1. **GENECTIC FACTOR**

It has a profound effect on the selection of raw material for a given processing application.

Cultivar and rootstock selection influences;

1. composition,
2. Quality (color, flavor, taste, texture)
3. storage potential,
4. Response to processing characteristics that may be inherited. In many cases, fruit cultivars grown for fresh market sale are not suited for processing and vice versa.

Examples,

1. grape varieties used for wine-making
2. grape varieties used for fresh food market.
3. Pulp content (Mango pulp more in grafted varieties, less in desi varieties),
4. Sweetness (mango varieties for table purposes, tart vatieties for juice production, some time both are mixed to obtain a suitable blend),
5. Color, Flavor, Taste,
6. Machineability (Orange, mandarin have less machinability, seed less fruits required),
7. Product yield (high yielding varietied are preferred, desi mango have less pulp yield due to large stone, less pulp and thick peel),
8. Low wastage/ high out put
9. Special characters as in potato (white, yellow, convertion of starch in to sugar during cold storage, lycopene contents, carotenoids (for dehydration matured carrots are used due to more color pigments proportion in matured carrots, etc).

Potato varieties with less or shallow internodes and uniform regular shape, thin skin,

1. High acid, good flavor tone, and disease free, and less succeptability to insect attack,

**Criteria used by breeders in the development of new varieties.**

Out of the pool of several varieties, there have been studies to identify those that suit a particular processing method. Modern processors usually contract out growers who grow a particular variety or cultivar that suits the raw material specifications for a given type of processing.

1. Higher yield,
2. Resistance to disease and disorders,
3. Improved compositional and nutritional values,
4. Reduction in undesired toxic compounds,
5. Improved processing characteristics.
6. Improvement of nutrients as sela rice is rich in thiamine,

Recently, there has been a significant amount of work reported on the modification of genetic makeup to improve the postharvest performance of fruits and vegetables. Transgenic fruits and vegetables have been released that have reduced browning and softening tendencies, and increased shelf life, and uniformity of flavor and color.

**2. Climatic Factor**:

Climatic factors which affect the quality of fruits and vegetables are;

1. The growing region (Temperate region, Tropical region, sub-tropical region),
2. Environmental conditions specific to each region,

(a) temperature,

(b) humidity,

( c) light (duration, intensity, and quality of light during cultivation affect the quality at harvest,

(d) wind,

(e) soil texture,

(f) elevation,

(g) rainfall,

In tomatoes, leaf shading of fruits is known to result in a deeper red color during the ripening and when grown in full sunlight contain more sugar and dry matter.

Exposure to sun tends to make citrus fruits;

* lighter in weight,
* with thinner rind,
* low amounts of juice and acids,
* high solid content compared to those that were shaded or those inside a canopy.
* The differences in day length and light quality affect the product physiology; for example, onion varieties developed for short-day climates will not produce large bulbs.
* In purple cabbage and eggplants, formation of anthocyanin pigments is controlled by short wavelengths of light in the blue and violet regions
* Thiamine synthesis in plants is stimulated by light and generally occurs in the leaves and increases in concentration until the plant matures.
* Turnips harvested in the morning contain more riboflavin than those harvested at other times of the day.
* Among leafy vegetables, leaves are larger and thinner under a condition of low light intensity.
* Fruits grown in cold climate usually are more acidic than those grown in warmer regions.

1. **Cultural Practices**

Plant produce is affected by

1. Soil type (sandy soil, loam soil, sandy loam, peat soils, muck soils)

soil nutrient (N for vegetative growth, P, K, minerals, organic matter, addition of fertilizers affect the mineral content of fruits, many physiological disorders have been linked to the nutrient status of the soil),

1. water supply (tube well, rain water, river/canal water),
2. pruning (removal of unnecessary twigs to allow straight growth of plant, influence nutritional composition, The closer the planting, the less will be the sweetness of fruits),
3. thinning (allow specific number of plants to grow in a specific area),
4. pest control or chemical spray,
5. density of planting

Some other cultural practices such as pruning and thinning may by changing fruit crop load and size.

* Potatoes grown in sandy, gravelly or light loamy soils, and low-water or fertility soils have consistently produced higher dry matter than those grown in peat or low-moisture soils.
* A high N/K ratio and phosphorus deficiency in soil increases the tendency of potato to darken after cooking.
* Pineapple plants receiving undue amounts of nitrogen produce tart, white, and opaque fruits of poor flavor characteristics.
* Pesticide residues may give rise to flavor taints in fresh and processed products, and excessive use of pesticides may even produce harmful metabolites and toxicity that may not be necessarily destroyed during processing or heat treatment.

1. **Harvesting Factors**

**Maturity at Harvest**

Maturity at harvest is the most important quality criteria for a processor as it directly affects

1. Composition
2. Quality
3. Losses
4. Storage potential of plant produce

The optimum harvest maturity is vital to achieve maximum postharvest life of the fresh produce.

Although most fruits reach peak eating quality when harvested fully ripe, they are usually picked mature, but not ripe, to decrease mechanical injury during postharvest handling.

Immature fruits are more subject to shriveling and mechanical damage, and are of inferior quality when ripened.

Overripe fruits are likely to become soft and mealy with insipid flavor soon after harvest.

Fruits picked either too early or too late in the season are more susceptible to physiological disorders and have a shorter storage life than those picked at mid-season.

Harvesting fruits either immature or overripe can cause extensive loss of the produce; thus maturity indices are important criteria used for arriving at a correct harvesting stage.

The optimum maturity of produce for fresh consumption and processing is determined by the purpose for which it will be used.

The maturity stage considered best for canning may not be best for dehydration, freezing, or making jams or preserves. For example, fully ripened fruits should be used for drying and making concentrated products (tomato sauce) to achieve the best flavor, but for fresh marketing these may not be suitable for its susceptibility to damage.

**Harvesting Methods**

There are two types of harvesting method

1. Manual Harvesting
2. Mechanical harvesting

**Manual harvesting are**

* accurate selection and grading according to maturity
* minimum damage to commodity
* minimum capital investment
* mechanical devices can be used as aids to manual harvesting.

**Disadvantages**

* it needs management of labor force
* it is slow.

**Mechanical harvesting**

**Advantages**

* it is fast
* it requires low labor and easy management.

**Disadvantages**

* it may cause mechanical damage to the produce by skin abrasion and tissue bruising
* It requires trained personnel and a special field lay out, and cropping patterns.
* The use of improper machinery and equipment in mechanical harvesting may cause serious food losses.
* The harvesting system used and its management has a direct effect on incidence and severity of mechanical injuries. Thus, for best results, management procedures should include the following:

1. selection of optimum time to harvest regarding fruit maturity and climatic conditions,
2. training and supervision of workers, effective quality control procedure. Pickers can be trained in methods of identifying the produce that is ready for harvest.
3. Harvested vegetables other than root crops should not be placed directly on the soil or be exposed to sunlight, heat, and rain.
4. Exposure to sun can lead to a high internal temperature, which is detrimental to the quality.
5. A simple shade or grass coverage can provide protection to the harvested products. Some root crops can benefit by brief exposure to the sun to dry off the surface or facilitate removal of adhering soil.
6. **Picking at the right time;** during the day- or night time, and weather conditions also affect the quality.
7. **Harvesting during or immediately after rains;** should be avoided and preferably carried out during the cooler part of the day (usually early morning) to avoid shriveling and wilting.