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# PRE-HARVEST FACTORS AFFECTING POSTHARVEST QUALITY





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## **a) Genetic Factors related to plants (Plant factors)**

The cultivar and species is the first factor determining the prevalence of different quality parameters of fruit such as colour, shape, size and weight with biochemical composition. The quality of seed or plant material is an important factor that controls the quality of the fruit and vegetable produced. Several parameters of quality are controlled genetically. The quality parameters of fruits varieties differs from one another, which are supposed to be due to different genetic makeup of the variety and also because of the difference in their total fruit development and ripening period.

e.g. jackfruit, bael, potato, onion, pumpkin, garlic etc. have good quality in relation to shelf life, while apple, mango, cherry, strawberry, tomato, capsicum, okra, brussels sprout, chinese cabbage, carrot, radish attract more to consumers due to their attractive appearance.



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## **b) Related to environments (Climatic factors)**

### **•Radiation**

In many cases, modifications in the level of nutritional composition and antioxidant capacity of fruit have been associated with changes in the radiation interception in the field. Sun-exposed sides of fruits have higher levels of phenolic and vitamin C than shaded regions.

### **•Temperature**

Very low or very high temperature may injure sensitive crops. Adequate high intensity and quality is important for the formation of some colour. Temperature influences the uptake and metabolism of mineral and nutrition by plant. Increasing temperature increase the transpiration, while lower temperature influences the flower sex and fruit setting. Fruits like grapes and apple contain higher sugar and lower acid content when grown under high temperature.



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## •Rainfall

Rainfall affect the water supply to the plant resulting influences the composition of harvested fruits. Fruits are more susceptible to mechanical damage during shipment. High rainfall and the consequences on fruit growth also increase incidence of skin cracking disorders.

## •Harvesting season and time

Quality of produce are greatly influenced by harvesting season e.g. Winter season harvest having more shelf life as compared to other season. When produce are harvested in off season it gives more remunerative price to the grower. Harvesting during or immediately after rains should not be carried out since it creates most favorable conditions for multiplication of microorganisms. Fruits should be harvested when temperature is mild because, higher temperature leads to faster respiration.



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### c) Cultural practices (Field Management factors)

•**Planting period:** Many plants are very sensitive to environmental conditions, and thus quality will not be optimized when crop is produced under adverse conditions. Producing summer plants during the winter or vice-versa will not be appropriate, unless protection practices are implemented.

•**Planting density:** It affects both the quantity and quality of the produce. High density planting increases competition between plants, reduces light availability, and thus may decrease quantity. Low density planting lead to large size, better colored fruit or vegetable which may have shorter shelf life. Larger fruits are commonly more sensitive to physiological disorders.

•**Irrigation:** Irregular watering usually reduces fruit size, increases splitting, physiological disorders, reduces water content in the plant or plant part, etc.



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- Fertilization:** Poor management of fertilizers will increase physiological disorders due to deficiencies of some minerals or increase of other leading to toxicity. In both cases, quality will be negatively affected.
- Pruning:** It reduces the load and increases the growth of fruit and chemical use after harvest. This operation reduces the competition between fruits or plants and thus promotes a good balance between the vegetative and fruit parts and improves quality.
- Protection:** Pathogens and insects have a very negative effect on quality. Poor management of plant protection programme can lead to very poor quality and reduced yield.



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•**Plant growth regulators:** Application of PGRs can provide significant economic advantage to the growers when used in appropriate concentration, as these have proven effective in stimulating a number of yield and quality parameters. Application of synthetic gibberellins is widely known to improve fruit set in apple and pear. Auxins increase fruit size in citrus, it stimulates cell expansion, especially of juice vesicles and cell expansion increase beside capacity for juice accumulation and finally fruit grow faster.

•**Pre-harvest packaging:** Pre-harvest packaging in fruit crops protects the fruit from the attack of pest such as fruit fly and guava weevil. Different types of bagging material are used like Kraft type paper, baking paper, polyethylene, poly propylene spun bond fabrics(PSF), Bio degraded films.



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## OTHERS

•**Season:** Quality of produce are greatly influenced by season e.g. Winter season harvest having more shelf life as compared to other season, while off season fruits and vegetables give more remunerative price. Harvesting during or immediately after rains should not be carried out since it creates most favorable conditions for multiplication of micro-organisms. Citrus fruits become susceptible to damage if harvested during rains as their rind becomes turgid and prone to easy bruising, sun-scald etc.

•**Time:** Fruits and vegetables should always be harvested when temperature is mild. Higher temperature leads to faster respiration. Morning harvest of horticultural crop prefer for local market because they are fully fresh and turgid and having dew drop in this time. Evening harvesting



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is preferred for distant market due to higher accumulation of reserved carbohydrates and less amount of moisture which give the better quality of the produce to consumer. Leafy vegetables harvested in the latter part of the morning or late in the afternoon, the petioles of these vegetables break less easily and their leaves are more resistant to tearing, since they have lost water through transpiration and therefore are less brittle. Cucumber is harvested in the late morning when it to be transported under less than ideal condition because it is less prone to injury when it contains less water.

•**Method of harvesting:** Selection of suitable method for harvesting of the produce is necessary otherwise bruises or injuries during harvesting may later manifest as black or brown patches making them unattractive. Latex coming out of stem in mango should not be allowed to fall on fruits as it creates a black spot. Injury to peel may become an entry



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point for microorganisms, causing rotting. Some harvesting gadgets have been developed, e.g. mango harvester in Lucknow (CISH).

- **Stage of harvesting:** Fruits and vegetables must be harvested at right stage of maturity. A very common cause of poor product quality at harvest and rapid deterioration thereafter is harvesting immature vegetables. Vegetables harvested immature or over mature usually do not keep long. Fruit vegetables harvested too early lose water fast and are more susceptible to mechanical damage and microbial attack. An over mature vegetable is more susceptible to decay, has passed its best eating quality, and deteriorates fast.

- **Consumer demand:** Harvesting time and harvest maturity can be altered by the requirement of the consumer's demand which may affect the quality of the produce at some extent.