in the shade before loading and transport is a simple recommendation that is usually overlooked. Covering the produce with a moist porous material will allow for evaporative cooling and an even greater drop in temperature. More sophisticated evaporating cooling structures can be constructed if necessary using porous materials such as charcoal or straw. All the above methods are techniques that do not require electricity or expensive equipment and should be incorporated in daily management for improved handling of fruits and vegetables.

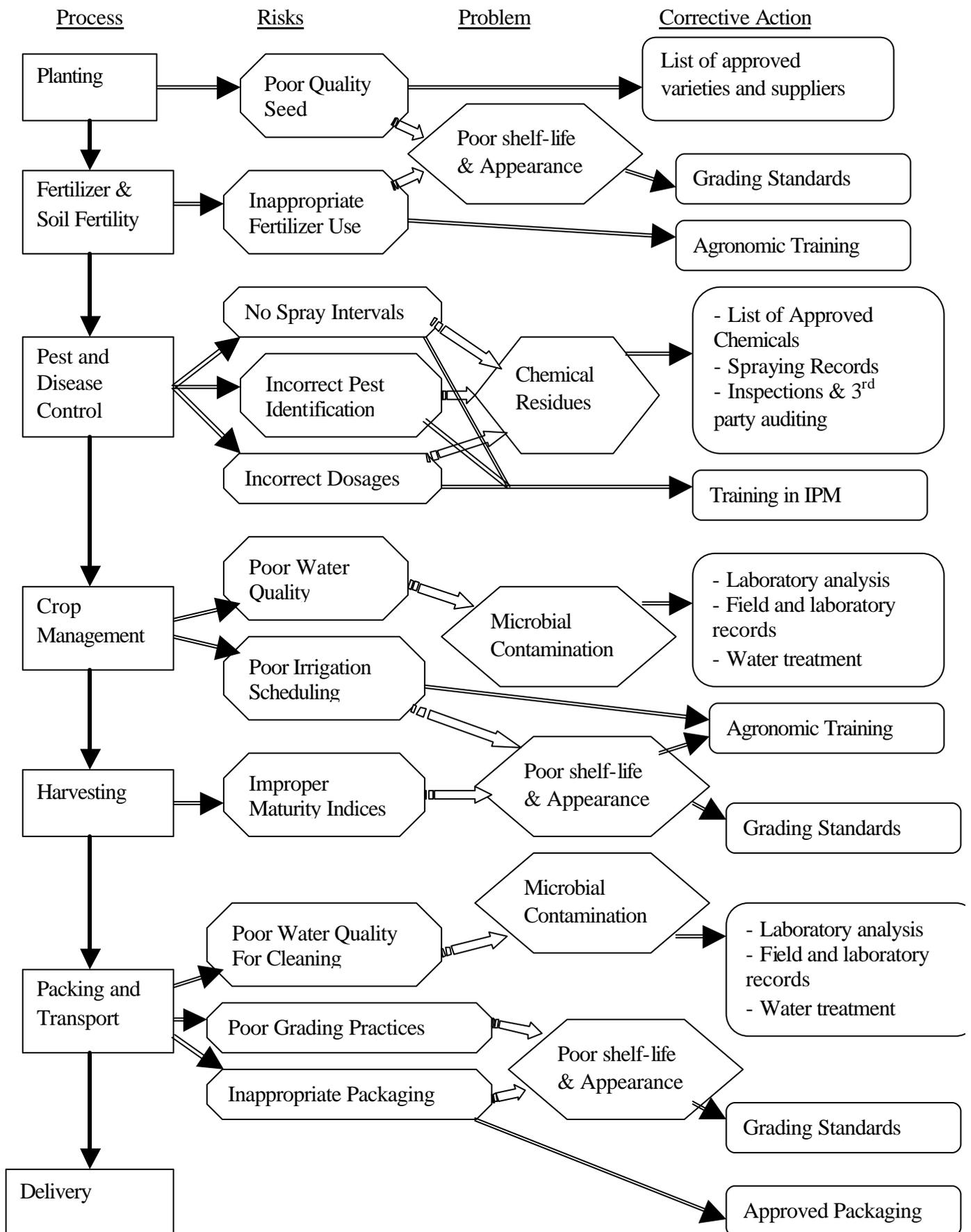
Fruits and vegetables also undergo changes in texture and they become softer. This means they become more susceptible to bruising and so a very important recommendation is that they should be handled very carefully to avoid any bruising. Damage to fruits and rough handling such as dropping a box resulting in an impact that ruptures peel and flesh can cause vegetables to rot. Constant vibration or rubbing can occur when fruit are packed loosely in a box or driven over rough roads and this can also cause damage. Damaged produce is unattractive to the customer, especially if the damaged area changes colour due to enzymatic browning reactions. Wounds can act as entry points for disease causing organisms and this may result in losses due to rotting. Inclusion of damaged products with sound/intact products will lead to more rots, wilting or shrivelling, faster ripening or over-ripening.

