NEWSLETTER

Food Technology®

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Shelf life extension of fruits and vegetables

Fresh fruits and vegetables are living organisms and continue respiration even after harvesting. During storage and transport period, fruits and vegetables may undergo deterioration as their character such as nutrition, flavour, colour and texture.

Shelf life of fruits and vegetables depends on two variables namely respiration of commodity and permeability of the packaging films. The Modified Atmosphere Packaging (MAP) using specially designed films acts as protective surface by controlling respiration of goods and permeation simultaneously. Edible coating is an alternative beneficial, low cost tool for shelf life extension of postharvest fruits and vegetables. Edible polymeric packaging materials can be made from polysaccharides, proteins and lipids. To extend the shelf life of postharvest fruits and vegetables, some effective measures including low temperature storage, Modified Atmosphere Packaging, irradiation and coating, have been applied.

Modified Atmosphere Packaging (MAP) is the technique in which sealed fresh fruits and vegetables alter the storage atmosphere ie. CO_2 and O_2 levels, through the packaging material. Generally, the respiration rate of fruits and vegetables has inverse relation with their postharvest shelf-life. It is desirable that the natural interaction that occurs between the respiration of fresh commodity and the packaging generates an atmosphere with low levels of O_2 and/or high concentration of CO_2.The fruits and vegetables packed in suitable films having selective permeability create atmosphere which has low levels of O_2 and/or high concentration of CO_2. This environment further creates the barrier to the respiration and thus stops decaying and increases storability and/or shelf life.

Likewise, fruit coating isolates the product from the external environment and reduces exposure to pathogens and contaminants. Polyethylene is the most commonly used polymer film for packaging with its advantages of being inert, permeable to gases and impermeable to water vapour.

By-product of Fruits and Vegetables – Source of Functional Components

In fruit and vegetables industry, the preparation and processing procedures lead to almost one third of the product being discarded. This waste has a high nutritional value and could be used as a food ingredient due to their functional abilities. Since this waste still contains some valuable ingredients; it is better referred as by-product. The by-products of fruits and vegetables are a rich source of functional components. When they are naturally present in some products, it is referred to as functional foods.
These functional components have many health promoting properties like antioxidant property, anti-cancerous, anti-inflammatory, reducing risk of cardiovascular diseases, diabetes, intestinal disorders and improving eye health, etc.

Table – Functional components of Vegetables by-products

Vegetables	By-products	Functional Components
Tomato	Pomace Seeds Skin	Leutin, polyphenols, sterols, terpenes, tocopherols Fibres, Seed Oil, Protein, Lycopene Beta-Carotene
Carrot	Pomace	Carotenes, uronic acids, neutral sugars
Onion	Brown Skin Outer 2 fleshy leaves Top & Bottom bulbs	Flavour components and fibre compounds rich in quercetin glycosides, fructans and fructoligosaccharides
Red Beet	Pomace Peel Crown	Betalains, betacyanins, betaxanthins, phnolic compounds
Potato	Peels	Phenolic acids
Olive	Skins and Stones	Olive oil, hydroxytyrosol, oleuropein

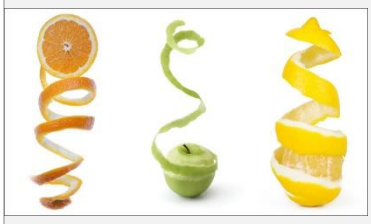

Table – Functional components of Fruits by-products

Fruit	By-products	Functional components
Apple	Pomace	Pectin, Polyphenols, Minerals
	Peels	Polyphenols (catechins, droxycinnamates, quercetins, pyrocyanidins)
Mango	Seed kernel	Fat equivalent to cocoa butter, starch. Antioxidants
	Peels	Pectin, dietary fibre, polephenolics
Grapes	Pomace	Ethanol, tartrates, citric acid, hydrocolloids, dietary fibres, anthocyanins, catechins, epicatechin, gallate, flavanol glycosides, phenolic acids
	Seeds	Seed oil and Polyphenols
Citrus Fruits	Peels	Pectin, Cellulose, Hemicellulose, dietary fibres
	Pomace	Carotenoids, polyphenols (hesperidin)essential oils, limonoids
	Seeds	Oil, Limonoids
	Defatted Meal	Protein
Banana	Peels (30%)	Biotechnological production of Proteins, ethanol, alpha-amylase, hemicellulases, cellulases, carotenoids
	Bracts	Anthocyanins
Guava	Seeds	Oil rich in essential fatty acids
	Peel and Pulp	Antioxidant, dietary fibre
Papaya	Latex	Papain Enzyme
	Pomace	Pectin

Application of by-products containing functional components

- Apple Skin Powder (ASP) was added to muffins to improve their phenolic content. It was found to enhance the flavor while increasing the phenolic and antioxidant contents.
- Orange peel may be considered to be a viable ingredient for a wide variety of products such as meat pastes, baked goods and yoghurt.
- Cauliflower leaf midribs, upper stem and stalks may be used as a fat substitute in the production of beef sausages.
- Solubilized Potato peel fiber decreases the hardness and gumminess of the bread.

Fruity and Veggie Facts!

- A strawberry is not an actual berry, but a banana is.
- Apples float in water because they are 25% air.
- The highest amount of vitamins and nutrients are contained within the vegetable's skin and the layer directly underneath it
- Tomatoes are the most popular fruit in the world
- Bananas have a natural antacid effect in the body, so if you suffer from heartburn, try eating a banana for soothing relief
- Soluble vitamins are lost through the absorption of liquid - for example, when boiling

A balanced diet of vegetables can dramatically help to lose weight or maintain a healthy weight, and live a longer and healthier lifestyle.

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