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# **Module 8** : Harvest and post-harvest management



## **Session 1: HARVESTING METHODS AND PROCEDURE**



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# Introduction:

- The effort to achieve an economic reward through the marketing of organic produce must begin well before harvest.
- Seed selection can be a critical factor in determining the postharvest performance of any commodity.
- Individual cultivars vary in their inherent potential for firmness retention, uniformity, disease and pest resistance, and sensory shelf life.



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## *Contd...*

- The application of food safety programs, in turn, has been shown to directly benefit postharvest quality.
- Once prerequisite production programs are in place, a systematic evaluation and implementation plan of Good Agricultural Practices during harvest operations and any subsequent postharvest handling, minimal or fresh-cut processing, and distribution to consumers must be developed. Considerations for these activities are listed below.



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# Handling during harvest:

- The inherent quality of produce cannot be improved after harvest, only maintained for the expected window of time (shelf life) characteristic of the commodity.
- Part of what makes for successful postharvest handling is an accurate knowledge of what this window of opportunity is under your specific conditions of production, season, method of handling, and distance to market.



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- Harvest during the coolest time of the day to maintain low product respiration.
- Avoid unnecessary wounding, bruising, crushing, or damage from humans, equipment, or harvest containers.
- Shade harvested product in the field to keep it cool. Covering harvest bins or totes with a reflective pad greatly reduces heat gain from the sun and reduces water loss and premature senescence.



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- If possible, move product into a cold storage facility or postharvest cooling treatment as soon as possible. For some commodities, such as berries, tender greens and leafy herbs, one hour in the sun is too long.
- Don't compromise high quality product by intermingling damaged, decayed, or decay-prone product in a bulk or packed unit.
- Only use cleaned and, as necessary, sanitized packing or transport containers.



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# **Module 8: HARVEST AND POST- HARVEST MANAGEMENT**



## **Session 2: POST-HARVEST MANAGEMENT**



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# Post-harvest management:

- If organic fruits and vegetables are stored after harvest, maximum quality will only be maintained if they are stored in cultivar-specific conditions.
- The important factors in storage are storage time, temperature, humidity, and sensitivity to ethylene. In some products, quality in storage can be further maintained using cultivar-specific controlled atmosphere conditions, i.e., reduced oxygen and increased carbon dioxide.



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# Dynamic Controlled Atmosphere (DCA) Storage:

- The use of controlled atmospheres (CA) is a known and effective technology for use on many fruits and vegetables and it is an acceptable organic postharvest technology when the CA uses only  $O_2$ ,  $CO_2$  and  $N_2$ .





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# Alternative Potato/Onion Sprout Inhibitors:

- A number of alternative potato sprout inhibitors have been found such as ethylene, 1,4-dimethylnaphthalene (1,4 DMN), 2,6-diisopropylnaphthalene (2,6 DIPN), carvone, clove oil and peroxides.

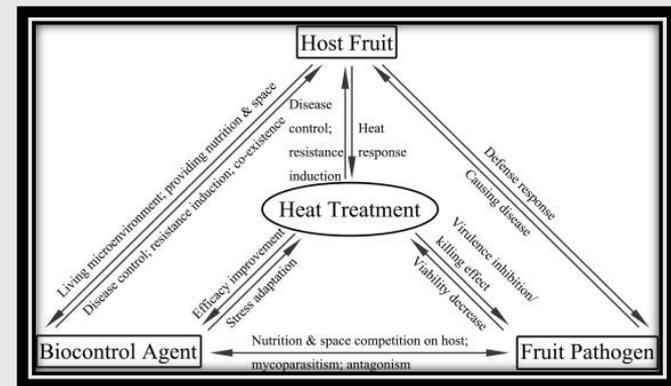




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# Heat Treatments:

- A promising non-chemical postharvest method for use on organic fruits and vegetables is pre-storage hot water treatment, either as a hot water immersion treatment (HWT) or hot water rinsing and brushing (HWRB).





