

# GUMS AND MUCILAGE



- Gums and mucilage have similar constituents and on hydrolysis yield a mixture of monosaccharides and uronic acids.
- Gums are considered to be **pathological products**, while mucilage is formed by normal metabolism.

# GUMS AND MUCILAGE



- Gums are amorphous translucent substances which are insoluble in alcohol and most organic solvents. They are soluble in water and gives a viscous, sticky solutions.
- Gums are swollen by absorbing water to form a gelly –like mass.
- Gums consist of Ca, Mg, and K salts of polyuronides.

# GUMS AND MUCILAGE

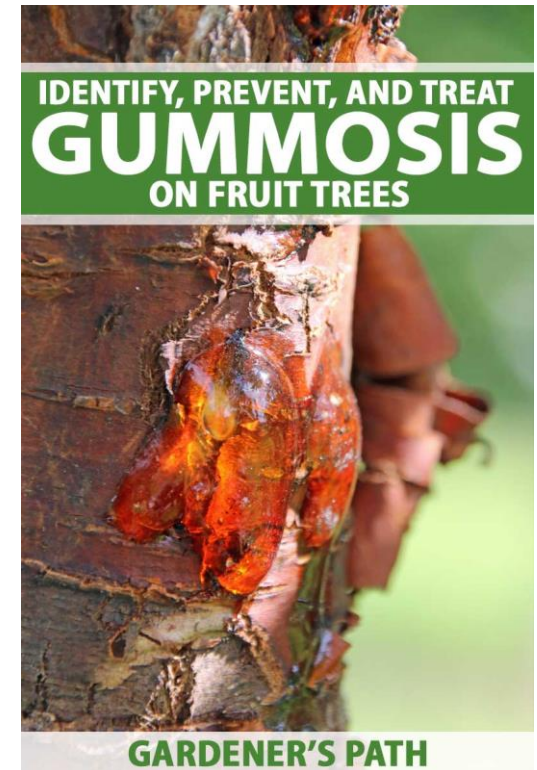


- Gums can be hydrolysed by prolonged boiling with dilute acids to yield a mixture of sugars (mainly galactose, arabinose, xylose) and uronic acids.
- Gums are commonly found in trees and shrubs of a number of families such as Leguminosae, Rosaceae, Sterculiaceae, Rutaceae

# Formation of Gums



- Gums are abnormal products, formed by injury of the plant in unfavourable conditions (e.g. Smashing, damaging, insect sting)
- Gummosis; a breakdown of cellulose, a constituent of cell walls by some bacteria or enzymes from fungi (a process of extracellular formation called **gummosis**)





- **Odourless**
- **Colourless in general, sometimes yellow to red**
- ▶ **Aqueous solutions rotate the plane of polarized light to the left**
- ▶ **White precipitate produced by alkaline lead acetate**



# Quality of gums



- **Viscosity**
  - **Solubility**
  - **Adhesive property**
- 
- **Viscose and strong adhesive gums are known as high quality**



# Classification of gums



- A) Water soluble gums (Gummi arabicum)
- B) Water insoluble gums (Tragacantha)
- C) Gums partly in water (Gummi cerasi)

# GUMS



- ▶ **Gums are heterogenous polysaccharides with high molecular weight**
- ▶ **Monosaccharides + uronic acid (glucuronic acid)**
- ▶ **Ca, Na, K salt from some of the  $-COOH$  group**
- ▶ **Aqueous solutions acidic due to free  $-COOH$**



# GUMS



## ▶ Quantitation

- ▶ 1) Gum-----+HCl boiled-----FURFURAL
- ▶ a) Gravimetric:
- ▶ Furfural+ thiobarbituric acid / phloroglucinol collapse and weighed.
- ▶ b) Titrimetric:
- ▶ Furfural+ bromur-bromate standard solution-  
---brom produced-----+KI reagent----free  
 $I_2 + Na_2S_2O_3$ -----titration.