9.0 Packing and Transportation

If packages are over filled and or vehicles overloaded, produce can be damaged by the resulting weight placed on them. Good handling therefore includes packing produce so that they do not get damaged in transit. No transportation of produce in Angola was observed and so only general comments can be made at this stage. However, it was observed that CLUSA staff was recommending large plastic crates. Plastic is good for sanitation since they are easy to keep clean. The design of the crates was good since it allowed for smooth inside edges instead of sharper edges which can pierce produce. The only problem is that the crates may be too big for some products. Transporting tomatoes in them, for example, may result in some damage because the crates are too deep; a shallower container or smaller box may be more suitable. Some strawberries were packed in straw baskets which presents two problems. They have a smaller base than top which means that fruit on the bottom are supporting a greater weight and will become crushed. The inner surfaces of most baskets usually have sharp edges that pierce fruit thus causing losses due to damage. Although strawberries are not one of the crops being promoted by CLUSA, this example highlights some of the problems that have to be tackled when working on packaging.

Below is a flow chart indicating some of the risks and suggested corrective measures needed to ensure the growers deliver a high quality product.

Flow Chart for Produce Quality



10.0 Traceability

In order to demonstrate to the market that the smallholders have produced a high quality product, they need to introduce mechanisms that will allow each consignment to be traced back to its point of origin. The system should be thorough and transparent enough to highlight all the different processes that the consignment has been exposed to. Due diligence is the process of demonstrating that the organisation has a quality assurance system and an appropriate internal control system in place.

The most important aspect of due diligence is record keeping and documentation. It is critical to have good records of all aspects of production and handling such as field spraying records or percentage pack-out and quality. The quality and condition of the product when it arrives at the central sorting site need to be recorded, and this may help solve disputes with growers should these arise. It is necessary to indicate who in the organisation is responsible for which steps and when important actions are required.

Good records are necessary where traceability is required (of the product from the farm to the market). One of the most common recording systems is to give each individual farmer a number and this is assigned to all transactions relating to this farmer, including each consignment. If necessary the association that the farmer belongs may be assigned an alphabetical letter which can prefix the farmer number.

When the farmer makes a delivery to a central collection or sorting centre, the date of delivery can be used as the batch number, a specific batch number can be used or a combination of date plus number can also be used.

It is preferable not to repack produce as this may increase losses due to damage, so the field packing must be very thorough. However, sometimes the farmer's produce may need to be repacked or regraded depending on market requirements. In such a situation, produce from different farmers should never be mixed.

The other key requirement in managing a good assurance system is to have well trained and motivated staff who understand the importance of the system and are committed to ensuring effective implementation.

In some cases due diligence can be ascertained by third party or independent monitoring or auditing. However this is usually done when trying to meet a specific standard or certification such as EUREPGAP.

Annex 1. Quality assurance standards

Quality Assurance and Food Safety concerns - HACCP, EUREPGAP

The perception of quality for many consumers of fruits and vegetables is related to the appearance of a product. When a product is uniform in size and colouring and is blemish free it is usually regarded as a high quality product. Other quality parameters that may be taken into consideration are the more intrinsic characteristics such as taste and nutritional value. Many consumers also expect the product to be safe to consume. It is difficult for a customer to assess the safety of a product before making a purchasing decision but if there is a problem the impact will have negative repercussions for the vendor as well. Many retailers (especially in the developing world) are now taking precautions to prevent their customers being exposed to food safety hazards. They are also taking steps to ensure they receive a uniform product in terms of their requirements by requiring quality assurance programs be implemented by their suppliers. There are several standards that have been developed but they usually cover aspects of uniformity of appearance, food safety, and environmental and social concerns. Implementation of the standards usually involves accreditation and certification with regular auditing (internal or external) to ensure compliance.

