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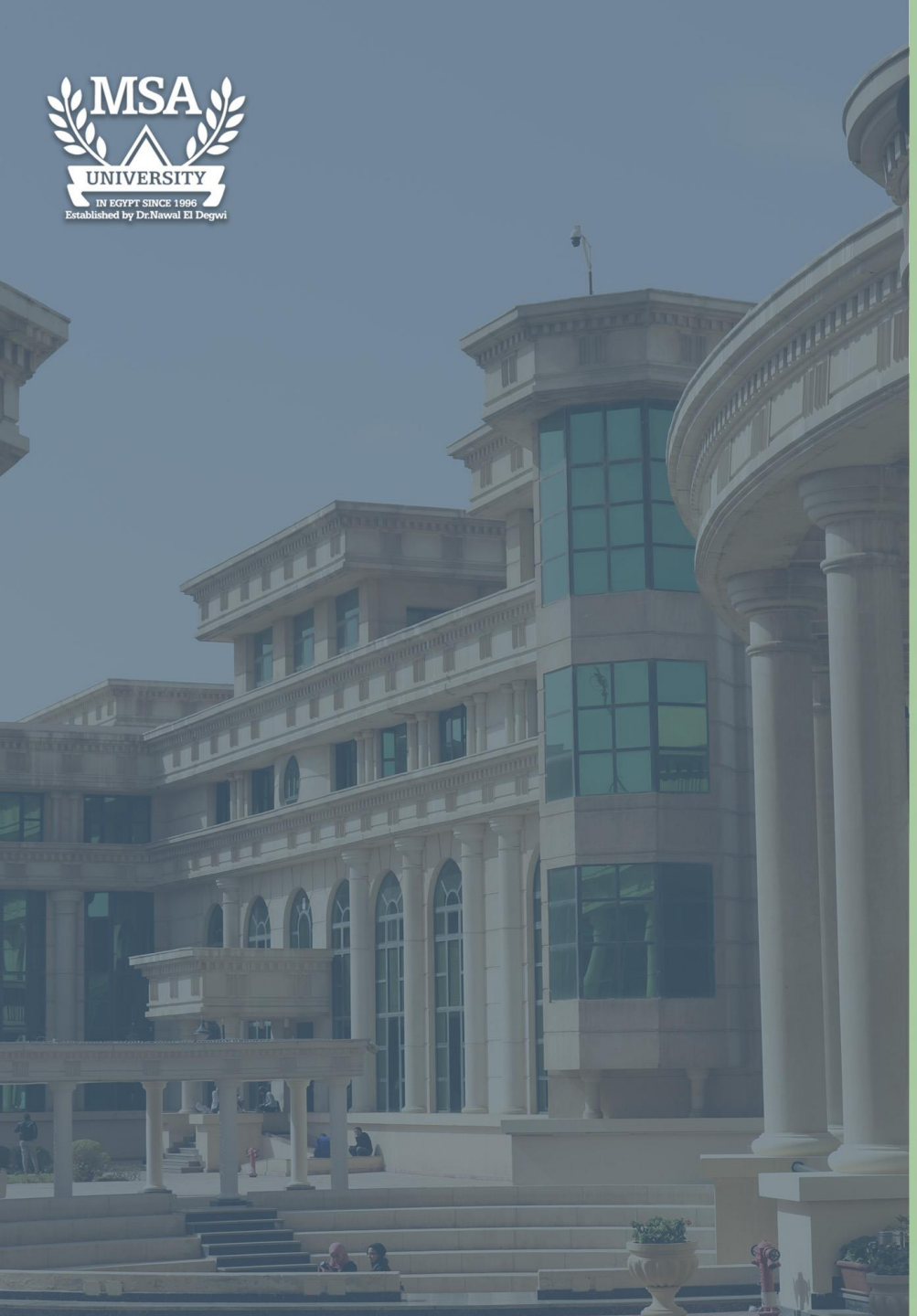
جامعة أكتوبر للعلوم الحديثة والآداب

Pharmacognosy
PHG112



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Lecture 6

Fruits Having Nutraceutical Applications (Cont.)