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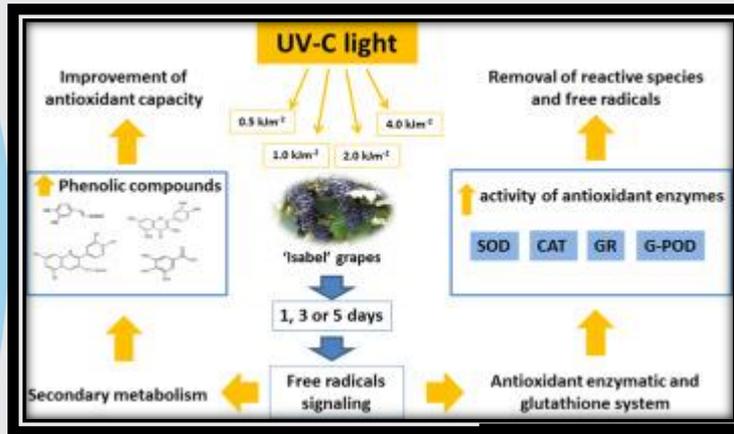
# UV-C Radiation:

- There are numerous research reports of the benefit of UV-C radiation, depending on its hormetic dose. For example, it controls grapefruit decay without affecting quality and controls both decay and chilling injury in peaches.
- Anti-Microbial Surfaces: Returning to the use of copper-containing (brass) water-holding containers reduces *Escherichia coli* and coliform bacteria by 90% overnight and 100% in 48 hours.



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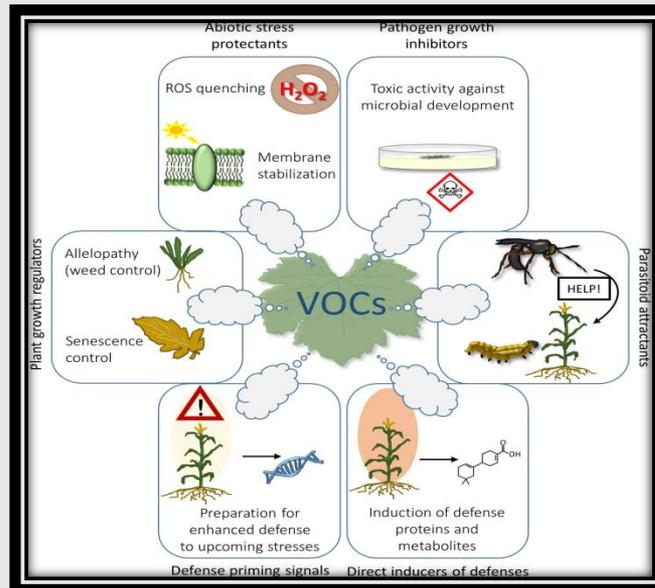




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# Natural Volatiles:

- In recent years there has been an increased appreciation of the potential anti-pest role of plant-produced volatiles and other volatile organic compounds, e.g., ethanol and acetaldehyde, acetic acid as well as biologically-produced volatiles.

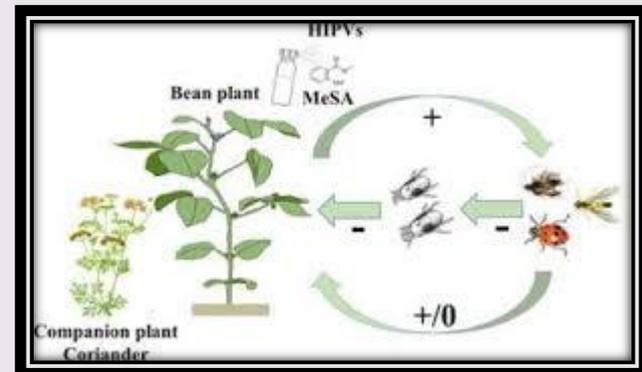
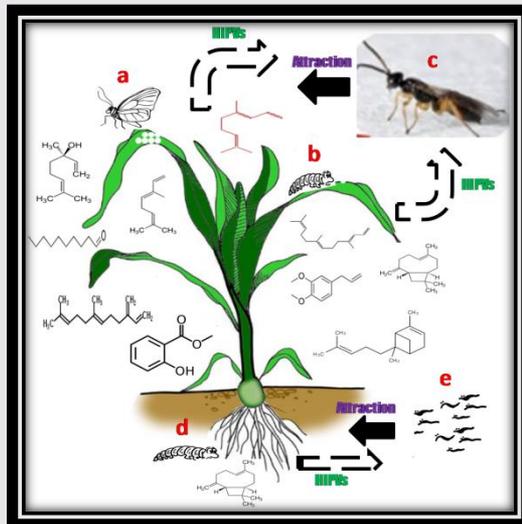




