MONOGRAPH OF LIQUORICE ROOTS /STOLONS

GLYCYRRHIZA GLABRA LINN

INTRODUCTION

Botanical Name : *Glycyrrhiza glabra* Linn

Family : Leguminosae (Fabaceae)

Common Name : liquorice' and 'sweet wood'. The word Glycyrrhiza is derived from the Greek term glykos (meaning sweet) and rhiza (meaning root

Part Used : Stolons , Roots

GEOGRAPHICAL SOURCES

Liquorice is grown in the sub-Himalayan tracts and Baluchistan. It is cultivated on a large scale in Spain, Sicily and Yorkshire (England) G. glabra var violaceae is found in Iran; whereas G. glabra var glandulifera exclusively grows in Russia (the 'Russian Liquorice').

CULTIVATION AND COLLECTION

It is cultivated by planting rhizomes or stolons in rich soil 4 feet apart in March. The plant has oval leaflets, white to purplish flower clusters and flat pods. It has an extensive root system with a main taproot and numerous runners. The main taproot, which is harvested for medicinal use, is soft, fibrous, and has a bright yellow interior.

The roots are harvested after 3 to 4 years from its plantation particularly from all such plants that have not yet borne the fruits, thereby ascertaining maximum sweetness of the sap. The drug is first dried under the sun and subsequently under the shade till it loses almost 50% of its initial weight.

DESCRIPTION :

MACROSCOPICAL CHARACTERS

- **Condition:** Dry, occurs in the peeled or unpeeled form.
- **Shape:** Cylindrical.
- **Surface (Outer):**Yellowish brown with longitudinal wrinkles (unpeeled); peeled ones are yellow coloured with fine longitudinal ridges.
- **Fracture:** Coarsely fibrous and splintery
- **Odour and Taste::** Characteristics and Sweet

Fig : Morphology of Liquorice roots

MICROSCOPY:

Periderm:

- Phellem (cork): tabular cells, outer layers are filled with reddish brown contents and inner few are colourless.
- Phellogen: Indistinct
- Phelloderm: 3-5 layered, immediately below cork, parenchymatous cells whose corners thickened with cellulose (collenchymatous); some cells contain prism of calcium oxalate and minute starch grain.

Secondary phloem:

- Numerous concentrically arranged bundles of phloem fibres each bundle is surrounded by a parenchymatous sheath whose cells contain prisms of calcium oxalate.

Medullary rays:

- Distinct, bi-to multiseriate, parenchymatous, in continuation with those of xylem however, the rays are narrower in the xylem region and become wider in the phloem region.

Secondary xylem:

- Xylem consists of vessel, fibres and lignified wood parenchyma.The vessels, fibres and lignified wood show scalariform and bordered pitted thickenings.

Pith :

- Consist of large parenchyma with intercellular spaces and contain few starch grains. Pith absent in root.

