

Afghan Grape Post-Harvest Handling Manual



ROOTS of PEACE



MINISTRY of AGRICULTURE,
IRRIGATION and LIVESTOCK



The World Bank

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Selected Scenes from the first season of training Afghan farmers and merchants on quality packaging procedures.



1 Introduction

This manual has been compiled to explain the process and problems that occur in harvesting and packing table grapes for modernizing markets¹.

Packing export table grapes of acceptable quality is a specialized and labor intensive task requiring knowledge of the cropping, packing, cooling, logistical and marketing process.

Good quality table grapes must have a good shelf life. There should be no browning of berries, dry stalks and a minimum of water loss. Berries should be firm, have a crisp texture when eaten, good flavor and an even color.

The object of the post harvest process is to get the grapes into the box as effectively and as efficiently as possible with the minimum of deterioration. The rate of packing will depend on how well the grapes have been prepared in the vineyard and the net return will depend on the market forces of supply and demand and on how well we have satisfied the demands of the market on the quality of product and market specifications. The hard truth is that what is advertised on the outside of the box must inside of the box. Without this element of trust there will be no confidence in the product, the brand, merchant or producer.

To explain the process of packing quality table grapes, the following aspects of the post harvest process will be discussed:

- Producing quality in the vineyard is the first step
- Definitions of terms used in the pack house
- Harvest practices to assure quality
- Documentation to assure quality control and payment
- Care and cleaning of pack house equipment
- Pack house management

¹ Funding for this manual has been provided through the Grape Value Chain Project (GVCP) of the World Bank Emergency Horticulture and Livestock Project (HLP), Contract No. MAIL/WB/HLP/Contract – 5185, IDA Grant Number: H226 – AF Project ID: P098256. The HLP is implemented by the Ministry of Agriculture, Irrigation and Livestock (MAIL) of the Islamic Republic of Afghanistan. Roots of Peace (ROP), an American NGO operating in Afghanistan under Ministry of Economy, NGO registration # 165, was the consulting organization for the GVCP. Mr. Louw Theron was the Roots of Peace consultant. The contents of this publication are the sole responsibility of ROP and can in no way be taken to reflect the views of the World Bank.

2 Producing Quality in Vineyard is First Step

Not much can be done in a pack house that has not been done in the vineyard beforehand. Therefore it is important to control bird damage, insect damage, and physical damage e.g., wind and chafing, and the control of diseases such as Botrytis and Powdery Mildew. It is important to understand the threat of Powdery Mildew² on the quality of table grapes and to prevent infection of this fungal disease as early as possible, as this is the single biggest threat to export table grape production in Afghanistan.

Powdery Mildew

This disease affects the lasting capacity or “shelf-life” of the grapes, drying out the stalks, making the grapes look old, unattractive and past their best, leading to customer complaints and claims from receivers. Powdery Mildew is seen in most countries as a reason for immediate rejection and destruction of the consignment. Further information on the control of Powdery Mildew is to be found in the Grape Production Manual produced by ROP for the Grape Value Chain Project.

Final stage of Powdery Mildew on ripe grapes



² Originally classified as *Oidium Tuckeri*, the fungus is now cited as *Uncinula necator* (Schw.) Burr; anamorph *Oidium tuckeri*.

3 Definitions of Terms Used in a Pack House

Arthropods

An arthropod is any stage in the life cycle of an invertebrate animal of the phylum Arthropoda, having jointed limbs, a segmented body, and an exoskeleton made of chitin. The arthropods most relevant to grape production and marketing include insects and arachnids. See section 4.8.

Blemish

Any external defect on the surface of the berry that detrimentally affects the appearance.

Bloom

The powdery white coating visible on grapes, technical name Cutin. It occurs naturally and protects the grapes against moisture loss and microorganisms.

Brix

A measure of the sweetness of fresh grapes. A relative density scale used in the grape industry, it indicates the percent of sugar (sucrose) by weight (grams per 100 milliliter of water) in the juice of grapes in degrees Brix (°Bx). Brix is the most commonly used refractometer scale for measuring solids dissolved in water. It corresponds directly to the refractive index scale. One °Bx equals one percent. Grapes are harvested at Brix levels between 15° and 25°, depending on the market. Afghan grapes are normally harvested at Brix levels greater than 20°.

A Clipping

A small bunch containing no less than 5 berries allowed to make up the minimum weight in the case of pre-packed fruit

Clipping

Removing all damaged berries from the bunch to prepare the bunch for a specific market.

Cold Chain

Keeping the chilled grapes in a cooled, refrigerated space from the pack house to the final retail shop. Ideally, packed grapes should be stored and transported at a constant temperature of between 0 to +1 degrees Celsius, with a humidity of between 85% and 95%.

Consignment

A quantity of table grapes of the same cultivar, belonging to the same owner and delivered under the cover of the same Delivery Note, Consignment Note or Receipt note or delivered by the same vehicle.

Container

Term used for the immediate container the grapes are in. Examples of containers in the various post harvest stages are: harvesting baskets (lugs), carton or wooden box and shipping container.

Cutting

Term used in the industry to mean cutting the grape bunches off the vine. It means the same as harvesting.

