NEW ERA AGRICULTURE MAGAZINE

Minimal processing of Fruits and Vegetables

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Introduction:

Consumer demand for fresh fruits and vegetables joins convenience is stoke an interest in minimally prepared products. Innovative packaging technology supply a prospective for better quality and increase shelf-life of these products, but shortly is known concerning the nutrition, physical and microorganism result of the minimal prepare product. Brand label and commercial label finding of these products will be need of new point of view shelf- life and quality assurance. The quality menage to the fresh fruits and vegetables or minimally process product according to the concept of assuming that best quality consumption and buyers.

Minimal processing of fruits or vegetable crops, it means without changing their fresh properties. Fresh cut produce in industry available for consumer by cleaning, sorting, grading, and sometimes cutting or peeling the without undergoing extend processing method like blanching, freezing or canning. Minimal processing also known as partial or fresh or light or prepared products. It is also named as fresh-cut or ready-to-eat is commonly free from additive and only needs minimal. It means consumers need for convenience are correlated for minimal food choice, therefore the fresh cut fruits and vegetables industry is working to increase the classification of minimally processed vegetable products that desire the consumers' needs for quick and convenient products that preserve their nutritional value, retain a natural and fresh colour, tasteful and texture and contain lesser additives such as preservatives. It is prepared foods are those which impact of the characteristics of food quality, which at the time giving food sufficient shelf life during distribution and storage. These techniques are used preserve processed product, but retain to a nutritional quality and sensory characteristics such as colour, flavor, aromas, texture etc. Minimally fresh processed fruits and

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vegetables are prepared for consumption such as washing, sorting, grading, cutting, grating, shredding, pulping, blanching, packing, storage at low temperatures under polymeric films that are able to generate optimum modified atmosphere packaging (MAP) conditions. All these steps have an impact on the shelf life, nutrients, quality of the prepared product i.e. these commodities until now the market include packaged shredded carrot, cabbage, lettuce, coriander cut into pieces fruits and vegetables in salads, potatoes, carrots, cauliflower florets and broccoli.

Minimal processing of fresh fruits and vegetables has two motives first one is important retain to the fresh product but suitable in the absence of nutritional quality. Second one the product should have shelf life satisfactory to make diffusion practical between the regions of utilization. The sensory analysis, microbiological, and nutritional shelf life of minimally prepared fruits and vegetable should be a minimum 4-7 days, but, if possible, even longer.

Minimal processed product aim is shelf-life increase, protect the microorganism, keep to nutritional quality, biological changes decay, storage durability long, and nutritional quality of the produce, while extending their shelf life and making them easier to consume. These methods typically aim to preserve the natural characteristics of the produce without significant alteration. Some common practices in minimal processing include:

Steps in Minimal Processing

Cleaning and Washing

- Fruits and vegetables are thoroughly washed to remove dirt, pesticides, and any surface contaminants.
- This step may include the use of chlorine or ozone solutions to ensure food safety.

Peeling and Trimming

- Automated machines may be used to peel fruits and vegetables without damaging the edible portions.
- Inedible parts (e.g., skins, roots, or outer leaves) are removed. This is common for produce like carrots, potatoes, and oranges.

Cutting, Slicing, and Dicing

- Produce is cut into smaller, ready-to-use portions (e.g., baby carrots, sliced apples, diced onions).This helps with convenience but also increases the surface area, which can lead to faster spoilage Blanching
- A brief exposure to boiling water or steam followed by rapid cooling (usually in ice water). This is used to stop enzyme activity that causes degradation while preserving colour and texture.
- This technique is especially useful for vegetables like broccoli and green beans.

Packaging

- Minimal processing often includes placing fruits and vegetables in modified

atmosphere packaging (MAP), where the composition of gases (e.g., oxygen, carbon dioxide) is controlled to slow spoilage.

- Vacuum sealing or using films that maintain the natural gases around the produce is another method.

Refrigeration

- Keeping minimally processed produce at low temperatures (just above freezing) helps maintain freshness by slowing down microbial growth and enzymatic reactions.

Edible Coatings

- Thin, edible coatings (e.g., made from natural ingredients like chitosan or starch) are applied to the surface of fruits and vegetables to reduce moisture loss and oxidation.

Benefits of Minimal Processing: -

- Preserves Nutritional Value: Vitamins, minerals and fibers are largely retained, unlike in heavily processed foods
- Convenience: Ready-to-eat or ready-to-cook formats reduce meal preparation time.
- Extended Shelf Life: Packaging and preservation techniques help extend the shelf life without the use of artificial preservatives.
- Nutrient Retention: Minimal alteration of nutrients, compared to full processing.
- Reduced Waste: Efficient use of the entire product, with only non-edible parts removed.

Challenges

- Perishability: Despite minimal processing, fruits and vegetables remain highly perishable and require proper storage conditions.
- Cost: Processing, packaging, and maintaining a cold supply chain can increase the price of minimally processed produce.
- Microbial Safety: Due to high moisture content, fruits and vegetables remain susceptible to microbial contamination.
- Shorter Shelf Life Compared to Fully Processed Foods: These products may have a shorter shelf life compared to frozen or canned produce.
- Quality Control: Ensuring consistency in appearance, taste and texture.