

# ***Pharmacognosy***

PHG 112  
PG 102

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Dr Ibrahim Ezz***

**Summer 2025**

# Faculty of Pharmacy



# Lecture 6



# Discussion of midterm exam



**By the end of the lecture, students should be able to demonstrate knowledge of:**

**Nutraceutical and cosmeceutical fruits**

- **Capsicum**
- **Wheat**
- **Lychee**
- **Papaya**
- **Avocado**
- **Lemon**





# **Fruits Having Nutraceutical Applications**



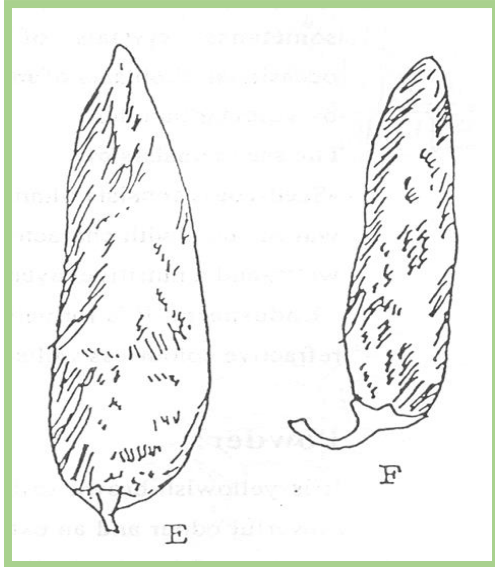
## Capsicum Fruit

Chillies, Cayenne pepper

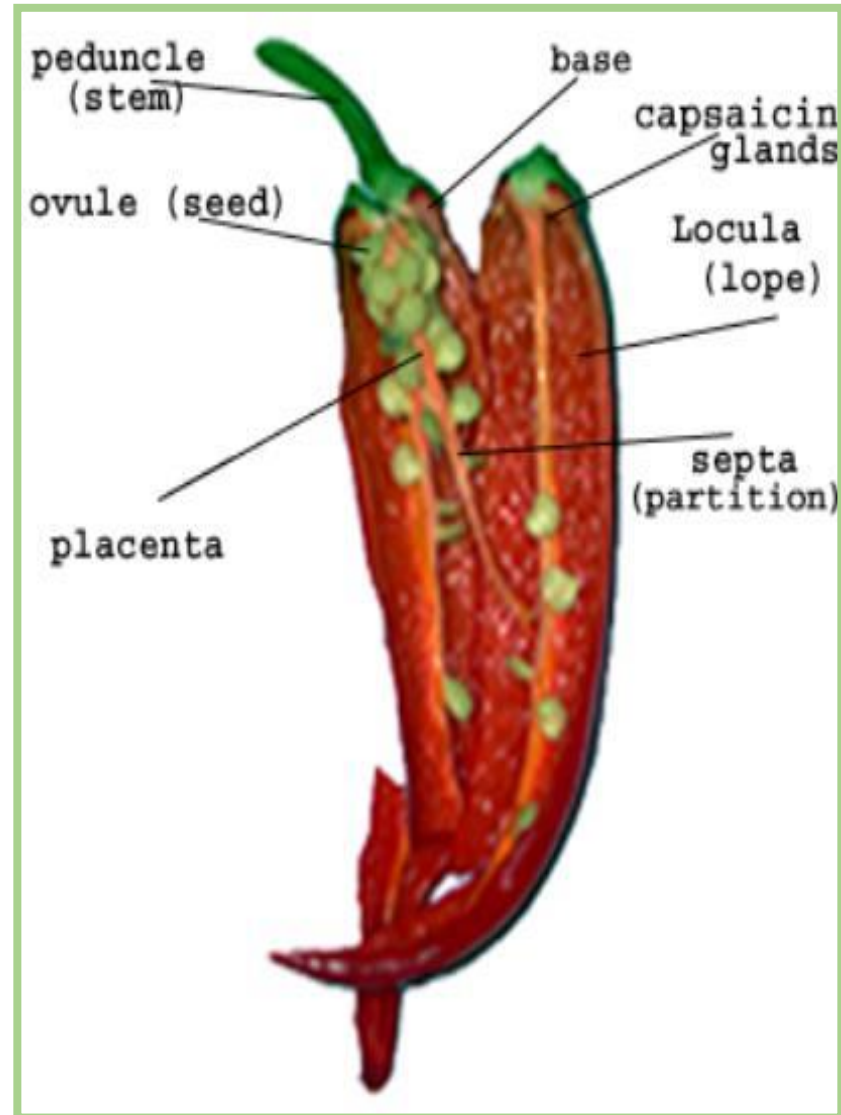
Capsicum is the dried ripe fruits of  
*Capsicum minimum* F. Solanaceae.