# GUMS



- ▶ **c) spectrophotometric :**
- ▶ **Furfural quantity is measured directly**
  
- ▶ **2) GUM-----HCl boiled-----FURFURAL+CO<sub>2</sub>  
(Uronic acid decarboxylation)**
- ▶ **a) Released CO<sub>2</sub>----Ba(OH)<sub>2</sub> solution mixed  
and quantified is measured**
- ▶ **b) CO<sub>2</sub> volume is measured.**
- ▶ **3) GUM-----Hydrolisation-----  
Monoaccharides+Uronic acid Quantified by  
chromatographic methods**

# GUMS



## ▶ Usage

- ▶ **Suspension agent in pharmaceutical technology**
- ▶ **Against mucosa irritation as gargle (mucosa inflammation)**
- ▶ **To delay absorption of toxic compounds**

# Herbs containing gums



- Gummi Arabicum-Acacia gum
- Tragacantha gum
- Gummi cerasi

# Acacia Gum, Gum Arabic (Arap zamki)



- Acacia gum is a dried gum obtained from the stem and branches of *Acacia senegal* and some other sp of *Acacia* (Leguminosae).
- Geographical sources:
- Kordofan, Senegal, Nigeria.
- Some gum exudates from trees a result of the wounding of the bark,
- Most of the best Kordofan is obtained from trees 6 years old.



# Acacia Gum, Gum Arabic (Arap zamki)

A small axe is used to make a transverse incision in the bark. The axe is then twisted so that the bark is loosened. Strips are then pulled off above and below the cut. A portion of the cambium is then bared. This cambium then produces new phloem and in about 30 days the tears of gum which have formed on the surface may be picked off.

The gum is collected and then cleaned from sand and vegetable debris and sorted.









# Acacia Gum, Gum Arabic (Arap zamki)



- Kordofan gum is the best quality. It has few cracks on the surface or relatively transparent.
- Slightly pink-yellow in colour.
- Tears are usually not very uniform in size (1-3 mm)
- It is viscid and when diluted, does not deposit on standing.

# Acacia Gum, Gum Arabic (Arap zamki)



- **Acacia is almost completely soluble in water (solution takes place rather slowly). This solution is slightly acidic and becomes more so on keeping, especially if hot water is used to make the solution.**

# Acacia Gum, Gum Arabic (Arap zamki)



## Constituents of Acacia;

- Galactose
- Arabinose
- Rhamnose
- Uronic acids
- Oxydase enzymes

# GUMMI ARABICUM (TP) ACACIA GUM



- ▶ Production of the acacia gum;
- ▶ *Bacterium acacia*, *Bacterium metarabicum* is considered to be active “**MARON**” means the gums is produced by releasing from bark cracks. This product is collected and left under sun for bleaching.



# GUMMI ARABICUM (TP)



- ▶ **Kordofan is the best producer place of acacia gum. 80% of the world is produced here.**
- ▶ **“Drop Gum”/ “**Damla Zamki**” is accumulated gum on the tree, light-coloured spheres are grounded, dispersed in water and filtered, concentrated and dried on glass plates.**
- ▶ **This product is known as the best for pharmacy**



# GUMMI ARABICUM (TP)



- ▶ **Spheroid, ovoid or angular pieces**
- ▶ **In different size, 1-3 cm diameter range**
- ▶ **Similar to glass, fragile**
- ▶ **Pale yellow, whitish, odourless**
- ▶ **Mucilage taste**
- ▶ **Soluble in 2 fold water**
- ▶ **Water solution is mild acidic**
- ▶ **Water solution+absolute EtOH---- precipitate+EtOH ---soluble**
- ▶ **Water solution+Leadsubacetate/Chromic acid/Fe<sup>+++</sup> precipitate**

# GUMMI ARABICUM (TP)



- ▶ **HYDROLASE (Amylase/Emulsin)**
- ▶ **OXIDASE**
- ▶ **PEROXIDASE**
- ▶ **Induce decomposition**
- ▶ **Resulted in oxidation products**

# GUMMI ARABICUM (TP)



- ▶ **GUMMI ARABICUM DEZENYMATUM:**  
Enzyme free form of gummi arabicum.  
Production:
- ▶ **1) Gummi arabicum in powder+EtOH-----**  
boiled for 1 hour---Distilled at 60<sup>0</sup>C  
under vacuum.
- ▶ **2) Swell up in water to produce gel----**  
Distilled at 60<sup>0</sup>C under vacuum.



# Acacia Gum, Gum Arabic (Arap zamki)

- **Uses of Acacia**
- **Used as general stabilizer in emulsions, lozenges, granules, tablets, pats.**
- **Demulcent properties used in coughs, sore throats.**
- **It has a wide spread use in the food, drink, dye and textile industries.**

# TRAGACANTH (GUMMI TRAGACANTHAE) (TP) KİTRE ZAMKI



- Tragacanth is the «air hardened gummy exudate produced naturally or obtained by incision, from the trunk and branches of *Astragalus gummifer* and other ssp. of *Astragalus*.
- Geographical sources of Tragacanth are; Syria, Iraq, Iran and Russia.