Interactive teaching methods and activities

Learning Outcomes

By the end of this lecture, students should be able to:

1. Remembering (Knowledge)

- Identify the botanical sources of important nutraceutical fruits such as capsicum, wheat, papaya, avocado, lemon, and lychee.
- List the major active constituents present in these fruits.
- Recall the main therapeutic and nutraceutical uses of these fruits in health promotion and disease prevention.
- Recognize the major chemical constituents responsible for the pharmacological activity of capsicum and citrus fruits.

Understanding (Comprehension)

- Explain how capsaicin in capsicum contributes to its medicinal effects such as analgesic and counter-irritant actions.
- Describe the nutritional and therapeutic importance of wheat germ oil, lychee nutrients, and avocado fatty acids.

Learning Outcomes

By the end of this lecture, students should be able to:

3. Applying (Application)

- Relate the chemical constituents of each fruit to their pharmaceutical, nutraceutical, or cosmetic applications.
- Apply knowledge of fruit constituents to explain their use in digestive disorders, inflammation, immune support, and cardiovascular health.

4. Analyzing (Analysis)

- Differentiate between nutraceutical and cosmeceutical uses of fruits such as papaya, avocado, and lemon.
- Compare the pharmacological activities of different fruits based on their active constituents.

Learning Outcomes

By the end of this lecture, students should be able to:

5. Evaluating (Evaluation)

- Assess the health benefits and possible side effects associated with the consumption or topical use of certain fruits (e.g., capsicum irritation).
- Evaluate the importance of natural fruits as sources of bioactive compounds used in pharmaceutical and cosmetic preparations.

6. Creating (Synthesis)

- Construct comparison tables summarizing the source, active constituents, and uses of nutraceutical fruits.
- Propose potential nutraceutical or cosmetic formulations derived from fruit bioactive compounds.

