

SCIENTIFIC BASIS FOR THE THERAPEUTIC USE OF *LUPINUS ARBOREUS****Ohadoma S. C.**

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ABSTRACT

Lupinus arboreus is a widely used herb in tropical countries, especially in southeast Nigeria. The compounds identified in this plant include saponins, glycosides, flavonoids, steroids, terpenoids, tannins, protein, reducing sugar and alkaloids. The reported phytoconstituents such as steroids, Flavonoids, and terpenoids consist of stigmastene 3,6-dione, tetrahydroxyflavone -3 α -rhamnoside which is a flavonol glycoside, and ursolic acid respectively. Studies indicate that *L. arboreus* possesses various pharmacological activities such as antinociceptive, antimicrobial, antiemetic, antipyretic and anti-inflammatory properties. Various other effects like antioxidants, spasmolytic as well as treatment of acute lymphatic leukemia, neoplasias and dermatological disorders have also been reported. These results are very encouraging and deserve more extensive study of this plant to reveal other potential therapeutic utilities.

KEYWORDS: *Lupinus arboreus*, phytoconstituents, chikadoma, therapeutic uses, scientific basis.**INTRODUCTION**

Age-long utility of medicinal plants has prompted investigations into phytochemical and pharmacologic activities of secondary metabolites of plants. Undoubtedly, this has improved modern pharmacotherapeutics and has gained continued support thereby making herbal medicine an inevitable global medical discourse.^[1] *Lupinus* is a genus of about 300 species of animals, perennials, and evergreen sub-shrubs or shrubs.^[2] These plants are found mostly in the Mediterranean region, North African, North, Central and South American where they are grown on dry hilly grassland or coastal sands or cliffs or along the banks of streams and rivers. With the synonym lupine, it is commonly planted in Nigeria as ornamental plant. Lupine is one of the plants employed medicinally by the people of ancient cultures against various disease conditions such as deformities of the skin, ulcers, scabies, scald heads and other cutaneous distempers.^[3] The objectives of this report was to review scientific basis for the therapeutic use of *L. arboreus* based on the versatility of the folkloric use of this plant in the management of several ill-health conditions and safety assessment.

Ethnopharmacology

Through documented information is limited enough yet *Lupinus arboreus* is used for various purposes in various gathering of humans all over the world.^[3] In Nigeria, decoction of the leaves of *L. arboreus* is being employed in the ethnomedical management of pain and inflammation.^[4]

Taxonomical classification

Kingdom : Plantae
Division : Magnoliophytha
Class : Magnoliopsida
Order : Rosales
Family : Fabaceae
Genus : *Lupinus*
Species : *arboreus*

Common Names

English : Yellow bush
USA (Northern California): Coastal bush
Nigeria : Chikadoma –
named after a lead researcher Dr. **Chika Ohadoma**, who pioneered extensively work on the novelty study of this plant.^[4]

Parts used

Leaves, seeds, and whole plants.

Synonym

Lupine.

Botanical description

The botanical and morphological description of *L. arboreus* can be influenced by source or geographical location. In Nigeria, *L. arboreus* is easily recognized as a bushy shrub that grows up to 1.8 m (six feet) tall, with bright yellow flowers blended with purple and white colours (Figure I). The flower has sweet-smelling aroma.^[5]



Fig. I: Leaves and bushy shrub of *Lupinus arboreus* in Nigeria location.

Some other species of Lupinus

In the rich specific diversity of Lupine, there are species, forms and varieties, which accumulate other useful substances not only in the quantitative contents but also in their qualitative structures. The species include *L. albus*- This is referred to as “white lupine” reputed for the amount of methionine in white lupine seed within the limits from 177 to 320 mg per 100 g or 0.4-0.7% in protein.^[6] *L. angustifolius*- this is known as “narrow-leave lupine”. *L. mutabilis* is called “Andean pearl lupine”. The low alkaloid forms (sweet) of this species are available by removal of alkaloids by means of soaking and cooking hence otherwise called *L. mutabilis* sweet. *L. luteus* is another species known simply as “yellow lupine”, while *L. polyphyllus* is referred to as “multifoliate or Washington lupine”.^[6] *L. chamissonis* is known as “blue bush lupine” which can easily be distinguish from yellow bush lupine by silver, densely hairy leaves that appear gray-blue and light violet to blue flowers.^[7]