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.**

**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 permanganate**

# USES AND ACTIONS

## 1- Condiment



2- Internally, In atonic dyspepsia and flatulence.



## USES AND ACTIONS (cont.)

**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.

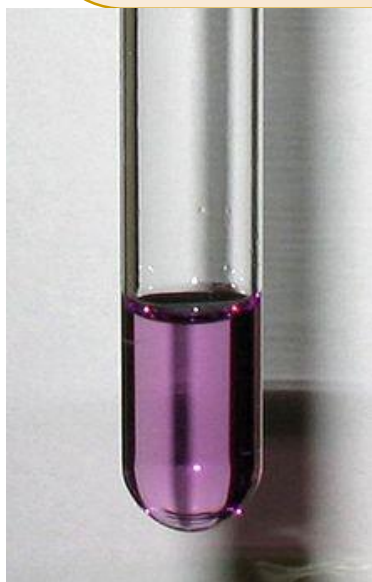
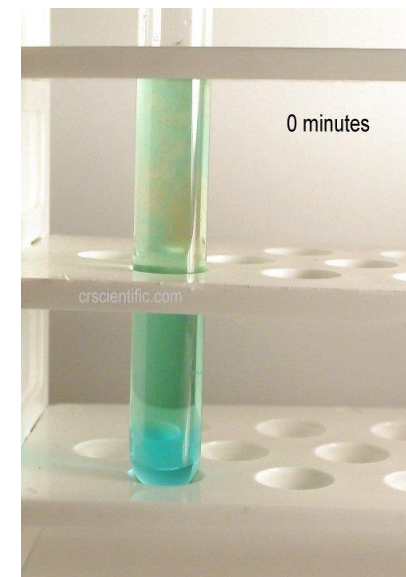
People with ulcers, heartburn, or gastritis should use any cayenne-containing product cautiously as it may worsen their condition.

