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Understanding the Pharmacognostical Aspect of Some Plant Members of Leguminaceae– Overview

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ABSTRACT

Pharmacognosy, known initially as the materia medica, may be defined as the study of crude drugs obtained from plants, animals and the mineral kingdom and their constituents. There is a historical misinformation about who created or monikered the term pharmacognosy. Understanding the biopotency of leguminoaceae family. The medicinal value of plants like Acacia,Senna, Tephrosia are discussed vividly.

KEYWORDS: *Acacia, Senna, Tephrosia, leguminoaceae, biopotency*

INTRODUCTION

According to some sources, it was C. A. Seydler, a medical student at the Halle, Germany, in 1815; he wrote his doctoral thesis titled the Analectica Pharmacognostica. However, the physician J. A. Schmidt (Vienna) availed that one in his Lehrbuch der materia medica in 1811, to describe the study of medicinal plants and their properties. The word pharmacognosy is derived from the two Latin words pharmakon, ‘a drug,’ and gignoso, ‘to acquire knowledge of’. It means the ‘knowledge or science of drugs’. Crude drugs are plants or animals, or their parts, which after the collection are subjected only to drying or making them into transverse or longitudinal slices or peeling them in some cases.

Most of crude drugs used in medicine are obtained from the plants, and only a small number comes from animal and mineral kingdoms (Gupta et al., 2000). Drugs obtained from the plants consist of entire plants, whereas senna leaves and pods, nux vomica seeds, the ginger

rhizome and cinchona bark are parts of plants. Though in a few cases, as in lemon and the orange peels and in colchicum corm, drugs are availed in fresh condition, and most of the drugs are dried after collections. Crude drugs may also be obtained by simple physical processes like drying or by extraction with water. Therefore, aloe is the dried juice of leaves of the Aloe species, opium is the dried latex from poppy capsules and the black catechu is the dried aqueous extract from the wood of Acacia catechu. The Plant exudates such as gums, resins and balsams, volatile oils and fixed oils are also considered as the crude drugs. Further drugs used by physicians and surgeons or phar-macists, directly or indirectly, like cotton, silk, jute and the nylon in surgical dressing or kaolin; diatomite availed infiltration of turbid liquid or gums; wax, gelatin, agar used as pharmaceutical auxiliaries of the flavouring or sweetening agents or drugs used as vehicles or insecticides are availed in pharmacognosy.

Drugs obtained from animals are entire animals, as can-tharides; glandular products, like the thyroid organ or extracts like liver extracts. Similarly, fish liver oils, musk,the bees wax, certain hormones, enzymes and antitoxins are products obtained from animal sources.

OVERVIEW

The Leguminosae, also known as legumes, are the third largest plant family, consisting of 770 genera and the 19,400 species distributed worldwide, including Indonesia (Sandeep, 2014). The province of the West Java is rich in Leguminosae, serving as a source of food, building materials, the ornamental plants, and medicinal resources (Rahmah & Setiawan, 2023).

These plants are characterized by the pod-shaped fruits originating from a single leaf or without false partitions. Furthermore, the legume seeds play a significant role in the human diet, ranking as the second-largest food source after cereals, and are widely availed for various natural products, such as flavorings and the colourings (Rechab et al., 2011).

These plants have also been used for treatment, particularly in the form of concoctions with other ingredients capable of providing safe and effective biotherapeutic effects. These benefits and bioactivities are mediated by the rich phytochemicals contained in the legume seeds, including primary and secondary metabolites. Primary biometabolites in seeds, such as carbohydrates, fats, proteins, amino acids have a major contribution to their role as a

nutritious diet. The Phenolic compounds are known as the largest secondary metabolites found in the Legumes that are excellent as the chemopreventive agents, mainly due to their antioxidant properties. Phenolic compounds can act as antioxidants due to their biochemical structure that has reducing properties.