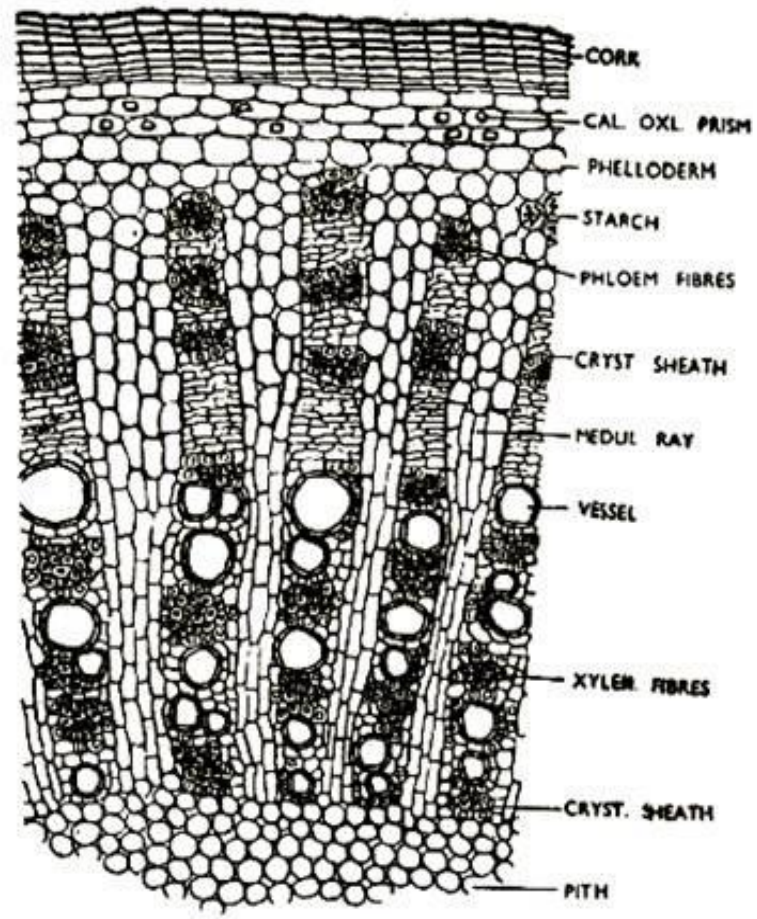
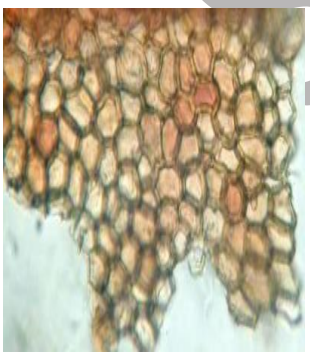


Fig. 1: T. S. of Glycyrrhiza root

Fig : Transverse section of Liquorice roots

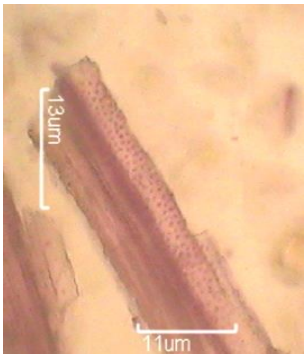
POWDER ANALYSIS

- Cork Cells
- Fibres : Yellow coloured fibres, in budles of 10-15
- Calcium Oxalate : Paraenchymatous sheath containing calcium oxalate
- Wood elements : Xylem vessels with large bordered pits.