## -Contraindications

Application on injured skin, allergies to cayenne preparations

# CHEMICAL TESTS

**1- Capsaicin gives a bluish-green colour on addition of few drops of  $\text{FeCl}_3$**



**2-Capsaicin dissolved in  $\text{H}_2\text{SO}_4$  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.

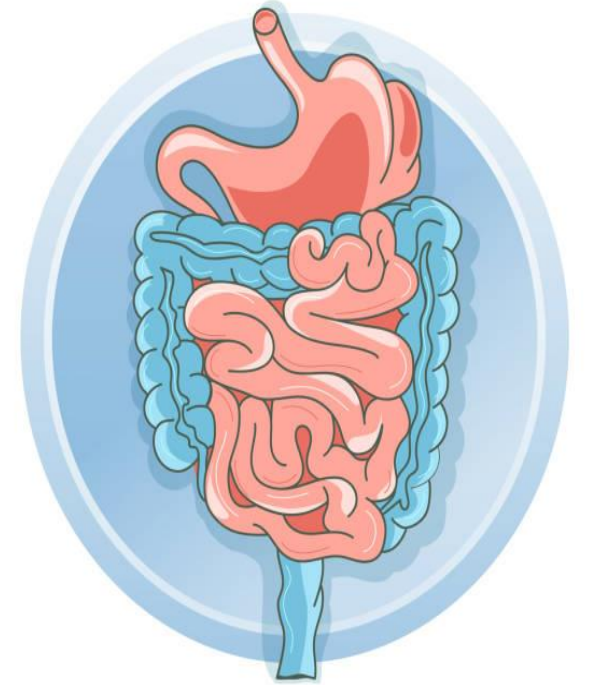


## Uses:

### 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.

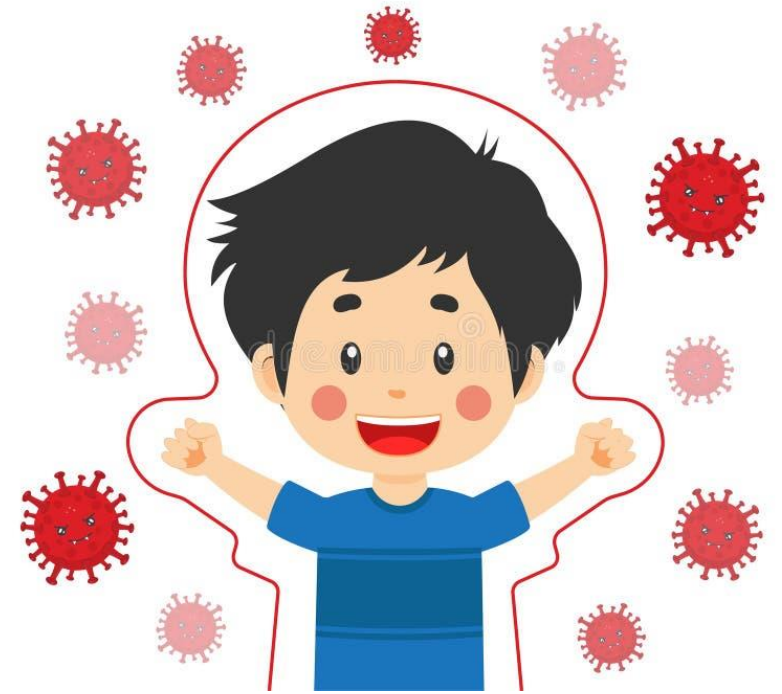


## Uses:

### 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.

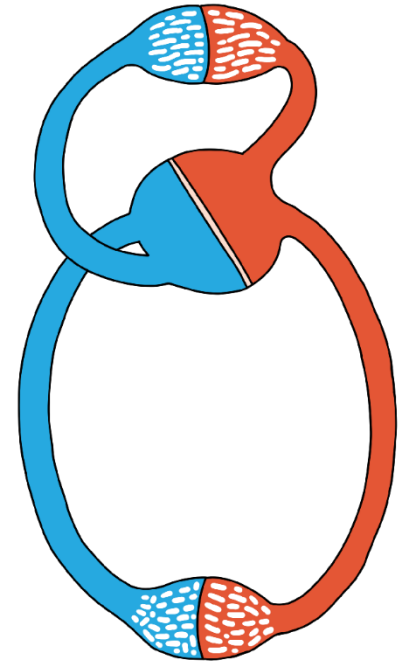
Potassium levels are almost three times higher in dried lychee rather than in fresh lychee!



## 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 and Cosmeceutical Applications**





# Papaya Fruit

“Fruit of Angels”



## Active constituents

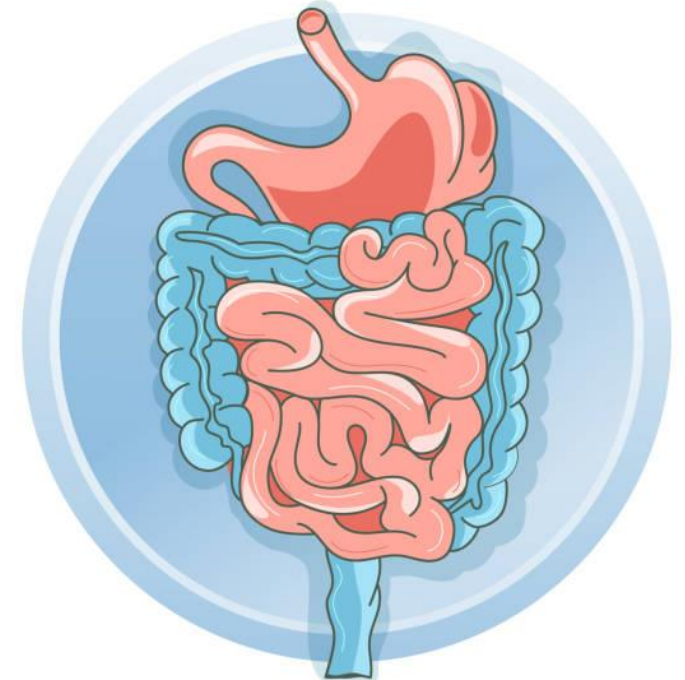
- 🔥 Papaya leaves contain tannins, saponins, alkaloids, and flavonoids; while shoots contain various minerals like Ca, Fe, Mg, K, Zn, Mn etc.
- 🔥 Enzymes are present in the unripe fruit and latex such as papain and chymopapain. Fruit also contains carotenoids;  $\beta$  carotene
- 🔥 Papaya oil is found 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.