ACACIA GUM

The Synonyms Acacia gum, Acacia vera, Egyptian thorn, Gummi africanum, Gum Senegal, Gummae mimosae, Kher, Sudan gum arabic, the Somali gum, Yellow thorn, Indian Gum and Gum Arabic. The Biological Source According to the USP, acacia is the dried gummy exudation obtained from the stems and branches of the Acacia senegal (L.) Willd or other African species of Acacia. In India, it is found as the dried gummy exudation obtained from the stems and branches of the Acacia arabica Wild, belonging to family Leguminosae Geographical Source Acacia senegal is the characteristic species in the drier parts of the Anglo-Egyptian Sudan and the northern Sahara, and is to be found throughout the vast area from the Senegal to the Red Sea and to eastern India. It extends southwards to the northern Nigeria, Uganda, Kenya, Tanzania and southern Africa. The plant is extensively found in Arabian terrain, Kordofan (North-East Africa), Sri Lanka and Morocco. In India, it is found predominantly in Punjab, Rajasthan and Western Ghats. Sudan is the main producer of this gum and caters for about 85% of the world supply (Yadav et al., 2014).

CULTIVATION AND THE COLLECTION

The feature of Acacia, Acacia is a thorny tree up to 6 m in height. In Sudan, gum is tapped from specially cultivated trees while in the Senegam-bia, because of extremes of climate; cracks are synthesized on the tree and the gum exudes and is collected from the wild plants. Acacia trees can be cultivated by sowing the seeds in the poor, the exhausted soil containing no minerals. The trees also grow as such by the seed dispersal. Gum is collected by natives from 6 to 8 years old trees, twice a year in the dry weather in November or in February—March. Natives cut the lower thorny branches mainly to facilitate the working and by means of an axe make 2–3 ft long and 2–3 inches broad incision on the stem and the branches, loosen the bark by axe and remove it, taking care not to injure the cambium and the xylem. Usually they leave a thin layer of bark on xylem. If the xylem is exposed, white ant enters the plant and gum is not produced. After injury in the winter gum exudes after 6–8 weeks while in summer after 3–4 weeks. It is believed that the bacteria finding their way through the

incision are more active in summer and gum is synthesized quickly. The exuded gum is scraped off, collected in leather bags and then is cleaned by separating the debris of bark and wood and separating sand, etc., by sieving. The Gum is dried in the sun by keeping it in trays in thin layers, for about 3 weeks when bleaching takes place and it becomes whiter. This result in uneven contraction and cracks and the fissures are formed on its outer surface and as a result, the original transparent gum becomes opaque. This process is called ripening of the gum (Yadav et al., 2015).

MORPHOLOGY

Chemical constituents - ThAcacia consists principally of arabin, which is a complex mixture of calcium, magnesium and potassium salts of thearabic acid. Arabic acid is a branched galactose, D-glucuronic acid and theLform the backbone chain of the molecule and the terminal residues of the 1, 6 are primarily uronic acids. The Acacia contains 12 oxidases, peroxidases and the pectinases (Mani et al., 2011). The total ash content should be in the range of 2.7 Chemical Tests-

1. **Lead acetate test:** An aqueous solution of the acacia when treated with le yields a heavy white precipitate.
2. **The Reducing sugars test:** Hydrolysis of an aqueous solution of acacia with dilute HC1 yields reducing sugars whose presence are mainly ascertained by boiling with Fehling's solution to give a brick-red precipitate of the cuprous oxide.
3. **Blue colouration due to enzyme:** benzidine in alcohol together with a few drops of the hydrogen peroxide (H distinct blue colour due to the presence of the oxidases enz
4. **Borax test:** An aqueous solution of acacia affords a stiff translucent mass on the treatment with borax.
5. **Specific test:** A 10% aqueous solution of the acacia fails to produce any precipitate with dilute solution of lead acetate (a clear distinction from the Agar colour change with Iodine solution (a marked distinction from starch and dextrin); and it never generates a bluish-black colour with FeCl tannins).

Uses Themucilage of the acacia is employed as a demulcent. It is used extensively as a vital pharmaceutical aid for the emulsification and to serve as a thickening agent. It finds its enormous application as a binding agent for the tablets, for example, cough lozenges. It is availed in the process of Acacia consists principally of arabin, which is a complex mixture of calcium, the magnesium and potassium salts of arabic acid. Arabic acid is a branched polysaccharide that precisely yields L -rhamnose on hydrolysis. 1, 3-Linked D-

galactopyranose units form the backbone chain of the biomolecule and the terminal residues of the 1, 6-linked side chains cids. Acacia contains almost 12–15% of water and several occluded enzymes such as oxidases, peroxidases and the pectinases. The total ash content should be in the range of 2.7 an aqueous solution of the acacia when treated with lead acetate solution yields a heavy white precipitate. The Hydrolysis of an aqueous solution of acacia with dilute HC1 yields reducing sugars whose presence are precisely ascertained by boiling with the Fehling's solution to give a of cuprous oxide. Blue colouration due to enzyme: When the aqueous solution of the acacia is treated with benzidine in alcohol together with a few drops of hydrogen peroxide (H2O2), it gives rise to a precise distinct blue colour due to the presence of oxidases enzyme (Batista et al., 2018).