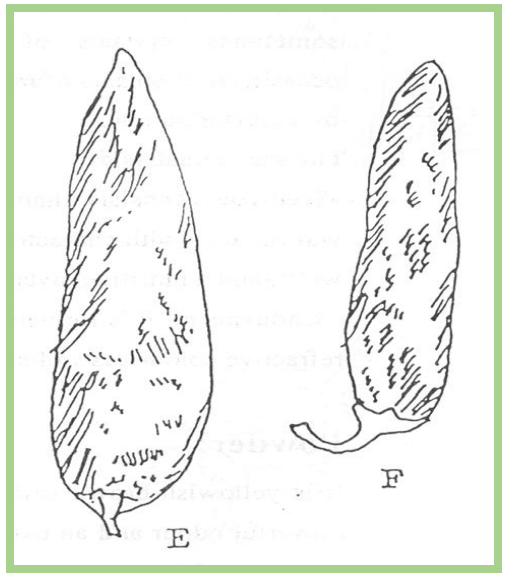
Capsicum

Origin: Chillies, Cayenne pepper

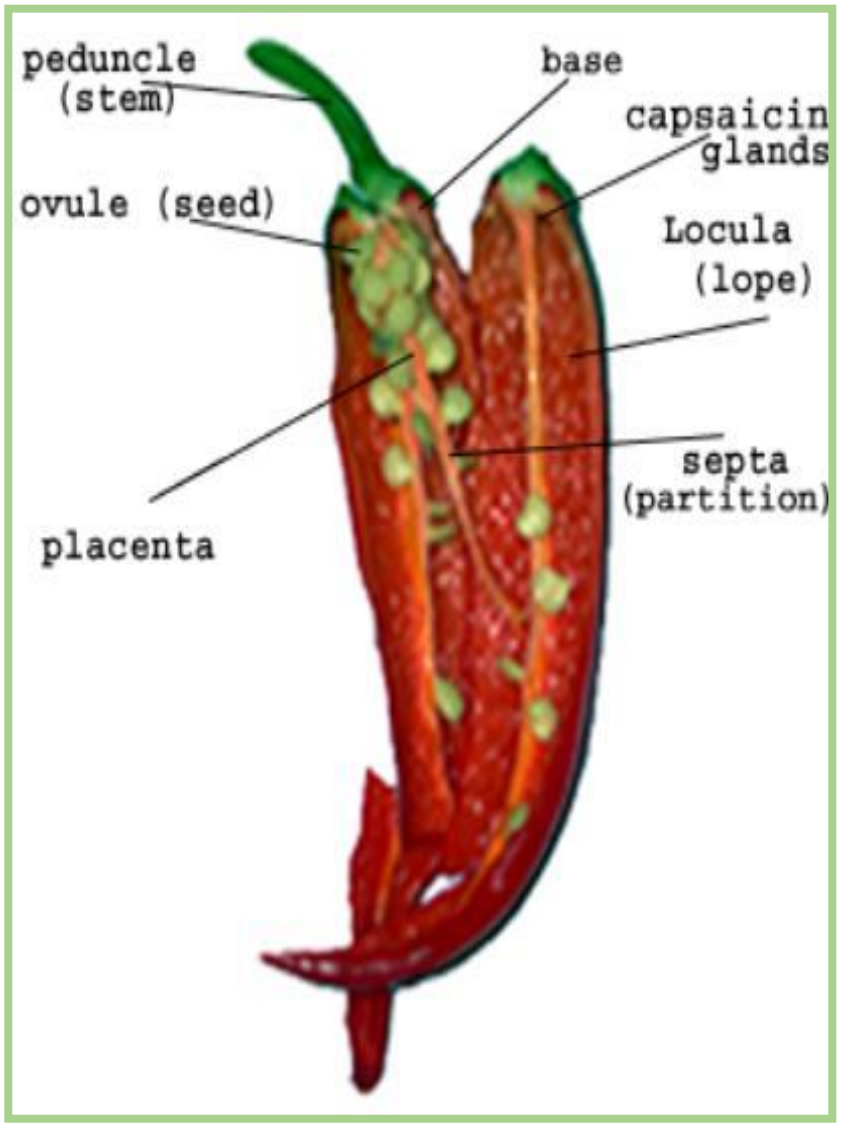
Capsicum is the dried ripe fruits of

Capsicum minimum **F. Solanaceae.**

It should contain not more than 3% of calyces and pedicels, and not more than 1% of foreign organic matter.



Capsicum Fruit



L. Cut of Capsicum fruit

Active Constituents

1- Pungent principles named Capsaicinoids (up to 1.5%), including **capsaicin** (0.1 - 1 %), 6,7 -dihydrocapsaicin, nordihydrocapsaicin, homodihydrocapsaicin, and homocapsaicin

2- Fixed oils.

3- Carotenoid pigments (including capsanthin, capsorubin, alpha- and betacarotene).

4- Steroid glycosides (capsicosides A, B, C, and D).

5- Fats (9 -17%), proteins (12 -15%), vitamins A and C, and trace of volatile oil.

Active Constituents

The capsaicin content of fruits varies in a range up to 1.55 and is much influenced by environmental conditions and age of the fruit. It occurs principally in the dissepiment

The pungency of capsicum is not destroyed by treatment with alkalis (distinction from gingerol, the phenolic pungent principle of Ginger) but destroyed by oxidation with potassium dichromate or permenganate