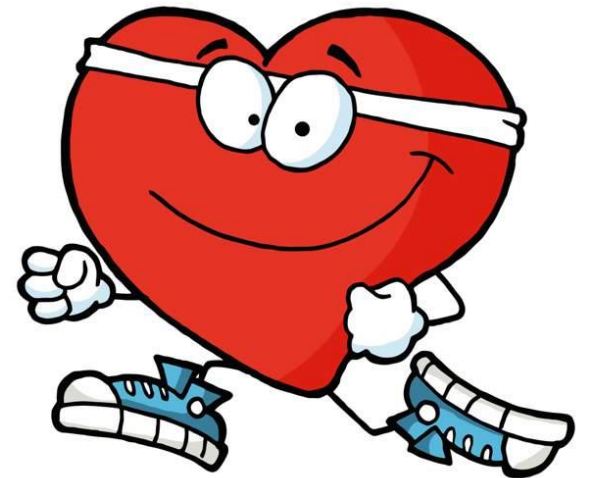


## Uses

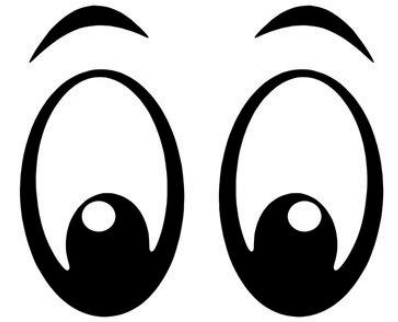
### Improves Heart Health

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.







### 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.

## 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.
- 🥑 Perhaps most importantly, avocados have a unique collection of organic compounds like phytosterols, carotenoids, and flavonoids.
- 🥑 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:

### 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.



## 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



## 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”



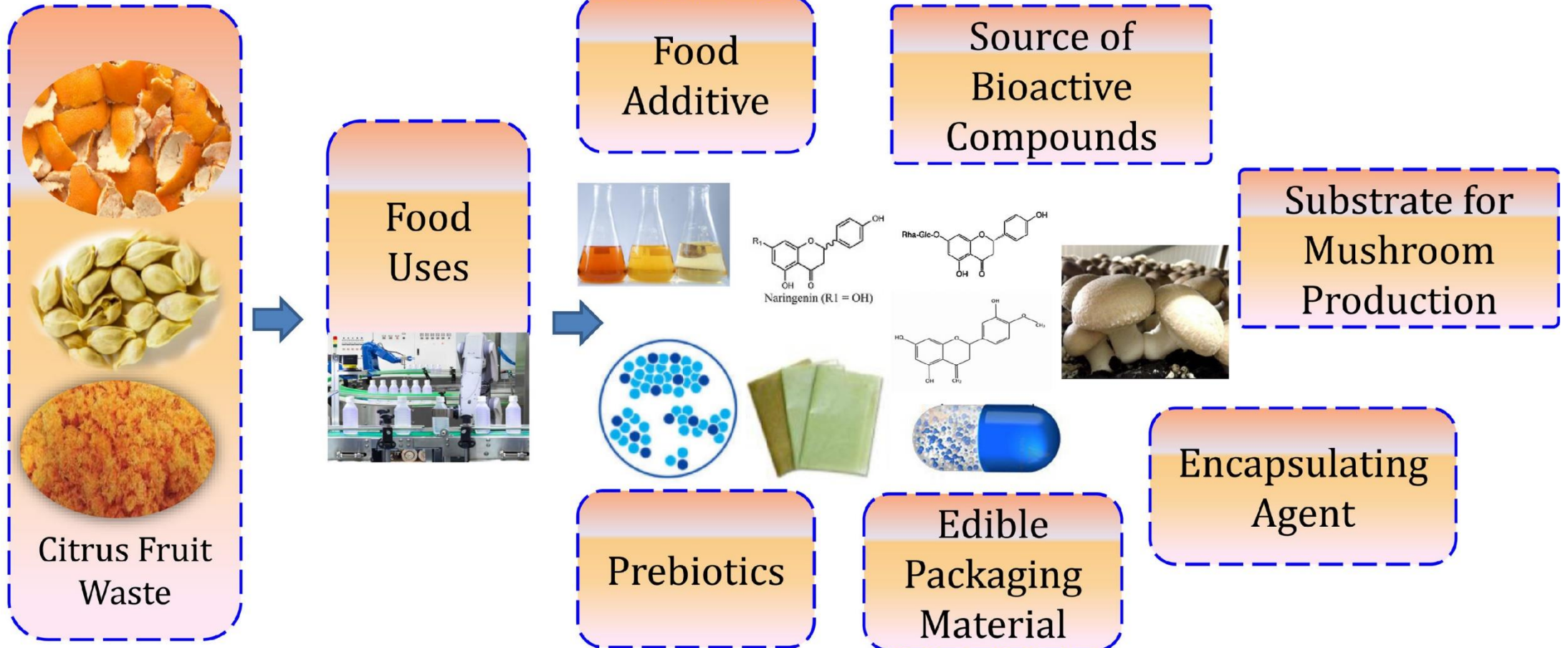


## Citrus waste products



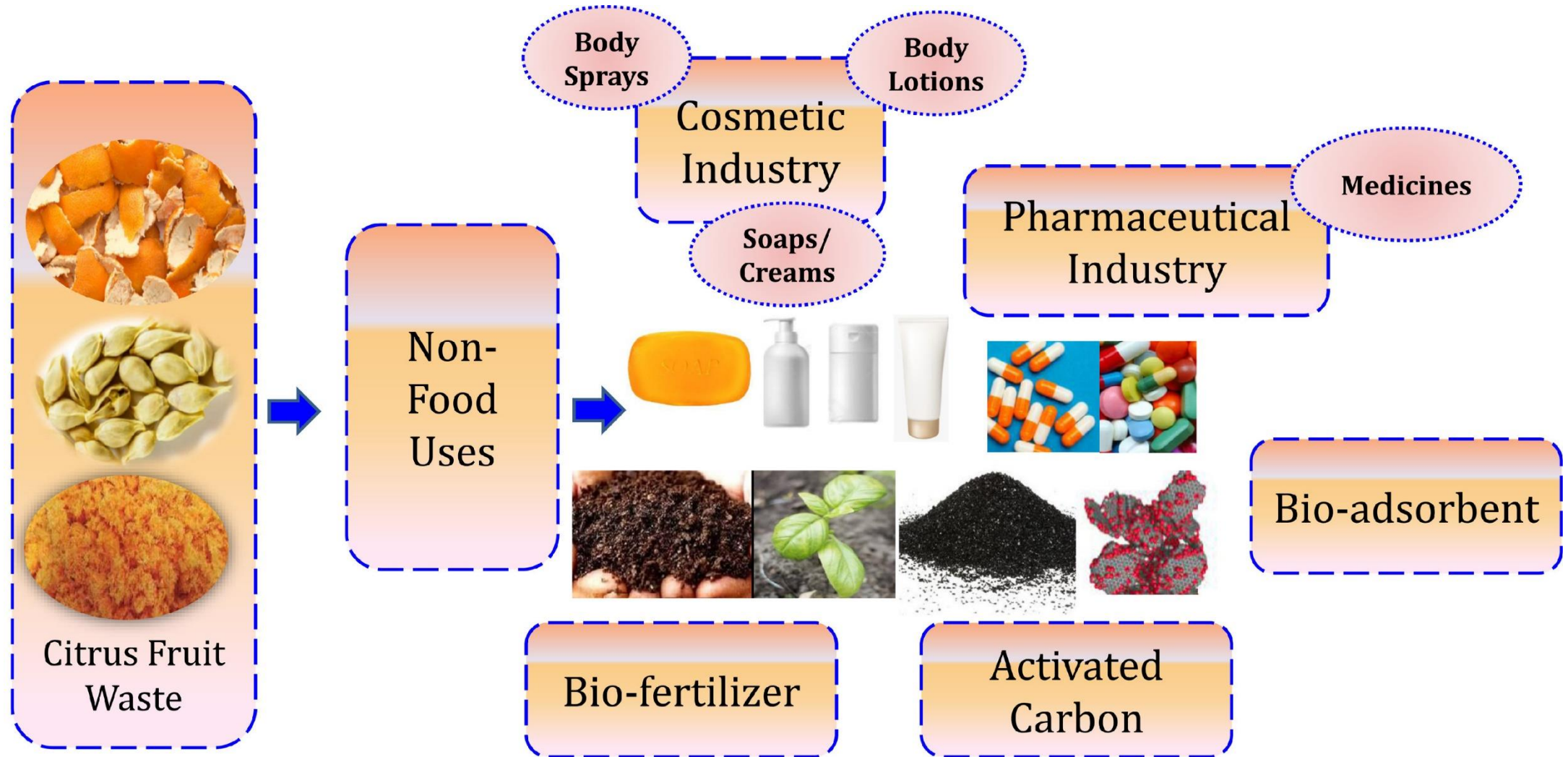
**10 Million Tons / Year**

# Citrus waste products





# Citrus waste products



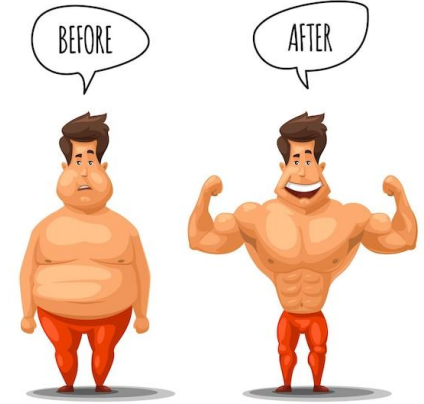
## Active constituents

- 🍋 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.





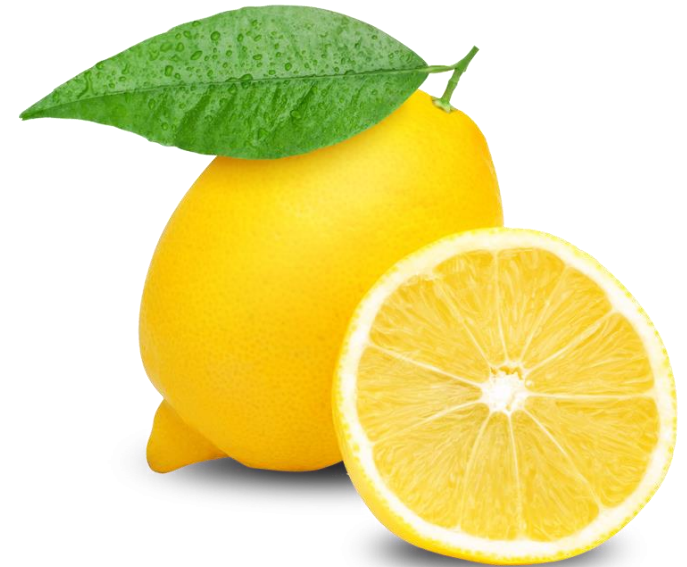
### Skin Care Agent



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:





| <u>Name</u>   | <u>Active constituents</u>   | <u>Uses</u>  |
|---|--|--|
| <p><u>Papaya Fruit</u></p>  | <p>🕯️ <u>Enzymes</u> are present in the unripe fruit and latex such as <u>papain</u> and <u>chymopapain</u>. Fruit also contains <u>carotenoids</u>; <u>β carotene</u></p> <p>🕯️ Papaya oil is found in seeds also contains <u>flavonoids</u> ( kaemferol, and myricetin).</p> <p>🕯️ Papaya is possibly rich in <u>vitamin C, A, E</u>, as well as some <u>B vitamins</u> (folate and pantothenic acid).</p> | <ul style="list-style-type: none"> <li>• Aids in Digestion</li> <li>• Improves Heart Health</li> <li>• Skin care</li> </ul>  |



