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Pharmacognostic studies on *Lycium barbarum* L.

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Abstract
Lycium barbarum L. is a Chinese indigenous plant similar to Goji berries and commonly called as Chinese Wolfberry. They have been used as a tonic in traditional Oriental medicine. Their fruits are usually small and oval in shape and reddish orange in color, and they are known to have a sweet but coarse taste. Animal studies suggest that they might have hypotensive, hypoglycemic and antipyretic activities and prevent some types of ulceration. Particularly, Lycium barbarum polysaccharide (LBP), extracted from L. barbarum, is found to have bioactivities such as anticancer, antioxidant, hypoglycemic and immunological activities. The beautifying property of *lycium* fruit may have some scientific basis after all which may justify its use in skin-care cosmetics, as the anti-aging properties come from one of the ingredients found in the berry, called polysaccharide. This ingredient triggers and boosts the production of growth hormones that in turn rejuvenates the cells in the body keeping them supple and young. It is also believed to improve eye sight, the strength of legs and knees, and human longevity. In the present study pharmacognsotic studies are carried out to authenticate and standardize this herb.

Keywords: *Lycium barbarum*, chinese wolfberry, TLC, physicochemical, anatomical, microbial limits

Introduction

Lycium barbarum has been used as a tonic in traditional Oriental medicine. Lycium fruit has its ability to "benefit complexion and maintain one's beauty"; it is also considered to have anti-aging properties. Various studies have shown lycium fruit to have numerous beneficial effects, including, antioxidant, immunopotentiating, antimutagenic, hypoglycemic, hypolipemic, hypotensive, etc., all of which contribute to the slowing down of the aging process or help us live longer. *Lycium barbarum i*s a deciduous shrub (small tree in cultivation) 0.8-2 m tall. Stems and branches glabrous, branches thorny. Leaves solitary or fasciculate, lanceolate or long elliptic, 2-3 cm × 3-6 mm. Inflorescences solitary or clustered flowers. Pedicel 1-2 cm. Calyx campanulate, 4-5 mm, usually 2-lobed, lobes 2- or 3-toothed at apex. Corolla purple, funnel form; tube 8-10 mm, obviously longer than limb and lobes; lobes 5-6 mm, spreading, margin glabrescent. Stamens and style slightly exserted. Berry red or orange-yellow, oblong or ovoid, 0.4-2 cm × 5-10 mm. Seeds usually 4-20, brown-yellow, ca. 2 mm [1].

Anti-oxidant activity of flower extract of Lycium barbarum assessed by Trolox equivalent antioxidant capacity (TEAC), the hemoglobin ascorbate peroxidase activity inhibition (HAPX) assay, EPR spectroscopy exhibited a moderate antioxidant potential [2]. In an another study to evaluate the anti-oxidant property of *Lycium barbarum* and *Lycium chinense* by *in vitro* methods of DPPH• and ABTS•$^{+,}$ *L. Barbarum* exerted higher free-radical scavenging activity thus emerging as a good anti-oxidant agent [3].Anti-microbial potential of *Lycium barbarum* was assessed against *Staphylococcus aureus, Bacillus subtilis, Listeria monocytogenes, Escherichia coli, Salmonella typhimurium* [2], *Campylobacter jejuni, Yarrowia lipolytica, Metschnikowia fructicola,* and *Rhodotorula mucilaginosa*), and fungi (*Penicillium expansum*, *Aspergillus niger*, *Fusarium oxysporum*, *Rhizoctonia solani* [4] exhibited decent anti-microbial activity.

In view of the medicinal significance of the aforementioned plant, a detailed pharmacognostic analysis was carried out to further authenticate and classify the plant, setting pharmacopoeial standards for the plant.

Materials and Methods

Specimen

The plant materials were collected and Identity was confirmed with the voucher specimen using [5]

Physico-chemical values such as the percentage of total ash, acid-insoluble ash, and water and alcohol-soluble extractives were calculated as per [6]

TLC fingerprinting: profile carried as per [7]

Anatomical studies and powder microscopic studies, transverse sections (TS) were prepared and stained [8, 9].

Microbial limit test: was preformed based on the standard provided by WHO Guidelines and also Indian herbal pharmacopoeia [10]