Decay

The state of decomposition or fungus development (excluding Powdery Mildew) that causes the grape tissue to collapse and detrimentally affects the quality of the table grapes.

Dirty Bunches

Bunches that are visibly soiled or marked with foreign matter such as, dust, sulfur, bird droppings, etc.

Food Safety

Assuring by laboratory testing that the grapes are fit for human consumption and do not contain chemicals in excess of Maximum Residue Levels (MRL) or pathogens which are harmful to humans.

Food Thermometer

An instrument to measure the internal temperature of grapes.

Grading

The final quality check, before the grapes are classed.

Hazard

A biological, microbial or chemical agent in, or condition of, a food product with the potential to adversely affect human health.

HACCP

The adoption and implementation of the Hazard Analysis and Critical Control Point (HACCP) system which addresses the complex issue of food safety as food is moved through the production, packing and logistical chain to the end receiver/consumer.

Phyto-sanitary Inspection

The inspection intended to prevent the spread and the introduction across national boundaries of pests of plants and plant products. All insects that pose a threat to the agriculture of the receiving nation, such as fruit fly, calandera, flower thrips, mites, leaf roller and other insects or diseases are targeted in phytosanitary inspections and regulations.

Refractometer

An instrument used to measure degrees Brix.

Suitable

This describes a product that meets the requirements of the targeted market segment as to specification on cultivar, packaging, sugar level, size, color, bunch shape and bunch mass.

Traceability

The ability to trace and follow the food product or substance intended to be or expected to be in a food product through the stages of production, processing, handling and distribution.

Transpiration weight loss

The loss of weight due to water evaporating from the grapes. Usually 100 grams to 150 grams of extra grapes are added per container to make up for weight loss due to transpiration.

Variety

A specific and acknowledged type of grape with specific characteristics such as taste, shape and berry size.

4 Harvesting Practices to Assure Quality

4.1 Testing for sugar level

It is important that sugar levels are checked properly before harvesting, as clients can reject grapes if the minimum sugar levels are not adhered to. The best test for maturity is the use of a hand-held refractometer.



Hand Held Refractometer

- Before a hand-held refractometer is used, the accuracy must be checked by placing a drop of distilled water on the lens and checking for a reading of zero.
- If the reading is not zero, a fine screw driver is used to adjust the setting screw on the refractometer to set it to zero.
- The lens of the refractometer must be cleaned between tests to ensure an accurate reading.
- If the temperature of the juice is above 20 degrees Celsius, adjustments to the reading must be made according to the table supplied by the refractometer manufacturer.
- The new generation of digital refractometers compensate for higher temperatures automatically and will give you an adjusted reading.



Digital Electronic Refractometer

- If a refractometer is not available the method of testing is to taste berries from the bottom part of the bunch (in the shade). These berries are the last to ripen fully. If they are sweet enough, the whole bunch will be sweet.
- Another good indicator of maturity is the color of the berries. If the bunch is fully colored the sugar can be tested.
- Clients can reject grapes if the minimum sugar levels are not adhered to.

- Grapes for the Pakistan markets should have Brix levels of 22° to 25°. See grape grading standards for export to Pakistan, page 23.

4.2 Berry Size

Berries are measured to ensure that the buyer's specifications on berry size are met. See grading standards for Pakistan on page 23. There are two ways of measuring berry size:

- The use of a caliper or
- Sizing rings

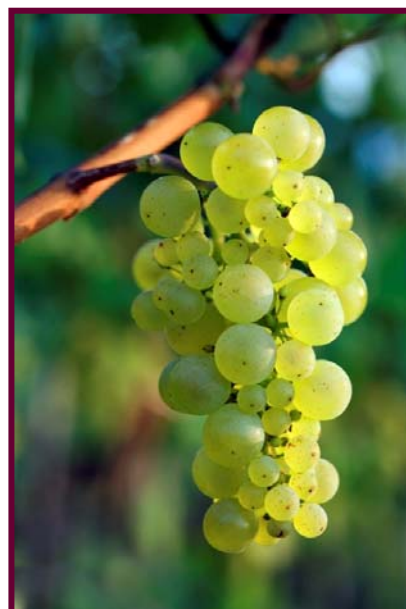
Berries should all be of an even size.

Uneven berry size is when berries are smaller than half the size of the average berry size of the bunch.

Using sizing rings to measure berry size



Un-even berry size



Using a caliper to measure berry size.



4.3 Color

Grapes bunches need to be evenly and fully colored according to variety color characteristics and market specifications. It is also very important to pack grapes of the same color in a box: grapes of a greener color should be packed together and grapes of a yellow color packed together, as any deviation immediately draws the eye and gives the impression of inaccurate

packing. For Class 1 export packing this would be an immediate reason for rejection. See table for export to Pakistan on page 23.