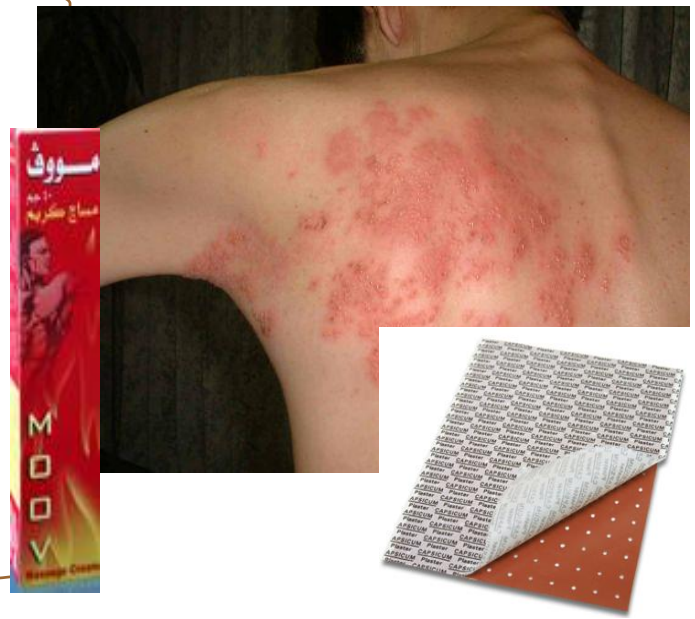
Uses and actions

1- Condiment

2- Internally, In atonic dyspepsia and flatulence.

3- Externally, It is used in different formulations (e.g. ointments and plasters) as a pain controller for the relief of rheumatism, lumbago, and after *Herpes Zoster* infections and counter irritant

Topical application of capsaicin relieves pain and itching by acting on sensory nerves for a range of conditions, including nerve pain in diabetes (diabetic neuropathy), post-surgical pain, muscle and nerve pain, osteoarthritis pain and rheumatoid arthritis.



Side effects and Contraindications

Side effects

- Allergic reaction to the cream, so the first application should be to a very small area of skin.

-Oral intake can cause burning in the mouth and throat, also, it can cause the nose to run and eyes to water.

People with ulcers, heartburn, or gastritis should use any cayenne-containing product cautiously as it may worsen their condition.

-Contraindications

Application on injured skin, allergies to cayenne preparations

Chemical tests

1- Capsaicin gives a bluish-green colour on addition of few drops of $FeCl_3$

2-Capsaicin dissolved in H_2SO_4 and small piece of sucrose sugar is added, a violet colour is developed after few hours.

Wheat grain

Origin: The dried caryopsis (grain) of *Triticum vulgare* F.Graminae

Active constituents: Starch, protein, vitamins A, B,B2,E, enzymes, wheat germ oil

Uses: Starch production - wheat germ oil

wheat bran production

Wheat germ oil

It is extracted from the germ of the wheat kernel.

Active constituents

Wheat germ oil is particularly high in octacosanol (a 28-carbon long-chain saturated primary alcohol), vitamin E (255 mg/100g), it also contains Linoleic acid (omega-6), Palmitic acid, Oleic acid, Linolenic acid (omega-3).

Uses

Octacosanol has been studied as an exercise- and physical performance-enhancing agent. Very long chain fatty alcohols obtained from plant waxes and beeswax have been reported to lower plasma cholesterol in humans.

Lychee Fruit
"Alligator Strawberry"

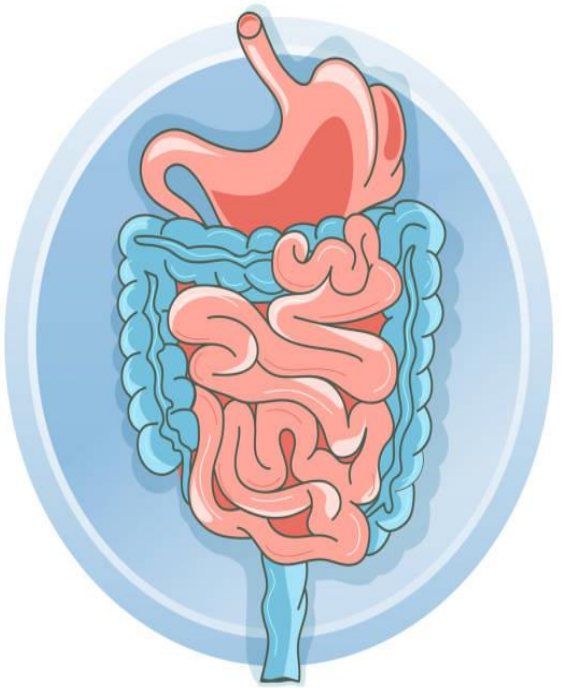
Active constituents:

- Lychee is packed with health benefits and they come from the vitamins, minerals, and nutrients in the fruit, including vitamin C, vitamin B6, niacin, riboflavin, folate, copper, potassium, phosphorus, magnesium, and manganese.