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# Contd...

- volatile organic compounds (acetaldehyde, benzaldehyde, cinnamaldehyde, ethanol, benzyl alcohol, nerolidol, 2-nonanone,  $\beta$ -ionone and ethyl formate) are the strongest growth inhibitors and the most lethal to fungal spores and mycelia and bacterial cells.





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# Grading:

- Grading is sorting of vegetables and fruits into different grades according to the size, shape, colour, and volume to fetch high price in market.





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# Grading of Fruits:

- Generally, the fruits are graded on the basis of size, weight, specific gravity, colour, variety, etc.
- Size grading is predominantly followed in almost all types of fruits on the basis of size. The fruits are graded as a small, medium, large and extra large.





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- On the basis of maturity, the fruits are graded as immature, properly mature and over mature. Grading on the basis of maturity decides both quality and shelf life.





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# Grading of Vegetables:

- The fruit vegetables such as bitter gourd, okra, bell pepper, brinjal , green chill, etc. are also graded on the basis of size into three grades as small medium and large.
- The vegetables like tomato are graded on the basis of color and maturity.

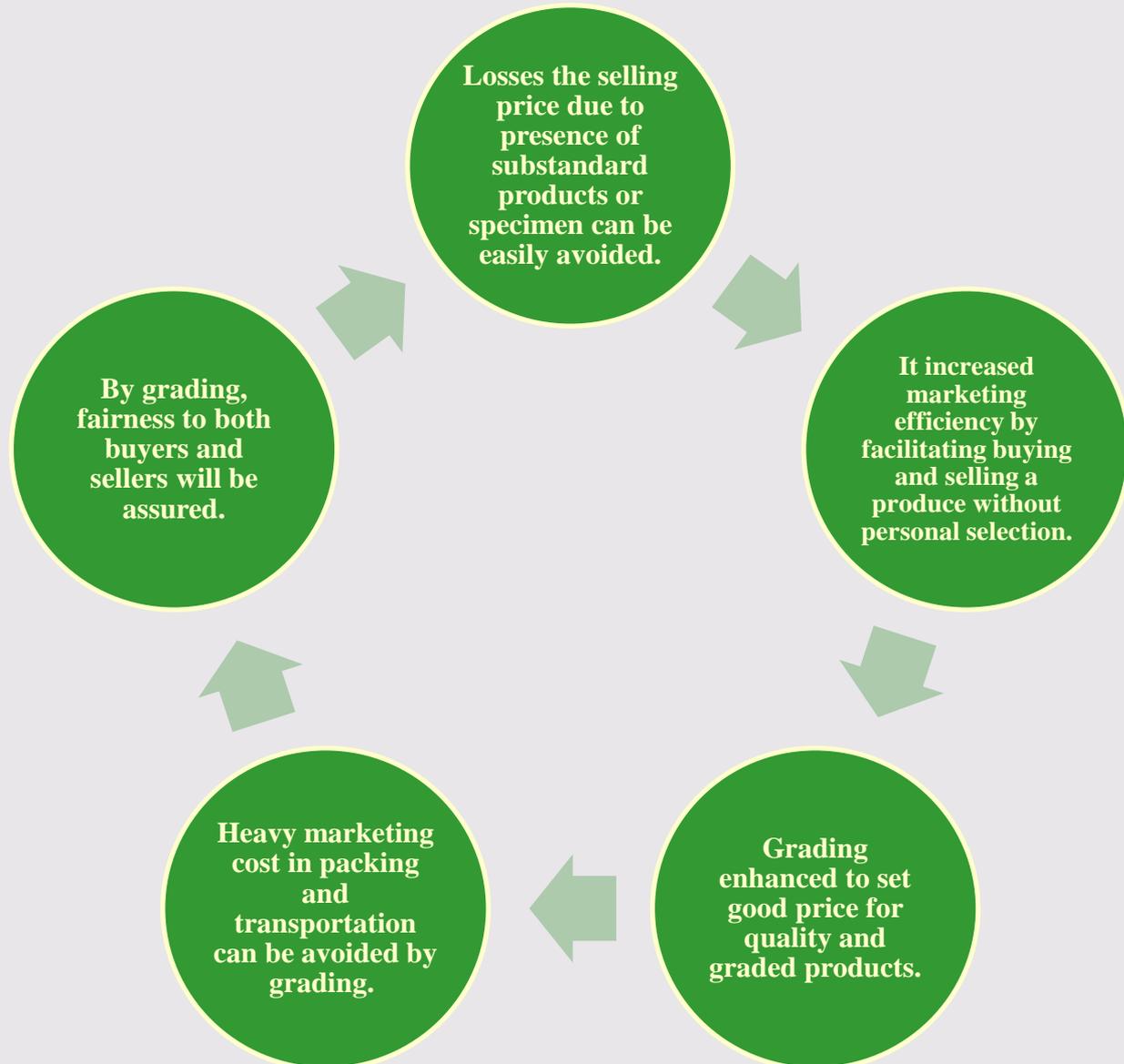




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# Advantages of Grading:





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# Handling:

- Improper handling may cause physical damage, change of composition and ultimately loss of quality; hence care should be taken during handling of organic produce.





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## Following are the general instructions for handling of organically produced crops.

- Any handling of organically produce the crops should be optimized to maintain the quality and integrity of the product and directed towards minimizing the loss of quality.
- Organic products shall be protected from co-mingling with non-organic products. Organic and non-organic products shall not be handled and transported together except when labelled or physically separated.
- The certification programme shall set standards to prevent and control pollutants and contaminants during handling.