Green



Yellowish/Green



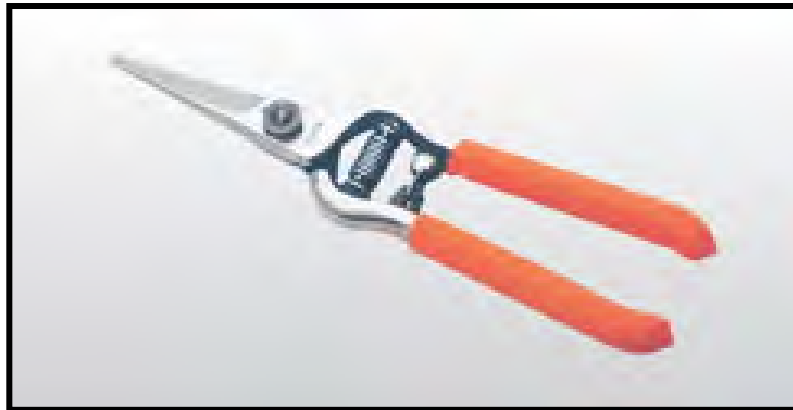
Incorrect mixing of color in the same box



4.4 Cutting

Once the grapes have reached the required maturity levels on sugar, color and berry size they can be harvested.

- The cutting/harvesting process must be approached carefully; the ripest, most evenly colored bunches are cut together. A few days later the next cut can take place and a few days later the final cut. This will ensure that grapes of similar ripeness are cut and packed together.
- Cut as early as the light allows (early morning) as this is the coolest time of day.
- Cut bunches of similar maturity and berry size.
- Use clean harvesting shears.(See page 24 for cleaning/sanitizing instructions)



Harvesting/Cutting Shears

- Cut a single layer of bunches into **clean** lugs or harvesting baskets, which have soft material (sponge or wood wool) in the bottom. See page 24 for cleaning instructions.
- Do not overload the lugs as this will lead to bruising, splitting and loose berries

Placing a single layer of grapes into the clean lug is best.

Correct loading



Incorrect loading



- Cutting of grapes must stop once the Pulp Temperature of the berry reaches 28°C (degrees Celsius).

- When the grape bunch is cut, the bunch must be held in two hands and **gently** placed in the lug/harvesting basket or box.
- Once the grapes have been cut they must be put in the shade until packed or transported to the pack house.
- It is very important to keep the grapes as cool as possible and covered with a tarpaulin to contain humidity.
- Temperature testing can be done by means of a food thermometer giving a Celsius read out in Digital form

Food thermometer



4.5 Field Packing

Currently, in Afghanistan, the grapes are harvested and packed in the vineyard with very little attention given to clipping, cleaning and the presentation of the grapes. The practice of filling the box to capacity and beyond is also common practice. This leads to the crushing and splitting of the grapes which will lead to decay in various forms. Trials have been done this past season to put fewer grapes in the box to rectify this problem and have proved successful. The only way forward on quality will be to convince the merchants that delivering a better product will hold financial gain for them in the form of higher prices and increased sales.

4.6 Clipping

- Immediately after harvest, the grapes are brought into the clipping and grading area and placed next to the clippers/packers.
- A clean clipping scissor is used to clip grapes.

Clipping scissors



- The clipper takes a bunch or cluster of grapes from the lug or harvesting basket, holding the cluster by the stalk, and removes the berries which have the following defects: sunburn, rot, decay, bird damage, insect damage, Powdery Mildew, fruit fly

or wasp damage, uneven berries and any other defects that detract from the general appearance and may cause phytosanitary problems in the receiving market.

- Always handle the bunch gently when picking it up and putting it down.
- Be careful of scissor damage – remove the berry if it has been pierced by the scissors, as this would be an ideal place for Botrytis to set in.
- Try to handle the bunch by the stalk as much as possible and not touch the berries unnecessarily, as this will remove the natural bloom which protects the berry.
- Always clip and pack in the shade to prevent heat damage.

Correct way of holding cluster while clipping

Use tents for shade near vineyards



4.7 Defects that need to be removed when clipping

Decay



Insect damage



Sunburn



Botrytis



Fruit Fly



Fruit Fly Damage



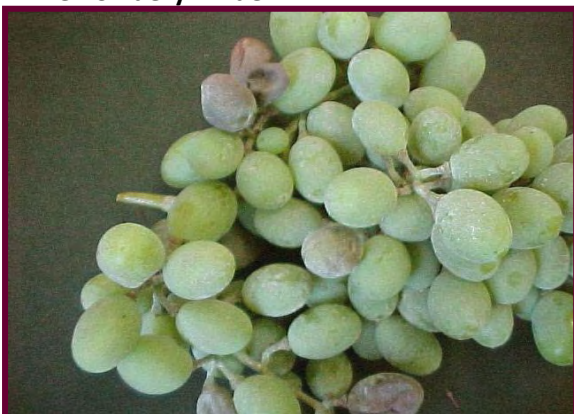
Polluted by Mealy Bug



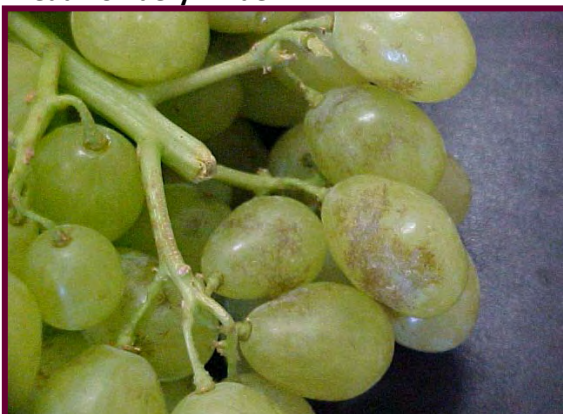
Split berries



Live Powdery Mildew



Dead Powdery Mildew



4.8 Packing

- It is important not to fill the boxes to the top, but to leave about 25mm space above the grapes, as this will prevent bruising and crushing when the boxes are placed on top of each other.
- Care should be taken that no defective grapes are placed in the bottom of the box with attractive grapes on top. This will lead to customer complaints and lower prices.