- Furthermore, lychee is a great source of dietary fiber, protein, and a good source of proanthocyanidins and polyphenolic compounds such as; Litchitannin A2.

Uses:

Aids in Digestion



The significant amount of dietary fiber in lychee helps add bulk to the stool and increases digestive health. This helps bowel movements move through the digestive tract smoothly, and fiber also stimulates peristaltic motion of the smooth small intestine muscles, increasing the speed of food passing.

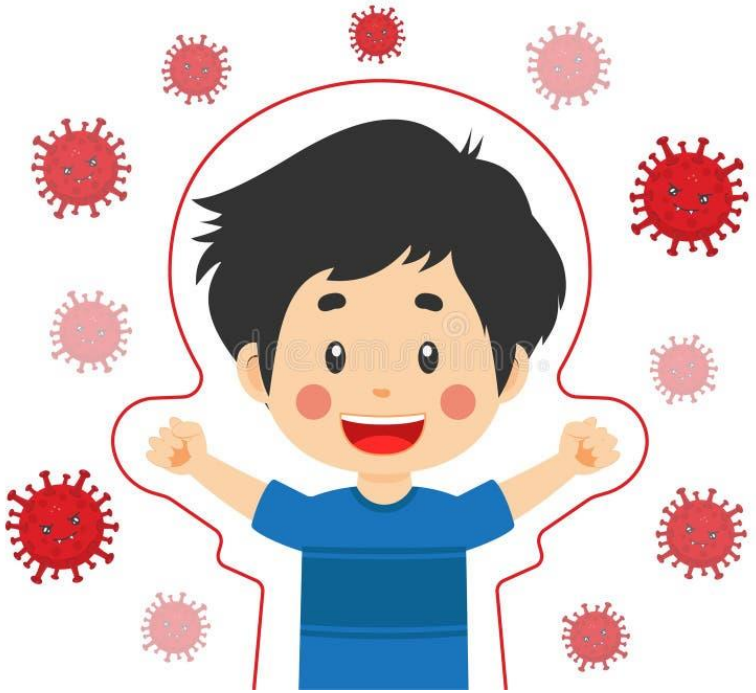
It also stimulates gastric and digestive juices, so the absorption of nutrients is efficient. This can reduce constipation and other gastrointestinal disorders.

Uses:

Boosts Immunity

Perhaps the most significant nutrient in lychee is vitamin C, and this fruit has more than 100% of the daily requirement of ascorbic acid in a single serving.

This means that the immune system gets a major boost, as vitamin C is a major antioxidant compound and is known to stimulate the activity of white blood cells, which are the main defensive line of the body's immune system.



Uses:

Antiviral

The proanthocyanidins in lychee have been studied extensively, and they have also demonstrated antiviral capabilities.

Litchitannin A2 has been closely connected to preventing the spread or outbreak of viruses, including herpes simplex virus and coxsackievirus.

Uses:

Controls Blood Pressure

Lychee has a wealth of potassium, meaning that it can help the body maintain a fluid balance, which is an integral part not only of metabolic functions but also in hypertension it is also low in sodium.

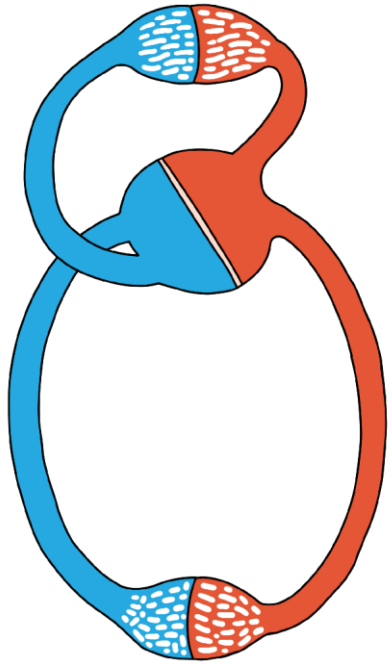
Potassium is considered to be a vasodilator, meaning that it reduces the constriction of blood vessels and arteries, thereby lowering the stress on the cardiovascular system.