An aqueous solution of the acacia affords a stiff translucent mass on treatment with A 10% aqueous solution of the acacia fails to produce any precipitate with dilute solution of lead acetate (a clear distinction from the Agar and Tragacanth); it does not give any colour change with Iodine solution (a marked distinction from starch and dextrin); and it black colour with the FeCl3 solution (an apparent distinction from employed as a demulcent. It is availed extensively as a vital pharmaceutical aid for emulsification and to serve as a thickening agent. It finds its enormous and key application as a binding agent for tablets, for example, the cough lozenges. It is used in the process of Acacia consists principally of the arabin(Simonsen et al.,2001), which is a complex mixture of calcium, magnesium and polysaccharide that yields L-arabinose, the Dgalactopyranose units linked side chains 15% of water and several occluded enzymes such as oxidases, peroxidases and the pectinases. The total ash content should be in the range of 2.7–4.0%. ad acetate solution, the Hydrolysis of an aqueous solution of acacia with dilute HC1 yields the reducing sugars whose presence are ascertained by boiling with Fehling's solution to give a When the aqueous solution of the acacia is treated with), it gives rise to an aqueous solution of the acacia affords a stiff translucent mass on treatment with a 10% aqueous solution of the acacia fails to produce any precipitate with dilute and Tragacanth); it does not give any colour change with the Iodine solution (a marked distinction from starch and the dextrin); and it solution (an apparent distinction from employed as a demulcent. It is availed extensively as a vital pharmaceutical aid for emulsification and to serve as a bio-thickening agent. It finds its enormous application as a binding agent for tablets, for example, the cough lozenges. It is used in the process of 'granulation' for the manufacturing of tablets. It is considered the gum of the choice by virtue of the fact that it is quite compatible with other plant hydrocolloids as well as the starches, carbohydrates and proteins. It is availed in combination with gelatin to form conservates for

micro-encapsulation of drugs. It is employed as the colloidal stabilizer (Sathiya et al., 2008). It is availed extensively in making of candy and other food products. The Gum acacia solution has consistency similar to blood and is administered intravenously in haemodialysis. It is availed in the manufacture of adhesives and ink, and as a binding medium for marbling colours.

The Allied Drugs Talka gum is usually much broken and of very variable biocomposition, some of the tears being almost colourless and others brown. Ghatti or the Indian gum is derived from Anogeissus latifolia (Combretaceae). It is produced in much the same localities as the sterculia gum, and is harvested and prepared in a similar manner. It resembles talka in possessing tears of the various colours. Some of the tears are vermiform in shape and their surface shows the fewer cracks than even the natural acacia. The Aqueous dispersions of the gum have a viscosity intermedi-ate between those of acacia and the sterculia gums. West African Gum Combretum, obtained from Com-bretum nigricans, is not permitted as a food additive but is mainly exploited as an adulterant of gum arabic. Unlike the latter in which the rhamnose and the uronic acid units are chain terminal, in gum combretum these moieties are mainly located within the polysaccharides chain. Many other gums of the acacia type are occasionally met with in commerce, and many gum exudates of the large genus Acacia have been given the chemotaxonomic consideration (Madhusudana et al.,2004).

Toxicology Acacia is essentially nontoxic when ingested. Allergic reac-tions to the gum and powdered forms of acacia have been reported and include respiratory problems and skin lesions. Acacia contains a peroxidase enzyme, which is typically destroyed by brief exposure to heat. If not inactivated, this enzyme forms coloured complexes with certain amines and phenols and enhances the destruction of many pharmaceutical products including alkaloids and readily oxidizable compounds, such as some vitamins. Acacia gum reduces the antibacterial effectiveness of the preservative methyl-p-hydroxybenzoate against Pseudomonas aeruginosa presumably by offering physical barrier protection to the microbial cells from the action of the preservative. A trypsin inhibitor also has been identified, but the clinical significance of the presence of this enzyme is not known (Ravikumar et al., 2012).