- The weighing of boxes should be considered and a standard weight must be agreed to by Producer, Merchant and Receiver and adhered to by all parties
- Packed grapes must be kept in the shade until transported to the market.

Short-term storage in shade



- Grapes must be delivered to Merchant's store as soon as possible after packing.
- When transporting to market, the grape boxes must be covered with a tarpaulin to stop the wind from drying out the grapes and stalks, thus shortening their shelf life.

When transporting grapes, cover with tarpaulin to prevent drying and heating.



4.9 Transporting of grapes to the pack house

- If the grapes are going to be packed in the packing house, they should be transported to the pack house as soon as possible after cutting.
- Grapes to be packaged in the packing house should be transported to the pack house in the harvesting baskets or lugs.
- The grapes should be handled **gently** at all times with special care taken in handling and moving. The lugs should be packed carefully on top of each other as any rough handling will lead to damage. Care must be taken with transport as knocks or bumps on the road will translate into bruising and a shortened shelf life. This is especially dangerous as the damage is only seen at the end receiver (in the terminal market) and not in the pack house or packing station.
- Grapes should be covered by a tarpaulin during transport to the pack house to prevent heat damage.

5 Packing Grapes in the Pack House

5.1 Receiving grapes at the pack house

- Grapes must be off loaded carefully and gently, into the receiving area of the pack house.
- The incoming lugs must be counted for stock control purposes.
- Harvested grapes should be put into a cooling facility as soon as possible to maintain peak condition.
- If an evaporative pre-cooler is available, grapes should be placed under cooling to await clipping, grading and packing.
- The ideal temperature for the cooling facility would be above dew point at +/- 16 degrees Celsius.

5.2 Clipping

Clipping in the pack house is done in the same manner as in the field.

5.3 Grading

- The duty of the grader is to check on the work of the clipper and to decide for which market the grapes are suitable - class 1, class 2 or local market.
- The grader must check on berry size, color, sugar, bunch weight and all other defects.
- The grader then places the bunch into the correct container (wooden box or carton).
- Always handle the bunch gently when picking it up and putting it down.
- The Grader must check on the bunch weight according to market specifications; a small electronic scale which can weigh up to 5kg works well.
- The carton or wooden box is then passed on to the weighing station

5.4 Weighing

- Scales should be checked for accuracy at regular intervals
- The person doing the weighing must ensure that the correct weight is in the container as per market specification; including the additional weight for transpiration which is the loss of weight due to water transpiring and evaporating from the grapes. Usually 100 grams to 150 grams of extra grapes are added per container to make up for weight loss due to transpiration. .
- The weight on the outside of the box or carton (usually printed on the carton or on a label) must always be the same (or slightly more) as the weight inside the box.

5.5 Packing

- The packer places the grapes into the container gently, trying to ensure that there is no crushing and bruising of grapes;
- Typically the grapes are packed in a plastic liner (a micro-perforated liner is recommended)
- Always check that the grapes are not packed too high in the container, this will lead to damage. (See photos below.)
- The market specification will vary and at times the packer will be packing grapes loose (bulk pack) or in plastic carry bags according to market requirements.

Examples of boxes packed too full. Over-filled boxes result in bruising and crushing



5.6 Closing

- Those responsible for closing the boxes of packed grapes must first check on the height of the grapes in the container.
- If there is a problem they must inform the packers to watch the packing height.
- An absorbent (corrugated) paper sheet is then placed on top of the grapes.
- The Sulfur Sheet is placed on top of this absorbent sheet.
- The plastic bag in the box is then closed over the grapes by pulling the bag so that opposite points of the bag can be folded over each other to ensure that the bag is as airtight as possible.
- The folds of the plastic bag are held in place with sticky tape.
- Attention must be paid to folding the corners over neatly and getting a neat result. The closing will be the first thing the client sees when he opens the box.

5.7 Sulfur Sheets

Post harvest grapes are susceptible to fungal infection even when stored at the optimal temperature of 0.5°C. Botrytis is the most common pathogen developing on post harvest grapes. The active ingredient in the Sulfur generators is sodium metabisulphide. This chemical reacts with water to produce Sulfur dioxide gas, sodium sulphite and water. This gas fumigates the grapes and slows the development of fungi such as Botrytis.