Potassium levels are almost three times higher in dried lychee rather than in fresh lychee!

Uses:

Improves Blood Circulation

Copper is another essential mineral found in considerable quantities in lychee, and although iron is most commonly associated with red blood cells, copper is also an integral part of RBC formation. Therefore, the copper content in lychee can boost blood circulation and increase oxygenation of the organs and cells.



Market preparations:

Fruits Having Nutraceutical Applications and Cosmeceutical Applications

Papaya Fruit
"Fruit of Angels"

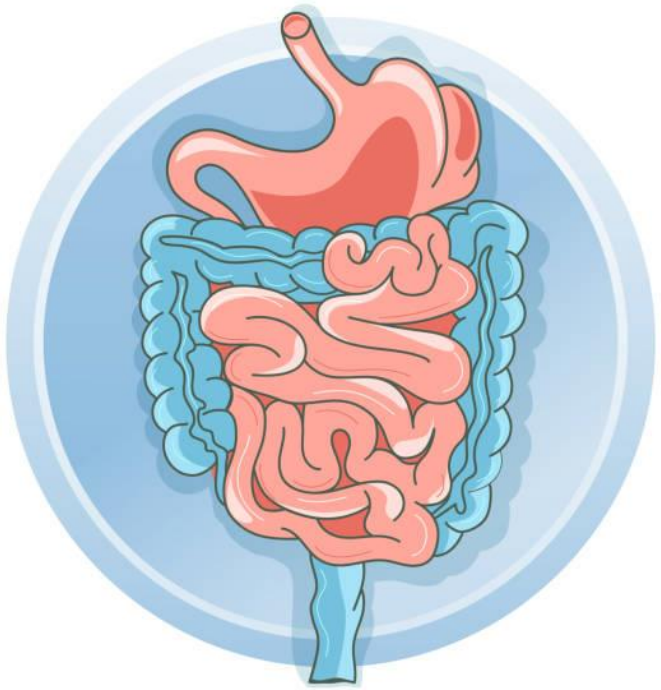
Active constituents:

- Enzymes are present in the unripe fruit and latex such as papain and chymopapain. Fruit also contains carotenoids; β carotene
- Papaya oil is found in seeds, it contains flavonoids, kaemferol, and myricetin.
- Papaya is possibly rich in vitamins C, A, E, as well as some B vitamins (folate and pantothenic acid).

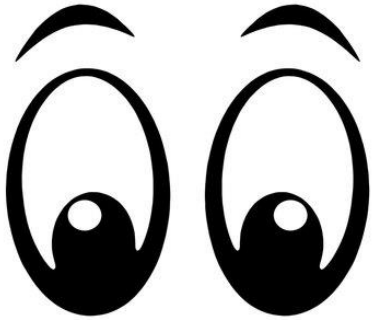
Uses

Aids in Digestion

Papayas are commonly consumed for proper digestion. The presence of papain, a digestive super enzyme, improves digestion by breaking down proteins and also cleanses the digestive tract. This ensures a reduced conversion of protein into body fat.



Uses



Treats Macular Degeneration

Macular degeneration is a disease of the eye. In this condition, the ocular cells degenerate, which results in blurred vision and can cause blindness as well.

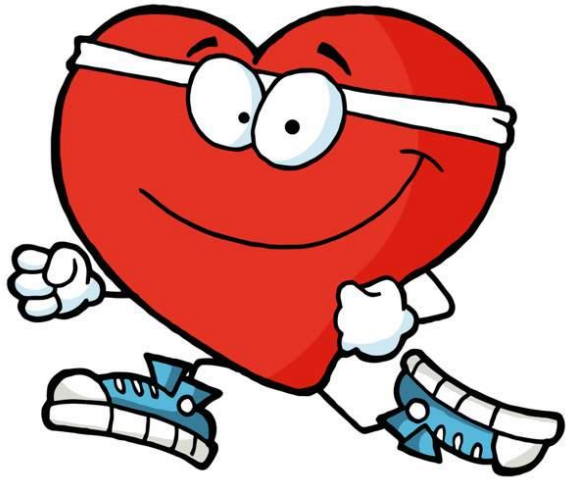
This is an age-related illness and adding papayas to the diet is beneficial for reducing the risk of developing macular degeneration.

