

QUALITY OF HORTICULTURAL PRODUCTS

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Abstract

Quality, i.e., the degree of excellence or superiority, is a combination of attributes, properties, or characteristics that give each commodity value in terms of its intended use. The relative importance of each quality component depends upon the commodity or the product and how it is utilised and varies among producers, handlers, and consumers. To producers a given commodity must have high yield and good appearance must be easy to harvest, and must withstand long-distance shipping to markets. Appearance quality, firmness, and shelf life are important from the point of view of wholesale and retail marketers. Consumers judge quality of fresh fruits, ornamentals, and vegetables on the basis of appearance (including 'freshness') at the time of initial purchase. Subsequent purchases depend upon the consumer's satisfaction in terms of flavour (eating) quality of the product. Consumers are also concerned about the nutritional quality and safety of fruits and vegetables and their products. Quality of planting materials (seeds and propagules) is based on viability, vigour, and freedom from diseases and insects. A positive return on investment is essential in judging quality of production inputs (such as starting materials, fertilisers, pesticides, and equipment) and harvesting and postharvest handling machinery.

1. Quality components

Appearance (visual) quality factors. These may include size, shape, colour, gloss, and freedom from defects and decay. Defects can originate before harvest as a result of damage by insects, diseases, birds, and hail; chemical injuries; and various blemishes (such as scars, scabs, russetting, rind staining). Postharvest defects may be morphological, physical, physiological, or pathological.

Textural (feel) quality factors. These include firmness, crispness, juiciness, mealiness, and toughness depending on the commodity. Textural quality of horticultural crops is not only important for their eating and cooking quality but also for their shipping ability. Soft fruits cannot be shipped long distances without extensive losses due to physical injuries. This has necessitated harvesting fruits at less ideal maturity from the flavour quality standpoint in many cases.

Flavour (eating) quality factors. These include sweetness, sourness (acidity), astringency, bitterness, aroma, and off-flavours. Flavour quality involves perception of the tastes and aromas of many compounds. Objective analytical determination of critical components must be coupled with subjective evaluations by a taste panel to yield useful and meaningful information about flavour quality of fresh fruits and vegetables. This approach can be used to define a minimum level of acceptability. To find out consumer preferences of flavour of a given commodity, large-scale testing by a representative sample of the consumers is required.

Nutritional quality factors. Fresh fruits and vegetables play a very significant role in human nutrition, especially as sources of vitamins (Vitamin C, Vitamin A, Vitamin B, thiamine, niacin), minerals, and dietary fibre. Other constituents that may lower risk of cancer and other diseases include carotenoids, flavonoids, isoflavones, phytosterols, and other phytochemicals (phytonutrients).

2. Quality control and assurance

An effective quality control and assurance system throughout the handling steps between harvest and retail display is required to provide a consistently good-quality supply of fresh horticultural crops to the consumers and to protect the reputation of a given marketing label. Quality control starts in the field with the selection of the proper time to harvest for maximum quality. Careful harvesting is essential to minimise physical injuries and maintain quality. Each subsequent step after harvest has the potential to either maintain or reduce quality. Few postharvest procedures can improve the quality of individual units of the commodity.

Many attempts are currently being made to automate the separation of a given commodity into various grades and the elimination of defective units. The availability of low-cost microcomputers and solid-state imaging systems have computer-aided video inspection on the packing line a practical reality. Solid-state video camera or light reflectance systems are used for detection of external defects, and x-ray or light transmittance systems are used for detecting internal defects. Further development of these and other systems to provide greater reliability and efficiency will be very helpful in quality control efforts.

3. Further research and extension goals

1. Identify the important components of quality and the interrelationships among these quality factors for the various horticultural commodities and products for which such information is not available.
2. Develop objective and non-destructive methods of determination of quality attributes, especially those, which are related to flavour, and nutritional quality of fresh fruits and vegetables.
3. Work with agencies responsible for standardization and inspection of fresh horticultural commodities to develop methods to improve the enforcement of current minimum maturity and quality standards to ensure better quality for the consumer. Also, consideration should be given to revising some of the existing quality and maturity standards with more emphasis on eating quality factors in fruits and vegetables.
4. Conduct consumer acceptance research aimed at relating maturity indices at harvest to the final organoleptic acceptability by the consumer.
5. Continue efforts aimed at development of new genotypes with better flavour and nutritional quality in all the major fruits and vegetables and genotypes with improved appearance quality and vase-life of cut flowers.
6. Study the effects of preharvest factors (climatic conditions, cultural practices, etc.) on quality attributes of fresh fruits, vegetables, and flowers.
7. Evaluate the effects of currently used and alternative postharvest handling practices on flavour and nutritional quality (including phytonutrients contents) and safety attributes of fresh fruits and vegetables.
8. Develop alternatives to currently used chemicals as part of integrated pest management strategies for control of postharvest diseases and insects of fresh horticultural crops.
9. Expand the current Extension programs to reach more of the handlers, receivers, marketers, and consumers and provide them with information about proper procedures for maintaining quality and safety of fresh produce.
10. Identify strategies to improve the efficiency of the distribution system for fresh fruits, ornamentals and vegetables at the local, national, and international levels.