

12. Overhanging roof extensions on storage structures are very helpful in shading the walls and ventilation openings from the sun's rays, and in providing protection from rain. An overhang of at least 1 metre (3 feet) is recommended.
13. Storage facilities should be protected from rodents by keeping the immediate outdoor area clean, and free from trash and weeds.
14. Containers must be well ventilated and strong enough to withstand stacking. Do **NOT** stack containers beyond their stacking strength.
15. Monitor temperature in the storage room by placing thermometers at a variety of locations.
16. Do **NOT** store onions or garlic in high humidity environments.
17. Store crops in a darkened room. This is especially important for potatoes, since light will stimulate solanine production (a toxic compound not destroyed by cooking).
18. Avoid storing ethylene sensitive commodities with those that produce ethylene.
19. Avoid storing produce known for emitting strong odours (apples, garlic, onions, turnips, cabbages, potatoes) with odour-absorbing commodities.
20. Inspect stored produce regularly for signs of injury, water loss, damage and disease. Remove damaged or diseased produce to prevent the spread of problems.

For further information please contact:

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**Ministry of Industry,
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Food Storage and Prevention
of Infestation Division
Ensuring Safety and Wholesomeness

Post Harvest Handling of Horticultural Crops

General dos & don'ts

Factors Contributing to High Quality Fresh Produce



Harvesting Tips

1. Containers used for harvesting should be: clean; smooth and free of rough edges; vented; and not too large. Steel or plastic buckets make good harvesting containers.
2. Use stackable plastic crates as field containers during harvest -- while initially expensive, these are durable, reusable and easily cleaned.
3. Train harvesters to recognize the proper maturity stage for the produce they are handling (such as size, shape, colour, sweetness or firmness).
4. Round the tips of knives to minimize inadvertent gouges and excess damage to perennial plants, sharpen knives and clippers.
5. Wearing cotton gloves, trimming fingernails, and removing jewelry such as rings and bracelets can help reduce mechanical damage during harvest.
6. Train pickers to empty their picking bags and/or baskets with care, never dumping or throwing produce into field containers.
7. Keep produce clean and free from soil contamination to reduce food safety hazards.
8. Avoid laying harvested produce or field containers on bare soil.
9. Always provide shade for harvested produce to prevent heat and sun damage.
10. Night or early morning harvest is sometimes an option for harvesting produce when internal temperatures are relatively low, reducing the energy needed for subsequent cooling. Let dew dry off first if harvesting crops susceptible to fungal diseases.
11. Cool produce (remove field heat) as soon as possible after harvest.

Transport Tips

1. Do **NOT** overload vehicles.
2. Prevent compression damage to produce by avoiding over-filling of containers (rounded sides or bulge-packing) and stacking heavier produce at the bottom of the load.
3. Avoid rough handling during loading and unloading.
4. When stacking containers, be sure to align them properly.
5. Prevent vibration damage by using air suspension systems -- these will provide a more gentle ride during transportation.
6. Make sure the vehicle has adequate ventilation to prevent heat gain during transport.
7. Provide good lighting to help sorters see defects.

Packinghouse Tips

1. Provide shade for harvested produce waiting to be sorted and packed.
2. Grade the roads and entryways between the field and the packing facility to make the road surfaces smooth.
3. Avoid locating the packinghouse directly next to an unpaved, dusty road.
4. Minimize mechanical damage -- avoid drops, throwing and rough handling.
5. Use hand-carts to assist workers in the careful movement of produce.
6. Pre-sort to remove damaged, diseased, and immature or over-mature produce.