Just as carrots help improve the eyesight due to the presence of beta-carotene, papayas are also known to be effective in reducing the effect of macular degeneration.

Uses

Improves Heart Health

The seeds of papayas are good for a healthy heart. Having three powerful antioxidant vitamins, namely vitamin A, C, and E, means papayas are helpful in preventing problems such as atherosclerosis and diabetic heart diseases.



The presence of pro-carotenoid phytonutrients as well as vitamins helps prevent oxidization of cholesterol in the body. When oxidation of cholesterol takes place, it sticks to the walls of the blood vessels and forms plaque that can lead to heart attacks and strokes.

Uses

Other uses:

- Relieves toothache
- Anticancer properties
- Anti-inflammatory effect
- Treats constipation

Cosmeceutical application

Skin care

Papayas can be great revitalizing agents, which is why they are used in many cosmetics.

Also, papayas are used in homemade face masks by many women. The papain in them kills dead cells and purifies the skin. The beneficial properties and the healing enzymes present in papaya help treat sunburn and irritated skin.

The peels of papayas are also used to rub on the face and hands for healthy skin.

Papayas are also used to treat skin disorders like eczema, psoriasis, etc.

Market preparations:

Avocado Fruit "Alligator Pear"

Active constituents:

- Avocados are considered a "superfood" and are possibly rich in various nutrients, **vitamins, and minerals**. They are also a good source of healthy **monounsaturated fatty acids and dietary fibers**.

- Avocados contain minerals including **Ca, Fe, Mg, K, copper, manganese, phosphorus, and zinc.**

- They also have high levels of **vitamin A, K, C, E, B6**, thiamin, riboflavin, and niacin (vitamins B1, B2, B3, respectively).

Uses:

Vitamin K Deficiency

Vitamin K deficiency is not very common but may be seen in neonatal care. It may lead to a bleeding disorder known as vitamin K deficiency-related bleeding (VKDB).

This occurs mostly due to an insufficient intake of vitamin K by the mother during pregnancy. The inclusion of avocado in the diet of a pregnant woman may help in lowering the risk of VKDB in the newborn child

Uses:

Relieve Arthritis Pain

The possibly anti-inflammatory properties of avocados are perhaps its most valuable attribute. Between the wide range of phytochemicals, flavonoids, carotenoids, phytosterols, fatty alcohols, and omega-3 fatty acids it contains, avocados are one of the best foods for reducing inflammation in tissues, joints, and muscles.

Uses:

Hepatoprotective

The chemicals contained in avocados appear to be very good at reducing liver damage and improving liver health.

Avocados may play a major role in toning up and protecting the liver from a wide variety of conditions.

Cosmeceutical application

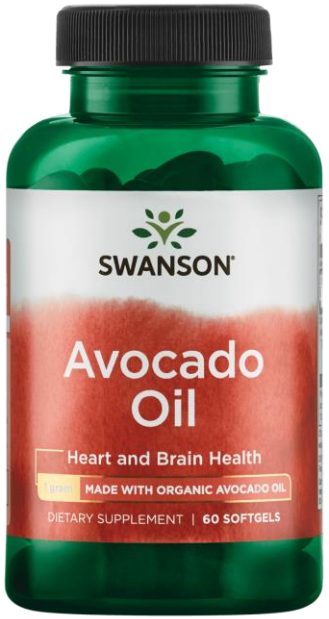
Skin and Hair Care

Avocados are added to a variety of cosmetics due to their ability to nourish the skin with essential vitamins and make it glow. It is also used for nourishing dry and damaged hair. Many people use avocados to prepare skin and hair masks.

Above all, avocado oil provides relief from plaque psoriasis. Beta-carotene and lycopene have been connected to improving the health and tone of your skin and eliminating signs of premature aging.