Action of the Sulfur Sheet (Sulfur Pad)

Within minutes of closing the plastic liner/bag over the grapes and then closing the box, the water vapor produced by the grapes initiates a reaction in the Sulfur Sheet and the Sulfur fumigation starts, reaching a maximum rate as the relative humidity reaches 100%. Since the Sulfur gas is produced by a chemical reaction, it is crucial to be aware of the influence of temperature.

- A 5°C increase in packing temperature will cause the rate of SO₂ production to double. Thus, instead of having 200ppm in the box, there could be 400ppm.
- Delays in cooling will also cause unacceptably high levels of gas.
- Temperature increases during storage could cause an excessive production of gas which not only damages the grapes but also could cause undesirable flavors as well as high Sulphite residues.

Grape Damage and other problems caused by Sulfur Dioxide

- Very high concentrations Sulfur Dioxide causes grape injury, visible as bleaching of the skin color. It occurs first around the pedicel (because of high concentrations of openings through which the gas can penetrate), cuts, bruises punctures and other weak areas of the skin. This will also lead to a very unpleasant taste of the grapes and a smell that is associated with rotten eggs. The challenge in using Sulfur pages to fumigate grapes is that the amount of Sulfur Dioxide required to control the spread of Botrytis in storage is close to the amount that causes bleaching. Finally high Sulfur Dioxide levels affect the taste of the grapes.
- The International Maximum Residue Level (MRL) allowed in most countries is 10ppm (parts per million).
- The above mentioned facts are important reasons why grapes must be harvested as early in the day as possible, packed and brought under forced air cooling as soon as possible. The ideal would be 1 hour; but, practically it is around 6 hrs in South Africa.

Sulfur burn



- **NB:** When a package of gas sheets is opened, the bag must be resealed and at no time may gas sheets lie around exposed to the atmosphere as this will cause them to start releasing gas and we will be putting a gas sheet on the grapes that has lost efficiency and will not get the protection needed to ensure the control of funguses, quality and shelf life.

Different types of Sulfur sheets

- **The First Stage Gas Sheet** is good for a few days (14 days Max) and releases high levels of Sulfur Dioxide, fumigating the grapes and killing surface spores as well as those in fresh wounds on the berries. Sulfur production peaks quickly, about 6 hours after packing and then slowly tails off
- **The Second Stage Gas Sheet** is designed to combat latent infection that may emerge from the stems or berries during storage. It is designed to be used in conjunction with the fast release gas generator. Gas production usually commences about 24hrs after packing, and ideally continues at a sustained level until the grapes are marketed. These gas sheets are widely used in the USA
- **The Dual Stage Sheet** is a combination of the 1st and 2nd stage sheets and designed to be used on its own for grapes stored for longer than 3 weeks. These pads will

continue to emit Sulfur Dioxide for 1 to 6 months depending on construction and amount of Sodium Meta-Bisulfide.

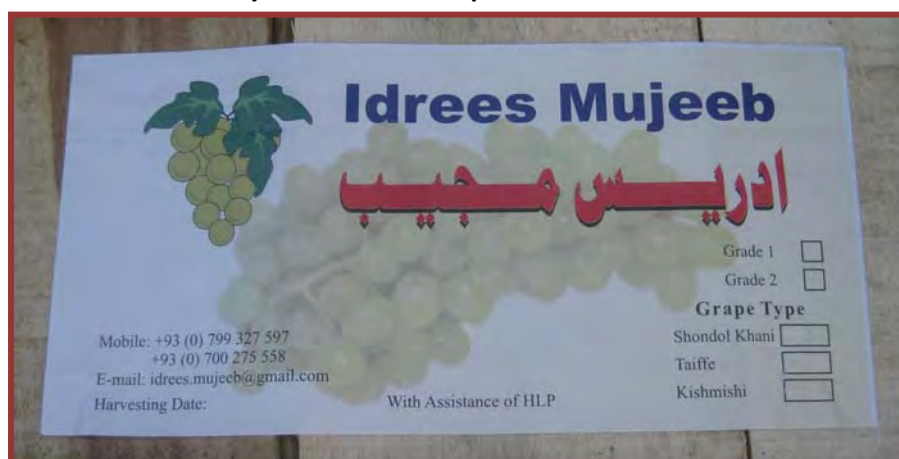
- **NB:** It is critical to have sufficient absorbent paper in the box. My recommendation is:
 - an absorbent sheet under the grapes, in the plastic bag,
 - then an absorbent paper on top of the grapes and
 - then the gas sheet on top of the top absorbent sheet.

This will solve the free moisture problem that occurs with rapid transpiration and will limit the danger of BLEACHING by the Sulfur Dioxide released by the Sulfur sheet

5.8 Labeling

- The labeling on the box or carton must be done very neatly as this is what the buyers see first and they will unconsciously form an opinion even before they open the box and see the grapes.
- Care must be taken that the labels contain the correct and relevant information, such as weight, class, variety, consignee and contact details.

Place labels neatly and in the same position on each box or carton



5.9 Cooling

- When cooling packaged grapes, the grape cartons or boxes can be packed in a staggered pattern in the cold store, to allow air movement between the cartons.
- Boxes or cartons packed in this manner should be packed on pallets to aid additional air movement.
- To facilitate faster cooling a tarpaulin is sealed over the stacked cartons to direct air flow. See photo below.