# TRAGACANTH (GUMMI TRAGACANTHAE) (TP) KITRE ZAMKI



- Formation of Tragacanth
- Tragacanth is the gum that exudates immediately after injury of the plant occurs and is therefore pre formed in the plant.
- A section of a Tragacanth stem shows that the cell walls of the pith and medullary rays are gradually transformed into gum (Gummosis).

# TRAGACANTH (GUMMI TRAGACANTHAE) (TP) KITRE ZAMKI



Botanical sources of Tragacanth;

- *Astragalus gummifer*,
- *A. microcephalus*,



# TRAGACANTH (GUMMI TRAGACANTHAE) (TP) KĪTRE ZAMKI



## Methods of collection:

- The gum can be obtained from the plants in the 1st year. This is than of poor quality and unfit for commercial use.
- Plants are normally tapped after the 2nd year. The earth is taken away from the base to a depth of 5 cm. the exposed part is incised with a sharp knife and a wedge-pieces of wood is used to open the incision to exudate easily. The gum is collected for 2 days after incision.

# TRAGACANTH (GUMMI TRAGACANTHAE) (TP) KÌTRE ZAMKI



- Grades of tragacanth;
- Tragacanth is graded into several qualities. The best grades form the official drug(Yapprak), while the lower grades are used in food, textile and other industries.

# TRAGACANTH (GUMMI TRAGACANTHAE) (TP) KĪTRE ZAMKI

- “Yaprak” tragacanth occurs in flattened ribbons. The surface shows number of ridges that indicates the temporary stoppages of flow from the inclusion.
- The gum is white or white-yellow in colour and translucent. It is odourless and has little taste.
- Tragacanth swells into a gelatinous mass when placed in water but only a small portion will dissolve.



# TRAGACANTH (GUMMI TRAGACANTHAE) (TP) KİTRE ZAMKI



- ▶ **Yaprak is classified into three quality:**
- ▶ **I. Quality-----Fiyor (white thin)---pharm techn.**
- ▶ **I. Quality-----White (white thick)- pharm techn.**
- ▶ **II. Quality—Piyando-Yellowish irregular pieces**
- ▶ **III. Quality-----sarı (light yellow)**
- ▶ **III. Quality-----çalı (brown)(collected after rain)**



# TRAGACANTH (GUMMI TRAGACANTHAE) (TP) KİTRE ZAMKI



- ▶ **2) FIRDE :**
- ▶ **Obtained from *A. microcephalus* naturally by bleeding**
- ▶ **East Anatolia**
- ▶ **Filiform**
- ▶ **Classified into three quality; I.Firde, II.Firde, III:Firde**

# TRAGACANTH (GUMMI TRAGACANTHAE) (TP) KITRE ZAMKI



- ▶ **3) TRAGANTON:**
- ▶ **Obtained from *A.gummifer* naturally**
- ▶ **East Anatolia**
- ▶ **I.Traganton and II.Traganton (two quality)**

**FİRDE and TRAGANTON used in textile, dye and other industry.**

# TRAGACANTH (GUMMI TRAGACANTHAE) (TP) KİTRE ZAMKI



## Constituents of Tragacanth

- A water insoluble fraction (basorine)  
(arabinose +galactose)
- A water soluble fraction (tragacanthine)  
(galacturonic acid+xylose+fucose) acidic  
character
- Both these are insoluble in alcohol

# TRAGACANTH (GUMMI TRAGACANTHAE) (TP) KİTRE ZAMKI



## Uses of Tragacanth

▶ Tragacanth obtained from *A.microcephalus* is the best quality

▶ **Fiyor**, **Beyaz**, **I.Firde** are used in pharmacy, food and technology

- As a suspending agent for insoluble powders
- Binding agent in pills and tablets
- In cosmetic and hand lotions
- Additive for food industry.

# TRAGACANTH (GUMMI TRAGACANTHAE) (TP) KITRE ZAMKI



- ▶ **Does not contain oxidase therefore tragacanth can be used instead of Gummi Arabicum**
- ▶ **Tragacanth is export product of Turkey**
- ▶ **The plant can be used as forage and for firing**

# Gummi Ceraci



- Gummi ceraci is a dried gum obtained from *Prunus* ssp. (sour cherry, cherry, peach, apricot and plum).
- Constituents of gum are glucuronic acids, galactopyranose, arabinose, xylose, mannose
- Partly soluble in water.
- Adhesive in industry.