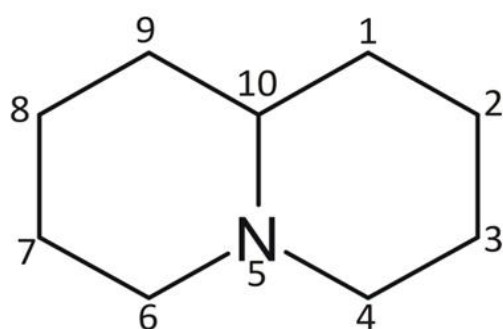
Phytochemistry

L. arboreus has a plethora of phytochemicals. The Phytochemical composition of *L. arboreus* varies according to the geographical origin. The compounds such as saponins, glycosides, steroids, terpenoids, flavonoids, resins, proteins, reducing sugar and alkaloids have been reported while quinolizidine alkaloids which are considered chemotaxonomical markers of the plant genus have constantly been registered.^[8,9,10]

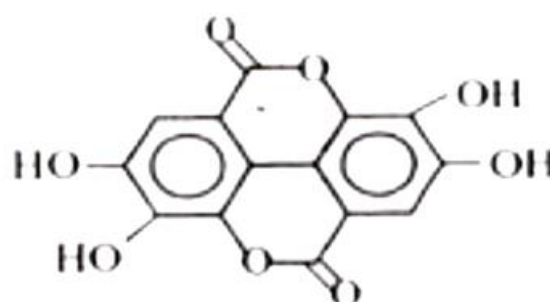
Flavonol glycosides, stigmast steroids, triterpene hydroxyl acid and phenolic compounds

L. arboreus has been found to consists of stigmastene 3,6-dione – a stigmast steroids^[11], tetrahydroxy flavone - 3 α -rhamnoside – a flavonol glycoside^[12], ursolic acid – a triterpene hydroxyl acid^[13], and ellagic acid – a phenolic acid^[14], isolated from the plant.

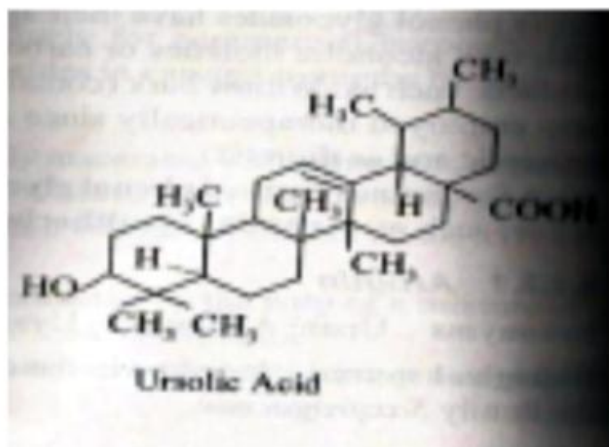
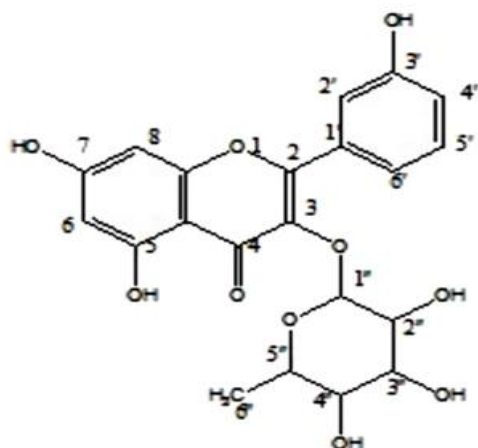
Chemical structures of the major constituents of *L. arboreus* are shown in Figure II.



Quinolizidine



Ellagic Acid



Tetrahydroxyflavone-3 α -rhamnoside

Fig. II: Chemical Structures of some major constituents of *Lupinus arboreus*.

Nutritive Value

L. arboreus is highly nutritive and wholesome. It comes close to soyabean in protein content hence grown for fodder.^[15]

Pharmacology

The medicinal value of *L. arboreus* in terms of scientific investigation and documentation is relatively scarce. A lot more can still be explored and utilized. A summary of the findings of available pharmacological studies is presented below.