Cartons packed in a staggered pattern and covered with a tarpaulin to facilitate cooling

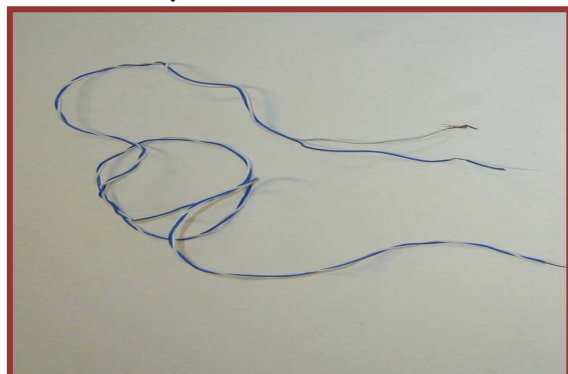


- Ideally, packed grapes should be stored at a constant temperature of between 0 to +1 degrees Celsius, with a humidity of between 85% and 95%.
- Once the core temperature of the grapes has reached between 0 to +1 degrees Celsius the grapes can be moved to the holding rooms in preparation for transport to the destined market

Thermo Couple Reader



Thermo Couple Wires



- To measure the core temperature of the grapes in a cold store, a thermo couple is used. A thermo couple is made up of 2 thin, plastic coated (different colors) electrical wires of +/- 1 meter, which are soldered together at one end. The soldered end is inserted into a berry in the middle of a box of grapes. The wire is looped around a stalk of a bunch in the same box to ensure that it cannot accidentally be pulled out of the berry in which it has been inserted. The box with the thermo couple is placed in the middle of the pallet or stack of staggered packed boxes in the cold store. At the other end the plastic is stripped away so that the wires can fit into the clips of the thermo couple reading machine.
- If no thermocouples are available a food thermometer can also be used.

- **NB:** Maintaining the cold chain of constant temperature is one of the most important aspects of ensuring the delivery of quality grapes to market. All efforts must be made to have the grapes from the vine, packed and under forced air cooling (in the pull down room) within 6 hours.

5.10 Logistics

Grapes packed for export and Class1 markets:

- Transport should be arranged ahead of time in consultation with the person responsible for cooling, the merchant and the pack house manager.
- Once the grapes are on temperature, they can be loaded out into a cold truck or cold container.

Cold Truck arrives to be loaded



Loading Grapes into the cold truck



- On arrival of the cold truck or cold container at the pack house, the first thing to be checked is the setting of the operating unit. This must be between 0 to +1 degree Celsius.
- Both the truck driver and the person responsible for loading out at the pack house must sign to verify the operating temperature of the cold truck or cold container.
- The temperature of the grapes being loaded out must also be verified by the truck driver and the person responsible for loading out the consignment.
- The temperatures of the truck, cold container and the grapes are noted on the consignment note.
- All other relevant information must be filled in on the consignment note.
- When the grapes are loaded, it is advisable to attach a temperature recording device ("Temp Tale") on a carton in the front and in the back of the load. This device will give a record of temperature readings throughout the journey to the market.
- This is a valuable tool if cooling problems should arise on route and ensuing arguments about liability.

Temp Tale – Temperature Recording Device



- Grapes should not be kept for longer than 5 days in the holding rooms before loading out (to prevent dry stalks)

Note: The use of pallets would cut down on double and triple handling, and additional labor as well as the risk of damage by rough handling. The pallets can be sourced locally and have dimensions of 1m by 1.2m with a 4 way system. This means that the pallet can be accessed from all 4 sides by a pallet jack or fork lift truck.

This is a 2 Way pallet. A 4 way pallet has access from all 4 sides



6 Documentation to Assure Quality Control and Payment

6.1 Consignment note book

A consignment note book, which acts as the originating document for all grape loads leaving the cold store will be of great help. The book should have 5 copies per serial number, allowing a copy for the Pack House, Merchant, Trucking Company, Customs and Consignee.

See Addendum B for example of a consignment note.

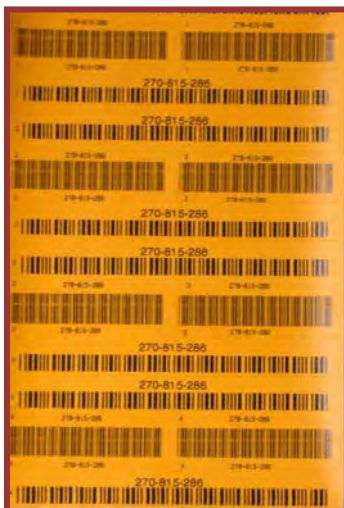
The information required on the consignment note book is;

- Name and address of pack house
- Name and address of person/company sending the load
- Contact details of person/company sending the load
- The date and time at which the load is sent
- Details of person /company to whom the load is being sent
- Contact details of person/company to whom load is being sent
- Details of the load, as to:
 - Product and Grade
 - Number and weight of boxes
 - Loading out Temperature
 - Trucking company details
 - Any other relevant information required under Afghanistan law and the countries the load will be passing through