Cork Cells

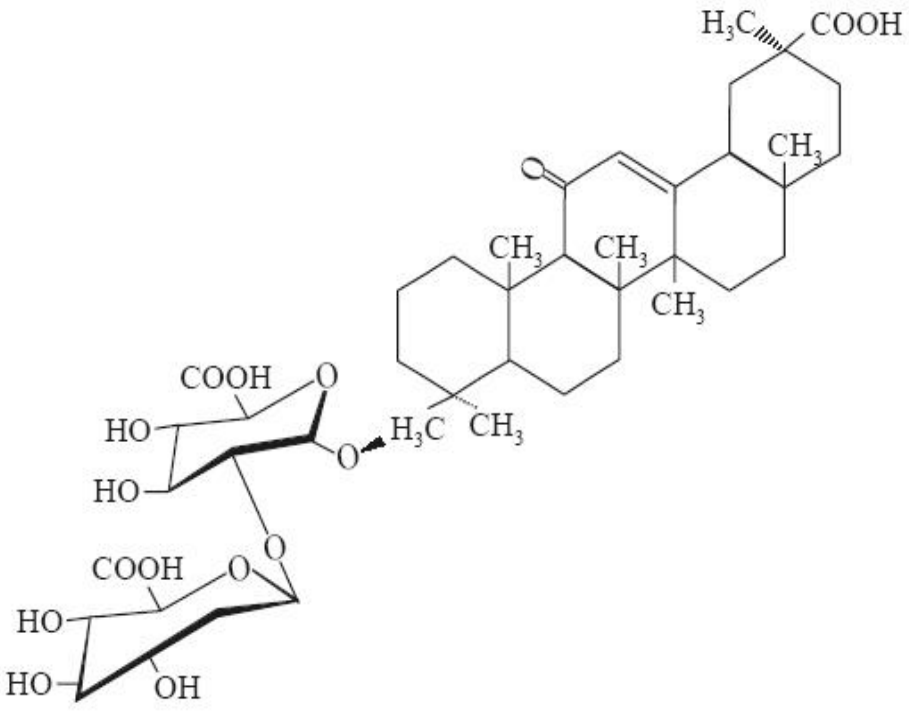
Calcium Oxalate Crystal Sheath



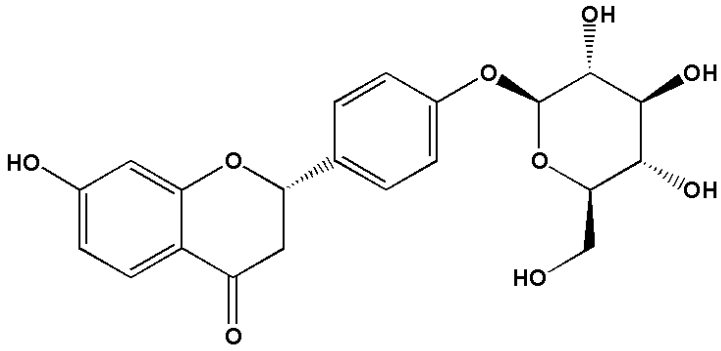
Pitted Xylem vessels

CHEMICAL COMPOSITION :

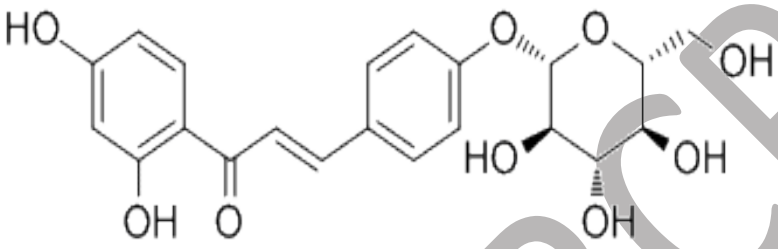
- The main constituent **Glycyrrhizin** (glycyrrhizic acid; glycyrrhizinate) constitutes 10–25% of liquorice root extract. It is a saponin compound (60 times sweeter than cane sugar) comprised of a triterpenoid aglycone b amyrin type, glycyrrhetic acid (glycyrrhetinic acid;) conjugated to a disaccharide of glucuronic acid. Glycyrrhizin and glycyrrhetic acid can exist in the 18α and 18β stereoisomer forms. . In liquorice, it occurs naturally as calcium and potassium salts
- **Coumarin derivatives** *:* umbelliferone and herniarin;
- **Flavonoid glycoside** *:* liquiritoside; isoliquiritoside, liquiritin; isoliquiritin, rhamnoliquiritin, and rhamnoisoliquiritin;
- **Asparagine;** and **about 20% of starch.**
- **Carbenoxolone**, which is an oleanane *derivative* is prepared from **glycyrrhiza** and possesses considerable **mineralocorticoid activity.**



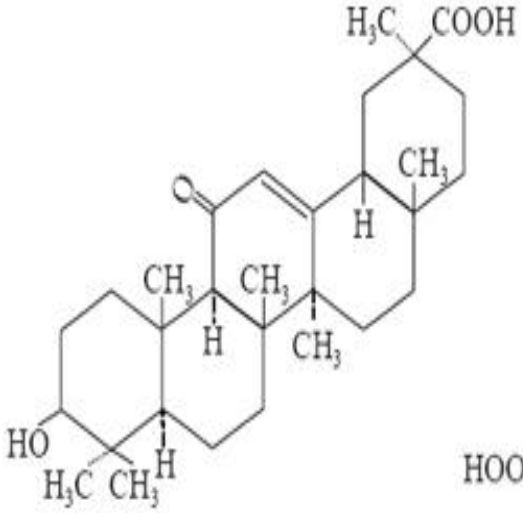
Glycyrrhizin
[Glycyrrhizic Acid]