HACCP (Hazard Analysis Critical Control Points): The main hazards that may affect consumers that are found in fruit and vegetable production and marketing are related to microbial contamination (e.g. *E. coli*) and pesticide residues on the product. A hazard is any biological or chemical or physical property or condition of food which may cause it to be unsafe for human consumption. All possible sources of hazards should be identified and it is usually necessary to call in experts for this work. The risks (or the likelihood of a hazard occurring) should also be listed. These may occur at any point in the supply chain and so mechanisms have to be introduced that prevent the hazards from developing. This can include management procedures to prevent the hazard from occurring or reducing the effectiveness of the hazard. The main mechanism is the introduction of a lethal step in the production system (e.g. heating of a fruit will kill bacteria) to eliminate the hazard. These are termed control points.

In order to ensure that a product is free of hazards it is necessary to study the whole production process and indicate all possible points of risk (where a hazard may occur). The next step is to introduce a system where procedures are introduced to eliminate the hazard. As long as the same procedure is followed each time, the system will ensure that the product is free of any hazards by the time it gets to the consumer. This is termed HACCP or Hazard Analysis Critical Control Point. This is a system normally used in food processing but it has possibilities for application in fresh produce handling where it can be used to eliminate the possibility of food safety problems occurring.

EUREPGAP: The regulations governing export of horticultural produce into the European market include requirements to ensure uniformity of quality and so all grades and standards and phytosanitary regulations are now harmonised. European regulations also include pesticide usage and residues on fruits and vegetables with a wide range of chemicals now banned and minimum allowable levels strictly enforced. This also includes standards for food safety hazards like microbial contamination. Many of the larger retailers and supermarket chains in Europe have come together to

develop their own more stringent standards and codes of practice. The European retailers consortium Good Agricultural Practice (EUREPGAP) standards have been developed to protect their customers and to prevent infringement of the European regulations. The introduction of standards like the EUREPGAP have significantly affected exporters of fresh produce to Europe especially in terms of costs of implementation and auditing and the ability to meet the requirements stated. Smallholder farmers will have great difficulty in meeting these requirements and may lose income from sale of their produce to the European markets.

Suggested Standards and Specifications

The following provides an example of standards that can be used for preparing the produce before delivery to the customer.

- **Size.** The vegetables will be of uniform size and separate size grades will be packed in separate boxes.
- **Colour.** The vegetables will be of uniform colour and maturity and the different colour grades will be packed separately.
- **Blemish.** The vegetables shall be free of all blemishes, bruises or disease scars or signs of damage by pests. Vegetables with minor scars (up to 5% of the surface) will be packed as a separate and lower grade.
- **Taste.** The varieties of vegetables to be grow will be selected on the basis of taste that is acceptable to the client. Agronomic activities must be implemented so as not to alter the taste characteristics required by the customer.
- **Pesticide and Fungicide residues.** The vegetables shall be free of all residues and they shall be produced using Integrated Pest Management techniques and all harvest intervals shall be followed.
- **Packaging.** The vegetables shall be packed in strong, durable, clean (and cleanable) containers that provide full protection to the contents.
- **Labelling.** The vegetables shall be properly labelled with the name of producer, production area or district, and date.

The product must have reached the required maturity level. They must have reached the required level of physiological development to enable ripening if this is necessary. They must be able to arrive at the market in a satisfactory condition. In all cases the product must be fresh and intact. The product must be sound, that is free of disease, rotting or deterioration. The product must be clean and free of any visible foreign matter and any foreign smell or taste.

Classification

Extra Class: Vegetables in this class must be of superior quality. The shape and colouring must be characteristic of the variety. They must be packed in containers of

uniform size and colouring. They must be free of defects with the exception of very slight superficial defects provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package.

Class 1: The product must be of good quality and characteristic of the variety.

However the following slight defects may be allowed provided these do not affect the general appearance of the produce, the quality and the keeping quality and presentation in the package.