6.2 Using Bar Codes

- The use of Bar Codes can be investigated as they will give traceability to the grapes.
- The Bar Code is made up of a single Orange sheet with 4 numbered sections allowing for 1 portion to be pulled off and attached to each side of the pallet by means of a sticky backing.
- The Bar Code sticker is numbered and the vertical lines on it can be read by means of a bar code scanner and the information downloaded into a computer using an automated accounting system.
- A tear off strip of the bar code sticker is stuck on each of the 5 pages of the Consignment Note Book and these acts as further information in the quest for traceability, food safety, record keeping and accounting

Bar code stickers



Bar codes on grape cartons



Bar code reader



6.3 Grape Standards for the Pakistan Market

Grape Standards for the Pakistan Market								
Type and Size	Shundulkhani		Shundulkhani		Kishmishi		Kishmishi	
	Grade No. 1		Grade No. 2		Grade No. 1		Grade No.2	
	From	Up to	From	Up to	From	up to	From	Up to
Berry size	2.4cm	1.8cm	1.8cm	1.4cm	1.4cm	1.1cm	1.1cm	0.9cm
Bunch length	30cm	25cm	18cm	16cm	24cm	20cm	18cm	16cm
Bunch weight	1.2kg	0.4kg	0.5kg	.03kg	1kg	0.4kg	0.5kg	0.250kg
Sugar	26°	24°	26°	22°	26°	24°	26°	22°
Color	Yellow	Yellow	Yellow	Yellowish/ Green	Yellow	Yellow	Yellow	Yellowish/ Green
Packing size	7kg	10kg	7kg	13kg	7kg	10kg	13kg	13kg
Damage/kg	2%	4%	4%	7%	3%	5%	5%	10%

6.4 Military Base Market

This will be an ideal and large market for Afghan grapes and a market well worth investigating. There are moves to implement a “Buy Local Program” for the Military Bases. When implemented, producers will need to get accreditation as suppliers. Once this process is complete producers have to get detailed specifications from the senior food safety officer in charge, as to food safety compliance, HACCP in the pack house and quality specs on:

- Volumes
- Purchasing Schedule
- Payment Terms
- Packaging material required
- Cultivars
- Sugar
- Color
- Berry Size
- Marks
- Shelf Life
- Temperature
- Logistics
- Loading out Temperatures
- Slot Times
- Phyto Sanitary Issues on insects

6.5 Class 1 Export Market

This is a market that Afghan producers can strive for in the future. The Class1 export market to the UK and EU is a sophisticated market demanding a certification level far above the infrastructure of the grape industry of Afghanistan at present. A consignment of table grapes shall be classified as class 1 if it:

- Is of good quality
- Is characteristic of the cultivar
- Complies with the quality standards set out by market specifications for a specific market
- Complies with the applicable berry size for class 1
- Complies with the maturity indices for class 1.

- Does not exceed the permissible deviations for class 1

7 Care and Cleaning of Pack House Equipment

7.1 Harvesting Baskets or Lugs

- Harvesting Baskets (called “lugs” in the industry) must be sterilized before use in the vineyard or pack house.
- 2 large baths are used for this purpose, the first contains the sterilizing agent and the harvesting baskets are washed in this one. The second contains clean water to wash off any residue and dirt.
- Harvesting baskets should not be left in the sun unnecessarily as this heats them up and also perishes the plastic.
- When not in use, harvesting baskets should be kept out of the sun in hygienic conditions.
- Preferably stackable harvesting baskets should be used. These prevent the grapes from getting damaged and take up less space in a pack house.
- Harvesting baskets with flat bottoms are advised, as these will move smoothly over a roller conveyer system.

Different types of harvesting baskets (“lugs”)



7.2 Cutting shears and clipping scissors

- Cutting shears and clipping scissors must be sterilized before use in vineyard and pack house.
- 2 buckets or bowls are used. The first contains the sterilizing agent and the second clean water for rinsing. The cutting shears and/or scissors should be washed with soap and brush, then dipped into the sterilizing agent, then rinsed in the second tank.
- Paper towels can be provided for drying of shears and scissors.

7.3 Packing systems and tables

- Packing systems and tables must be sterilized on a daily basis.
- Use an accepted sterilizing agent.
- Use clean sterilized cloths.

7.4 Pack House Floor

- The pack house floor should be cleaned on a daily basis with an accepted sterilizing agent and a high pressure water pipe.

- Berries that land on the floor should be picked up immediately before they are trodden on.
- The pack house floor should be painted when necessary.