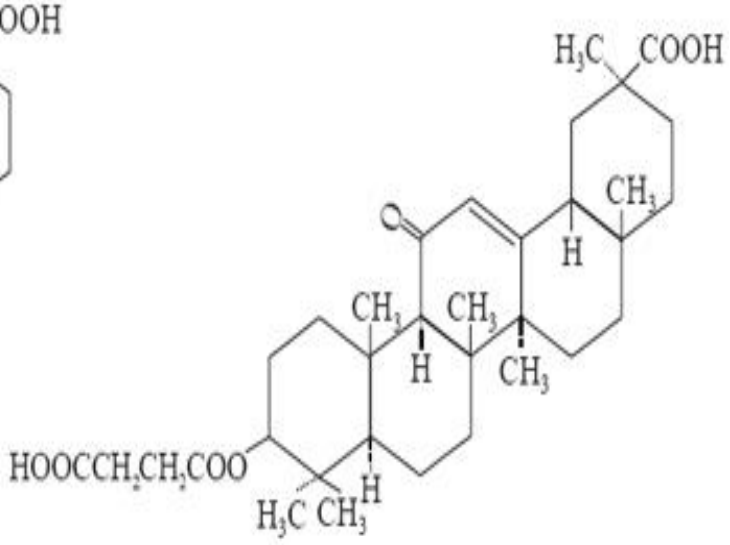
Liquiritoside



Isoliquiritoside



Glycyrrhetic Acid



Carbenoxolone

CHEMICAL TEST :

- When sulphuric acid (80%) is added to a thick section of the drug or powder, it instantly produced a deep yellow colour.
- It gives positive Liebermann Burchard reaction for triterpenes (red colour) and Shinoda`s test for flavonoids

SUBSTITUENTS/ADULTERANTS:

- *Glycyrrhiza uralansis,* also known as **Manchurian Liquorice**, which is pale chocholate brown in appearance having wavy medullary rays and exfoliated cork
- **Russian Liquorice** is also used as an adulterant, because the drug is purplish in appreance, has long roots.

THERAPEUTIC USES:

- The presence of **glycyrrhetinic acid** exert mineralocorticoid activity and hence it is used in the treatment of inflamations, rhematoid arthritis and Addison's disease. It acts on neutrophil functions including ROS (reactive oxygen species) generation. Glycyrrhizin is considered as quenching agent of free radicals and also as blocking agent of lipid peroxidation chain reactions. Glycyrrhizin showed chemopreventive, antioxidant, and antiproliferative activity
- **Liquorice liquid extract** is used in the treatment of peptic ulcer. Carbenoxolone is useful in the treatment of alimentary tract ulcerative conditions like peptic ulcers. It is reported to inhibit two enzymes that are important in metabolism of prostaglandin, 15-hydroxyprostaglandin dehydrogenase and Δ13 prostaglandin thereby raising prostaglandin levels. Prostaglandins stimulate mucous secretion and cell proliferation. Thus, ulcer healing is promoted
- **Glycyrrhiza** has demulscent and expectorant properties
- It is used as a masking agent for bitter drugs in pharmaceutical formulations, such as: quinine, aloe, ammonium chloride etc.
- The inherent surfactant activity due to the presence of saponins helps to facilitate the absorption of poorly absorbed drugs, for instance: anthraquinone glycosides.
- **Liquorice** is an important ingredient in **'Liquorice compound powder'** wherein it augments the action of senna.
- In Europe the **glycyrrhetic acid** is employed exclusively in dermatological formulations for its remarkable antiinflammatory properties.

MARKETED PREPARATION

- 20% Glycyrrhiza glabra extract , Himalaya`s Liquorice.

REFERENCES

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