Antibacterial activity

The crude methanol leaf extract, n-hexane, ethylacetate, and methanol fractions of *L. arboreus* have been shown to possess activity against chemical isolates of Gram-negative and Gram-positive bacteria^[16] responsible for majority of the multidrug resistant infections in Nigeria^[17], and *Salmonella*^[18], asymptomatic genital and urinary tract infections, otitis media as well as wound infections caused by *Pseudomonas aeruginosa*^[19], and *Staphylococcus aureus*^[20], periodontal disease, upper respiratory tract infections, and osteomyelitis in children caused by *Bacillus* species and *Streptococcus* species^[21]

Antiemetic activity

Aqueous extract of *L. arboreus* leaves showed remarkable antiemetic effect in a dose-dependent manner.^[22]

Antifungal activity

The crude methanol extract, n-hexane, ethylacetate and methanol fractions of *L. arboreus* leaves showed weak activity against *Candida albicans* and *Aspergillus niger*.^[16]

Anti-inflammatory activity

In both albumin (acute) and formaldehyde (Chronic) induced oedema in rats, the leaf extract of *L. arboreus* produced a significant dose-dependent inhibition.^[4]

Antileukemia activity

L-asparaginase from developing seeds of *L. arboreus* catalyse the formation of the neuroactive amino acid L-aspartate by deamination of asparagines and showed activity against acute lymphatic leukemia.^[23]

Antineoplastic activity

The concoction of the seed of *L. arboreus* has antitumour effect.^[24,23]

Antinociceptive activity

The methanol extract and fraction of *L. arboreus* leaf studied using acetic acid-induced (writhing reflex) pain, pressure-induced (rat tail immersion) pain and thermally-induced (hot plate) pain exhibited dose-dependent significant antinociceptive activity in rodents.^[4]

Antioxidant and free radical scavenger effects

Methanol leaf extract of *L. arboreus* had showed to have antioxidant and free radical scavenger effect by methods of 1, 1-diphenyl-2-picrylhydrazyl (DPPH), phosphomolybdenum reduction assay, metal ion chelating activity, reducing power assay and superoxide radical scavenging assay.^[25]

Antipyretic activity

Aqueous extract of *L. arboreus* leaves produce a dose-dependent decrease on the rectal temperature of rats.^[22]

Antityphoid activity

L. arboreus showed appreciable activity using method of agar-well diffusion, against *Salmonella paratyphi*. Ethylacetate fraction of *L. arboreus* showed the highest activity on *S. paratyphi* (MIC: 9.4 mg/ml) while the methanolic fraction showed least activity on *S. paratyphi* (MIC: 21.13 mg/ml).^[16]

Spasmolytic effect

L. arboreus leaf extract was not spasmolytic on guinea pig ileum but contractile in effect, hence does not give credence to the folkloric use of *L. arboreus* in the

management of colic pain.^[26] The contractile effect observed in this plant may cause constipation when used for a long period of time. Studies have showed that extracts of plants exerting contractile effect may not be effective in colic pain management except its analgesic tendency overwhelms its colic effect on the gastrointestinal tract.^[27]

Future Potential and concluding Remarks.

L. arboreus is native to Southern and Central California and introduced to many dune systems as a sand stabilizer during the early to mid-1900s. In Nigeria, the spread of yellow bush lupine is attributed to the quest for aesthetic and environmental beauty where it serves as ornamental flower. The plant is used in various folkloric settings as an antineoplastic, antinociceptive, antileukemia, antipyretic, antioxidant, spasmolytic remedy. *L. arboreus* contains a plethora of phytoconstituents such as flavonoids, alkaloids, terpenoids and phenolic compounds, which may be responsible for the various physiological and biological activities. Some pure phytopharmaceuticals can be isolated, which subsequently may serve as lead molecules for the synthesis of novel agents with good therapeutic activity. Both in the developing and developed countries based on the changing global scenario, the interest in plants possessing medicinal value is substantially increasing in the primary health care system. Hence, the information and compendium about *L. arboreus* will help researchers and Scientists to screen further the compounds implicated for various bioactivities and to elucidate the biochemical or molecular events leading to the various character of effects.

Conflict of interest statement

No conflict of interest declared.

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