Research shows that lutein and zeaxanthin may decrease signs of the aging process by protecting the skin from damage from UV rays and radiation as well as their antioxidant properties.

Market preparation:



Lemon Fruit
"Citrus fruit"

Active constituents:

- The most important group of bioactive compounds in both C. limon waste products and its juice, determining their biological activity, are **flavonoids such as; hesperidin** and quercetin, and **phenolic acids** such as; sinapic and ferulic acids.

- There are also **essential oil with limonene** as a major component, coumarin compounds, carboxylic acids, carbohydrates, as well as a complex of B vitamins, and, importantly, **vitamin C (ascorbic acid**).

Uses:

Weight Loss

Drinking warm water with lemon and honey in the morning is said to aid weight loss efforts. While that might or might not work for everyone, a research study performed on mice confirmed that polyphenols present in it can suppress body weight gain and body fat accumulation.

This could have positive implications for lemon juice drinks in human weight loss. Lemon honey juice fasting (LHJF) might also be considered as a natural remedy for reducing weight.

Cosmeceutical application

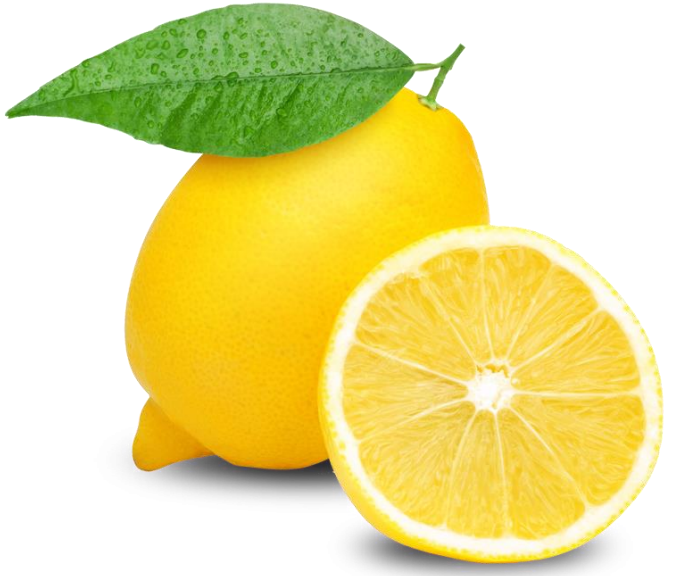
Skin Care Agent

Lemon juice, being a natural antiseptic medicine, may also be able to cure problems related to the skin.

The juice contains vitamin C, and therefore, it can be applied to reduce the pain of sunburns and bee stings as well. It is also good for acne and eczema.

Citrus juices like lemon juice act as an anti-aging remedy and may reduce wrinkles and blackheads too.

Market preparations:



Citrus waste products

10 Million Tons / Year

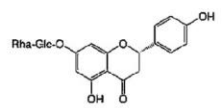
Citrus waste products

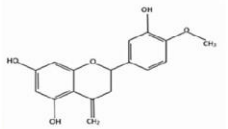
Citrus Fruit Waste

Food Uses

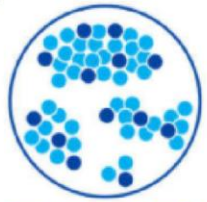
Food Additive

Source of Bioactive Compounds



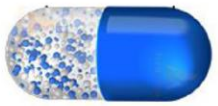


Substrate for Mushroom Production



Prebiotics

Edible Packaging Material



Encapsulating Agent

Citrus waste products

Citrus Fruit Waste

Non-Food Uses

Cosmetic Industry

Body Sprays

Body Lotions

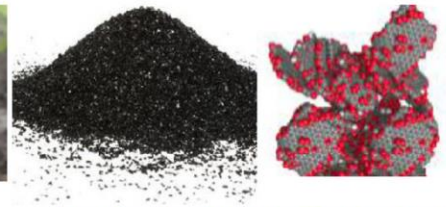
Soaps/ Creams

Pharmaceutical Industry

Medicines

Bio-adsorbent

Bio-fertilizer



Activated Carbon

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