| <u>Name</u>   | <u>Active constituents</u>  | <u>Uses</u>  |
|---|---|--|
| <div><u><b>Lychee Fruit</b></u></div> <div></div> | <ul style="list-style-type: none"><li>• <b>Vitamins ; including vitamin C, vitamin B6, niacin, riboflavin, folate. Minerals ; copper, potassium, phosphorus, magnesium, and manganese.</b></li><li>• <b>Dietary fiber, protein, and proanthocyanidins and polyphenolic compounds such as; Litchitannin A2</b></li></ul> | <ul style="list-style-type: none"><li>• <b>Aids in Digestion</b></li><li>• <b>Boosts Immunity</b></li><li>• <b>Antiviral</b></li><li>• <b>Improves Circulation</b></li></ul> |

**Blood**



| <u>Name</u>   | <u>Active constituents</u>   | <u>Uses</u>   |
|---|--|---|
| <p><b><u>Avocado Fruit</u></b></p>  | <ul style="list-style-type: none"> <li>• <b>Vitamins ; A, K, C, E, B6, thiamin, riboflavin, and niacin (vitamins B1, B2, B3, respectively).</b></li> <li>• <b>Minerals ; Ca, Fe, Mg, K, copper, manganese, phosphorus, and zinc.</b></li> <li>• <b>Dietary fiber, and monounsaturated fatty acids .</b></li> </ul> | <ul style="list-style-type: none"> <li>• <b>Relieve Arthritis Pain</b></li> <li>• <b>Hepatoprotective</b></li> <li>• <b>Vitamin K Deficiency</b></li> <li>• <b>Skin and Hair Care</b></li> </ul>  |



| <u>Name</u>   | <u>Active constituents</u>   | <u>Uses</u>   |
|---|--|---|
| <p><b><u>Lemon Fruit</u></b></p>  | <ul style="list-style-type: none"> <li>• <b>Flavonoids, and phenolic acids</b></li> <li>• <b>Essential oil with limonene .</b></li> <li>• <b>vitamin C (ascorbic acid).</b></li> </ul> | <ul style="list-style-type: none"> <li>• <b>Skin Care Agent</b></li> <li>• <b>Weight Loss</b></li> </ul>  |

# Homework

**Question 2: Match Column A with the appropriate statements from columns B & C. Re-write Column A with the chosen answers in your answer paper (5marks, 0.25 mark each)**

| Column A               | Column B  | Column C  |
|------------------------|---|---|
| ( , ) Nigella          | a-Capsaicin   | 1- It has strong lipolytic activity                                   |
| ( , ) Colchicum        | b- Physostigmine alkaloid   | 2- Antimicrobial &Antiviral activi                                    |
| ( , ) Coriander        | c- Sterols (e.g. $\beta$ -sitosterol, $\beta$ -tocopherols), squalene | 3-Cardiotonic   |
| ( , ) Star anise       | d- Colchicine alkaloid  | 4- It relieves the pain and inflammation of acute gout                |
| ( , )Evening primerose | e- Volatile oil ( mainly thymoquinone)                                | 5- It relieves diabetic neuropathy                                    |
| ( , ) Calabar beans    | f-Ouabin glycoside  | 6-Production of bran  |
| ( , ) Pumpkin seeds    | g- Volatile oil mainly anethole                                       | 7- Skin disorders such as eczema, psoriasis, and acne                 |
| ( , ) Wheat grain      | h- Volatile oil containing linalool                                   | 8- Support circulatory and immun system                               |
| ( , ) Capsicum         | i- Protein(essential amino acids, containing sulphur)                 | 9- Semi synthesis of rivastigmine to treat dementia in Alzheimer diso |
| ( , ) Strophanthus     | j- starch, protein, vitamins A, B,B2,E, enzymes                       | 10- Antiinflammatory, analgesic in urinary disorders                  |



Established by Dr.Nawal El Degwi  
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# Thank You!

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