Pharmacognosy is a branch of science that deals with studying the medicinal properties of plants (Dr. S. Sreeremya, 2024a), by treating the plants with different extraction techniques (Dr. S. Sreeremya, 2026a). Like soxhlet extraction,simple distillation, maceration (Dr. S. Sreeremya,2026b). The branch of pharmacology, biotechnology also promotes the field of pharmacognosy in a positive way (Dr. S. Sreeremya, 2024b).

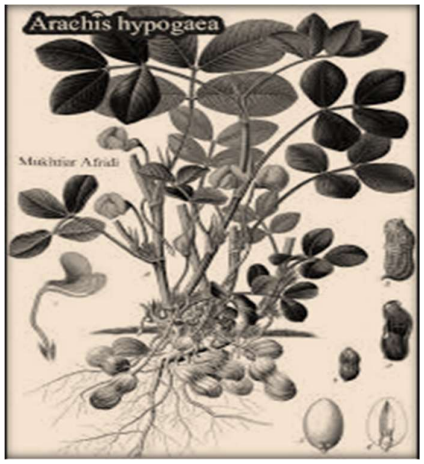

Figure: 1

Figure: 2

Figure: 3

PRELIMINARY PHYTOCHEMICAL INVESTIGATION IN SEEDS OF TEPHROSIA VILLOSA

The extracts were subjected to find the occurrence of preliminary phytoconstituents present in it following the standard procedures (Fig-1,2,3). Preliminary phytochemical screening is done

as follows:

1. **Detection of carbohydrates:** The extract is dissolved in 5mL distilled water and filtered. The filtrates are used to test for the presence of carbohydrates.
   - **Molisch's test:** 1mL of filtrate solution is treated with 2 drops of alcoholic alpha–naphthol solution in a test tube. 2mL of concentrated sulfuric acid is added on the side of the test tube. Formation of the violet coloured ring at the junction indicates the presence of carbohydrates.

2. **Detection of proteins and amino acids Ninhydrin Test:** To the extract, 0.25% w/v ninhydrin reagent is added and boiled for few minutes. Formation of blue-violet color indicates the presence of amino acids or protein.

3. **Detection of alkaloids:** The crude extract powder is dissolved in 2N Hydrochloric acid and filtered. The filtrate is divided into four portions to achieve the following tests.

4. **Dragendroff's test:** One filtrate portion is treated with Dragendroff's reagent (solution of potassium bismuth Iodide) (Almaraz-Abarca et al., 2007). Formation of red precipitate indicates the presence of alkaloids.

5. **Detection of flavonoids:-**
   - **Alkaline reagent test:** Extract sample is treated with a Few drops of sodium hydroxide solution. Formation of intense yellow colour, which becomes colourless on addition of dilute acid, indicates the presence of flavonoids.
   - **Shinoda's test:** The alcoholic extract is treated with magnesium turning and concentrated HCl gives red colour which indicates the presence of flavonones.orange-red color indicates the presence of flavonols.

6. **Detection of tannins:-**
   - **Gelatin test:** To the extract, 1% gelatin solution containing NaCl is added. Formation of white precipitate indicates the presence of tannins.

7. **Detection of diterpenes: -** Copper acetate test: Extracts is dissolved in water and treated with a few drops of copper acetate solution; formation emerald green color indicates the

presence of Diterpenes.

8. **Detection of steroids and tri-terpenoids:-** Libermann-Burchard test: The extract sample is dissolved in 2mL of chloroform in a dry test tube. 10 drops of acetic anhydride and 2 drops of concentrated sulphuric acid are then added. If the solution becomes red, then blue and finally bluish green in color, it indicates the presence of Steroidal nucleus while formation of purple or red color indicates the presence of triterpenoids (Choudhary et al., 2005).

CONCLUSION

Many bioextraction techniques are used like phytochemical screening, soxhlet extraction, maceration, chromatography, colorimetry, spectrophotometry to understand the biopotency of Leguminaceae (Fabaceae) family.

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