NB: Cleaning agents used should not contain chloride – refer to HACCP Manual

Clean pack house floor and tables



8 Pack House Management

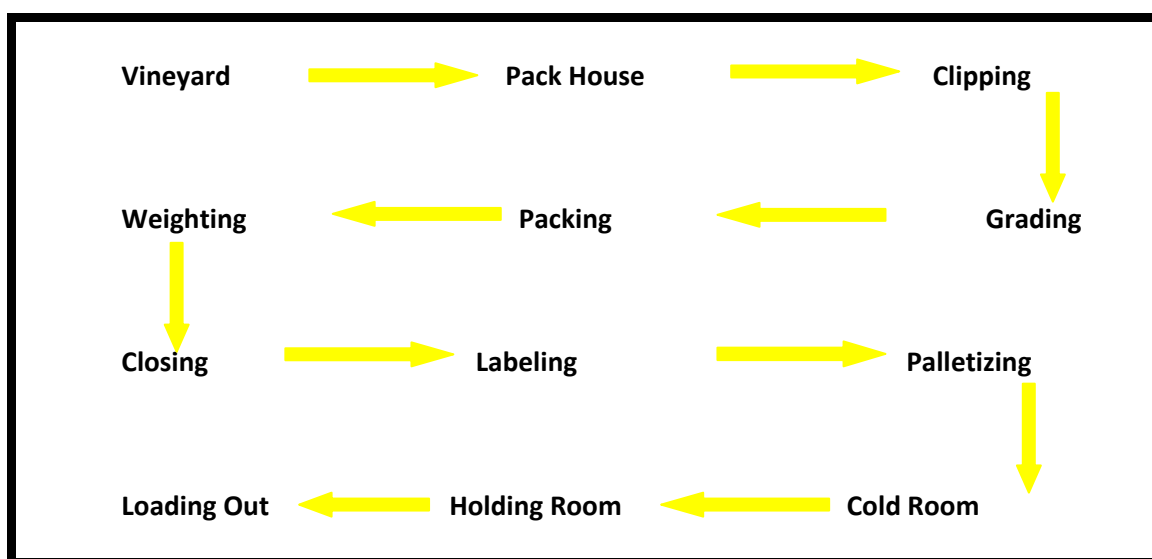
The pack house manager is responsible for the setting of objectives in consultation with merchants and producers to pack the right grapes for the right market. Objectives are measured by these criteria:

- Volume
- Quality
- Standard
- Time taken per function

8.1 Movement of grapes through pack house

- Grapes arrive at pack house
- Grapes go to holding area
- Moved to clipping and grading area
- Grapes are clipped removing defective berries
- Grapes are graded according to market specifications
- Grapes move to weighing tables to be weighed
- Grapes move to packing table where they are packed according to market requirements
- Grapes are removed to cold store for forced air cooling
- On reaching 0 to +1 Degrees Celsius they are ready to be loaded out to market
- Grapes are loaded into Cold Truck for transport to designated market

Flow diagram of post harvest handling of table grapes



8.2 Duties and responsibilities of the pack house manager

The manager is responsible for the following:

- Setting out of objectives – exactly what does the market expect as to quality and specs
- Exactly how the objective is to be reached
- Crop estimate – how many boxes per day are available of the cultivars to be packed
- Match availability of Grapes with Market volume requirement
- Match staff requirement to volume and market demand

8.3 Preparation of pack house before packing season

Health and Safety – HACCP, Staff Issues, fixed and ongoing requirements:

- Conduct test of water quality
- Check on condition of pack house and surrounding grounds
 - Floor
 - Walls
 - Ceiling
 - Lights
 - Bird and Insect screens
 - Bathrooms (condition, water supply, soap, paper towels, dustbins with lids)
- Make sure that overalls, hair coverings and gloves are ordered and arrive in time
- Check on condition and number of scissors and brushes(to remove dust from grapes)
- Check on clipping tables – work surfaces
- Check on scales – accuracy needs certification
- Check on packing tables – must be stable and painted
- Check on cold store - floors, walls, door, fans, gas levels of machines.
- Pallet Jack – check for oil leaks and oil level

8.4 Ordering of materials and other responsibilities

- Packing Material – from crop estimate and market orders, order ahead of time
- Look at product flow – for staff requirement, arrange ahead of time
- Cold store space – crop estimate and market requirements
- Cold Truck transport – product flow and crop estimate and orders from markets

8.5 Training of pack house staff

- Hygiene and clothing
- Berry size
- Sugar
- Color
- Bunch weight
- Defects – decay, bird damage, Powdery Mildew, Mealy Bug, sun burn, split berries, loose berries and dry stalks
- Weighing
- Packing
- Closing of cartons
- Labeling
- Cooling

8.6 Administration – Record Keeping

- Packing material register
- Loads coming in
- Temperatures of loads coming in
- Average weight of harvesting baskets
- Staff registers
- Training register
- Packing register
- Consignment Notes and Bar Code Stickers
- Cold store register
- Loading out register
- Labor Costing
- Cost breakdown on cooling
- Cost breakdown on packing material
- Costing per load of grapes from vineyard
- Costing per producer
- Costing per cultivar

9.2 ADDENDUM B – CONSIGNMENT NOTE

Name and Address of Receiver				Exp/Agent Pack House Contact details				Consignment Note No			
								Date			
								tel			
								fax			
e mail											
Barcode	Product	Variety	Class	Count Size	Pack code	Weight kg	Inventory	Target market	Pallets	Cartons Qty	
Transporter Signature _____ Date _____ time _____							Total				
Pack House Signature _____ Date _____ time _____							Loading Out Temperature _____ Date _____ time _____ Signature _____				