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- The certification programme may, grant exceptions where use is legally required or where severe dietary, or nutritional deficiency can be demonstrated.
- Where only part of the unit is certified and other products are non-organic, the organic products should be stored and handled separately to maintain their identity.





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# Packaging:

## ❖ General Principles and recommendations:

- Ecologically sound materials should be used for the packaging of organic products.
- Packaging materials that affect the organic nature of the contents should be avoided.





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## Contd...

- Use of PVC materials is prohibited. Laminates and aluminum should be avoided.
- Recyclable and reusable systems shall be used wherever possible. Biodegradable packaging materials shall be used.
- The materials used must not affect the organoleptic character of the product or transmit to it any substances in quantities that may be harmful to human health.





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# ***Labelling:***

- ❖ Labelling shall convey clear and accurate information on the organic status of the product.
- When the full standards requirements are fulfilled, products shall be sold as "produce of organic agriculture" or a similar description. Single ingredient products may be labelled as "produce of organic agriculture" or a similar description when all Standards requirements have been met.
- Mixed products where not all ingredients, including additives, are of organic origin may be labelled by mentioning raw material weight.



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## *Contd...*

- Where a minimum of 95% of the ingredients are of certified organic origin, products may be labelled "certified organic" or similar and should carry the logo of the certification programme. Where less than 95% but not less than 70% of the ingredients are of certified organic origin, products may not be called "organic".





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- Where less than 70% of the ingredients are of certified organic origin, the indication that an ingredient is organic may appear in the ingredients list. Such product may not be called "organic".
- Added water and salt shall not be included in the percentage calculations of organic ingredients. The label for in-conversion products shall be clearly distinguishable from the label for organic products.



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