8. Comfortable work stations will increase worker efficiency and help to reduce fatigue.
9. Keep the packing line as simple as possible and keep it clean. The packing line should be as straight as possible (avoid turns).
10. Provide sanitary facilities (bathrooms and hand washing stations) for workers.
11. Provide clean and sanitary conditions for all supplies, including box storage.
12. Hand sorting can reduce damage if workers are well-trained and provided with appropriate tools and equipment.
13. Know the requirements and postharvest handling recommendations for the crops you handle.
14. Consider the use of a water dump system for handling water-tolerant produce.
15. Do NOT wash green beans, cabbage, okra, peas, peppers or summer squash before packing.
16. Monitor pH (6.0-7.0) and chlorine levels in wash water to ensure adequate levels (100 to 150 ppm)
17. Provide cushioning on all sharp edges and rough surfaces of packing tables or the washing/sorting/grading/packing line. Clean the tables regularly.
18. When trimming produce, do NOT remove more than necessary for high quality. Dispose of waste materials properly.
19. Use appropriate postharvest treatments (waxing, hot water dips, SO₂, fungicides, etc.) to reduce the rate of decay or water loss.

20. Do NOT use any chemical treatments that are not specifically recommended or approved for your commodity.
21. Pack securely to immobilize produce, but do not overfill or under-fill packages.
22. Use "ranch packing" or field packing practices whenever possible to reduce handling damage.
23. Hand packing allows you to handle delicate vegetables and ready to eat, ripe fruits for specialty markets.

Cooling Tips

1. Cool produce as soon as possible after harvest.
2. Cool using appropriate methods for each commodity (consider water tolerance, time required to reach 7/8ths cooling, susceptibility to desiccation)
3. Shade should be provided over harvested produce, packing areas, for buildings used for cooling and storage and for transport vehicles.
4. Trees are a fine source of shade and can reduce ambient temperatures around packinghouses and storage areas.
5. Light colours on buildings will reflect light (and heat) and reduce heat load. Design buildings with overhangs on the sunny side to provide shade.
6. High pressure sodium lights in packing and cooling facilities will produce less heat and use less energy than incandescent bulbs.
7. The best method to reduce water loss is to increase RH by reducing temperature.

8. Wet the floor of storage rooms to increase the RH inside the room. (Do NOT do this when storing onions or garlic).
9. Monitor storage rooms by measuring temperature in several locations (in packages, at edges of stacks, near vents, doors and cooling ducts). Rearrange produce or adjust air flow to avoid too-warm and/or too-cold spots.
10. Use proper containers, suited to the method used for cooling (waxed cartons or wooden boxes for hydro-cooling or icing, boxes with aligned side vents for forced air cooling).
11. Consider using forced-air coolers inside a cold room to speed cooling and decrease water loss and decay rate.
12. Monitor hydro-cooler water quality, clean and sanitize the cooler each day before use.
13. Do NOT hydro-cool crops that are easily damaged (apricots or fresh herbs).
14. Cool before loading produce into refrigerated trucks (these trailers are designed only to maintain cool temperatures).
15. Use high quality insulation in coolers, storage rooms and transport vehicles to reduce incoming environmental heat load.
16. Use plastic strip curtains on doorways to prevent warm air from entering coolers or refrigerated trucks.
17. Mist water-tolerant vegetables during handling, storage and marketing to decrease the rate of water loss.
18. Be careful when using specialty packaging since these are even more sensitive to temperature abuse:

19. SO₂ pads: increased rate of SO₂ release can bleach table grapes.
20. MAP can become out of control: faster increase in CO₂ and rapid decrease in O₂ damages produce.

Storage Tips

1. Store only high quality produce that is free of damage and decay.
2. Store only produce that has been harvested at its proper maturity (not over-ripe or under-mature).
3. Know the requirements for the commodities you want to put into storage, and follow recommendations for proper temperature, relative humidity and ventilation.
4. Do NOT handle crops intended for storage when they are wet.
5. Cure root, tuber and bulb crops before storage.
6. Avoid lower than recommended temperatures in storage-- many commodities are susceptible to damage from freezing or chilling.
7. Do NOT overload storage rooms or stack containers too close together.
8. Provide adequate ventilation in the storage room.
9. Provide shade for storage structures or paint buildings white or silver to reflect heat.
10. Consider sprinkling the roof of the building with water if the heat load is very high.
11. Keep storerooms clean.