- Slight defects in shape
- Slight defects of the skin due to rubbing or sunburn, suberized stains due to resin exudation and healed bruises.

Size to be determined by weight or by diameter. 10 % of the number of items may be outside of the stated size grade.

Presentation: The content of each package must be uniform and contain only the same variety, origin, quality and size.

Packaging: The packaging must protect the produce properly. The materials used for the packaging must be clean and any cushioning material must be new and must not cause damage to the produce.

Annex 2. Postharvest Handling Procedures

After produce has been harvested, it is removed from the field and taken to a central place for sorting, grading and packing. The handling facilities should provide shade to protect the vegetables from the sun. It should have a solid floor covered in concrete or straw. There should also be grading table for the sorting of the produce. All produce must be free of contamination of microbial, chemical or physical hazards that can harm a consumer. The handling process should therefore eliminate these hazards and avoid introducing them on to the product.

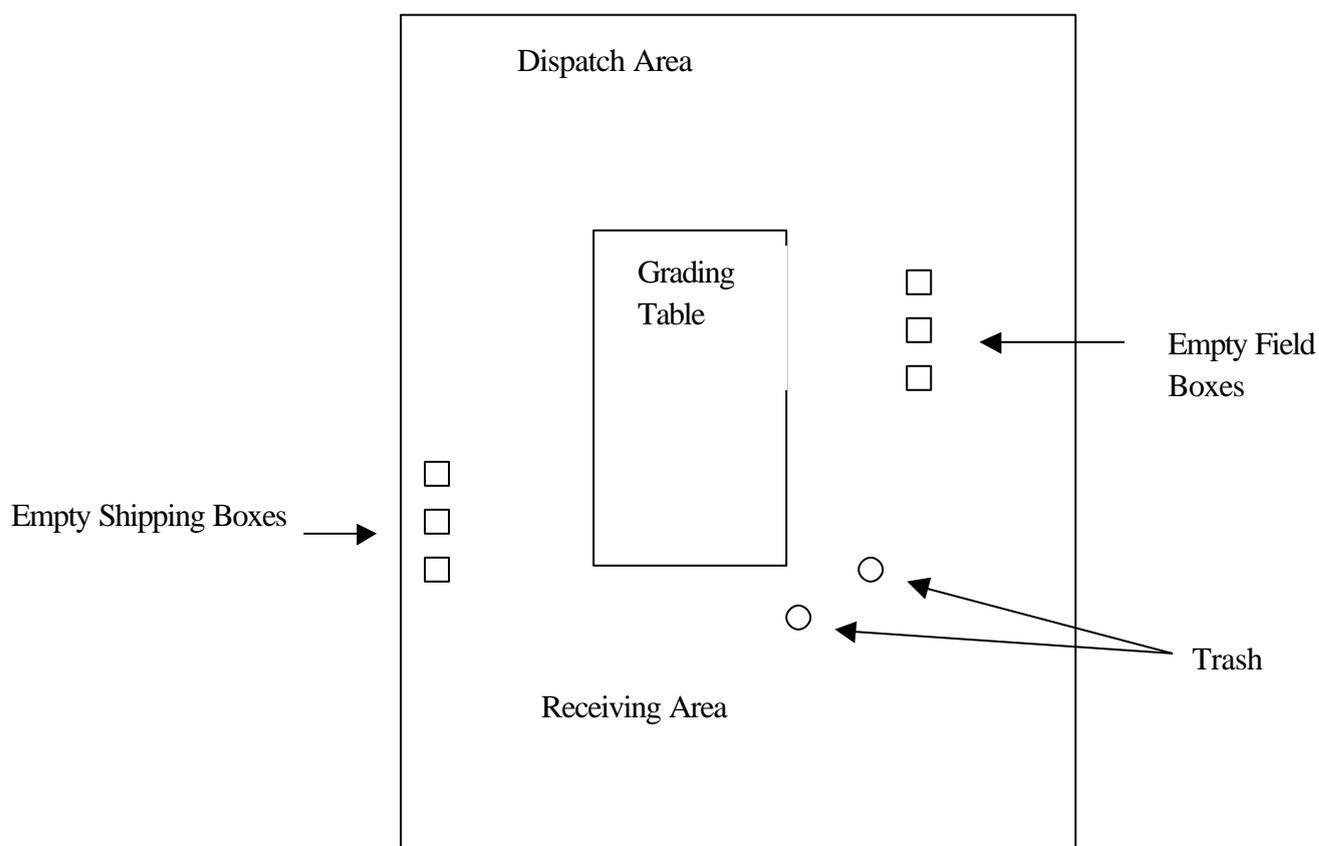
The handling and grading process should therefore be clean and hygienic. During the harvesting operation in the field, the workers must first wash their hands before harvesting or after using the toilets so as not to contaminated any produce. Equipment, tools and containers coming in contact with the product must therefore be clean. The packaging material and the workers must be clean. Wooden crates must be clean and the wood should not be treated with preservatives. Containers must not be used for anything else other than foodstuffs. In order to reduce microbial contamination during storage and transport, the product must be kept cool.

The persons involved in grading and packing must be healthy and operate in a hygienic manner including wearing clean overalls, washing of hands before packing, having short fingernails (this also reduces bruising of produce), covering their hair. All illnesses and wounds must be reported so that corrective action can be taken (e.g. covering minor wounds with waterproof plaster). At the pack shed or grading area, hand-washing facilities have to be in place for all those using the toilet. If running water is not available, a hand basin can be used. Therefore well-constructed toilet facilities need to be provided for workers.

The grading shed must allow plenty of light in order to ensure that grading decisions and other activities are easy to implement. The building should be well ventilated and cool. The work surfaces (e.g. grading tables and floors) must be kept clean. A cleaning schedule must be drawn up and cleaning records maintained.

An example of a layout for a packing station is shown below.

Simple Packing Station



The area must be protected from insect, rodents and birds. Dogs and other domestic animals are not allowed in the packing area. Control of rodents may be necessary if they become a problem but rodenticide chemicals must not be allowed to come into contact with vegetables. The area should be kept clean so as to discourage pests.

Waste material such as old containers or packaging or equipment must not be kept near the packing area. Waste material from the grading process must be carefully disposed of using a covered container located in an opposite direction to the clean selected vegetables.

Sometimes there is need to wash the vegetables before packing them. The water to be used for this operation must be clean and potable (fit for human consumption) and if there are any doubts it must be tested for microbiological contamination at a recognised laboratory. Records of these tests must be kept. There may be need to check water quality on a seasonal basis. If there are problems then corrective action must be taken and this has to be recorded.

Packing station operations: The flow of the product through the pack shed can follow a set pathway as it is prepared and packed. It is very important to note that the produce must be handled carefully so as to prevent any damage from dropping or bruising or rubbing. Damage to fruits and vegetables results in unsightly bruises, encourages disease and reduces shelf-life and these problems reduce marketability. The main operations that take place within a pack shed includes–

- a) Receiving of produce. Material from the field arrives, is unloaded and recorded. Space is required for this activity and the area must have protection from sun and rain.
- b) Cleaning and trimming. The material may need to be cleaned either dry or with water. Product preparation may include trimming or cutting off undesirable plant parts. It is important to note that disposal of waste material must move in a separate pathway from clean material.
- c) Grading. The next step is the grading or the sorting of the produce according to market requirements. It is important to try and obtain a uniform pack with all blemished fruit removed. Usually the product should have a uniform size, colour and maturity.
- d) Packing. The produce is then packed into boxes for shipment to the market. In high value markets these boxes enable the product to be identified and also protect the product from damage during transit.
- e) Storage. Fruits or vegetables may need to be stored before transport and optimum conditions should be provided for this. The most important storage treatment is temperature and humidity control.
- f) Dispatch. Produce that is ready is then transported to the market. Good record keeping is important so that any problems that occur in transit or at market can be resolved quickly.

The growers association must keep good records of quantities of produce supplied by their members. This helps resolve disputes and it also helps ensure traceability if there is a problem. These records can include name of producer (or grower code) and date of delivery, vegetable type and variety, total number or weight of goods, temperature and condition of produce.

When produce is delivered to the client, there must be clear documentation leading back to the original grower. The association should have delivery register where the name of the producer, date of delivery, type of product, quantity and quality are recorded. The grower should retain a copy in case of any misunderstandings that may occur.