Results and Discussions

Pharmacognosy

Table 1: Pharmacognosy features

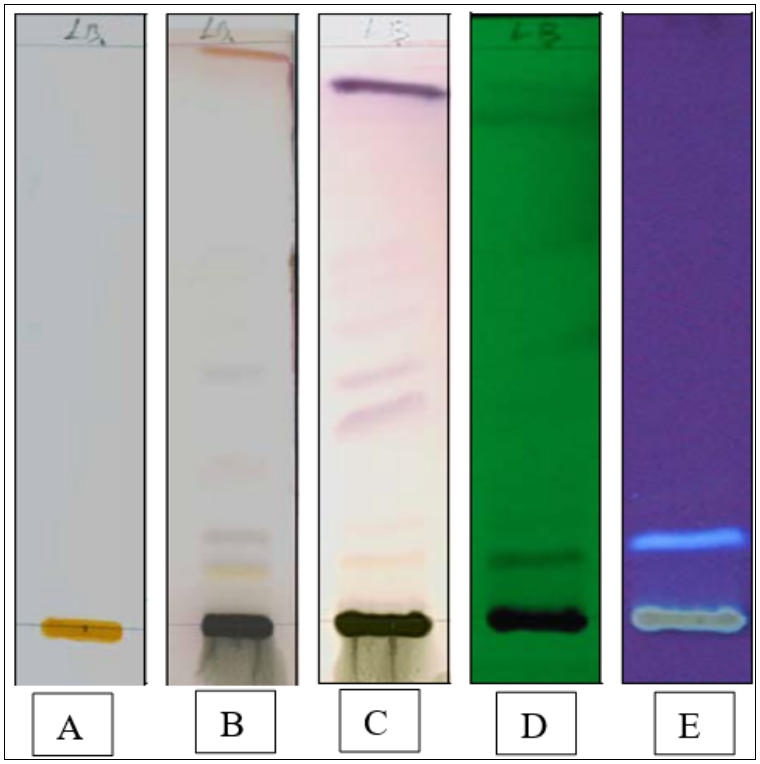
Physicochemical Constants			Organoleptic Characters	
Parametrs	Values	Limit	Parametrs	Values
TA	5.15%	NMT 15 %	Taste	Sligtly sweet
AIA	0.15%	NMT 2%	Color	Brown
ASE	24.3%	NLT 4.5%	Odour	Characteristic
WSE	4.08%	NLT 20%	Texture	Rough

TA - Total Ash; **AIA -** Acid Insoluble Ash; **ASE -** Alcohol Soluble Extractive; **WSE -** Water Soluble Extractive ; **NMT**- Not More Than, **NLT**- Not Less Than Limit as prescribed by Ayurvedic Pharmacopeia of India

All the values except for water soluble extractive value were within the limit. The deviation from the parameter of water soluble extractive value could be due to the presence of exhausted materials or incorrect processing. Organoleptic properties are distinct (table 1)

Table 2: TLC Profile

TLC Finger Printing Profile								
Under Visible Light								
Rf Values	-	-	-	-	-	-	-	-
Sprayed with 10% H_2SO_4								
Rf Values	0.09	0.15	0.43	0.99	-	-	-	-
Sprayed with Anisaldehyde								
Rf Values	0.03	0.1	0.37	0.43	0.93	-	-	-
Under Short UV (254 nm)								
Rf Values	0.1	0.88	-	-	-	-	-	-
Under Long UV (366 nm)								
Rf Values	0.14	-	-	-	-	-	-	-



(A – Visible, B – H_2SO_4, C – Anisaldehyde, D – UV 254 nm, E – UV 366 nm)

Fig 1: TLC Chromatograms

Lycium showed no band under visible light, 4 bands when sprayed with 10% H_2SO_4 and 5 bands when sprayed with Anisaldehyde. Further, 2, 1 bands were observed under short and long UV light respectively. The results are qualitative TLC finger print profile of plant under study (table 2, fig 1).

Anatomical Characters

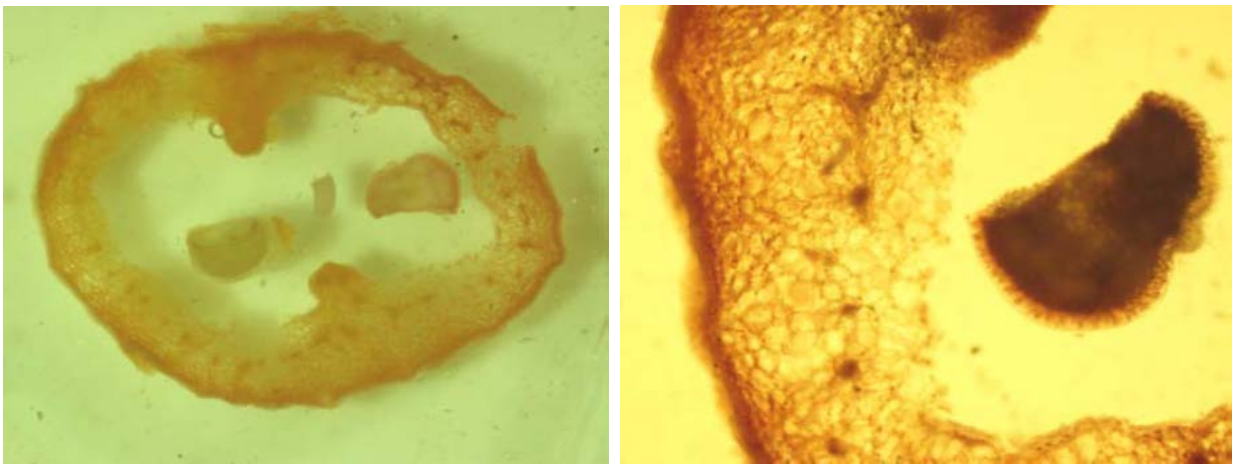


Fig 2: Anatomical Characters of *Lycium*

T.S. of shows single layered epidermis with thin cuticle, After epidermal layer 3-4 layers of loosely arranged parenchyma cells with inter cellular spaces, Vascular bundle are situated within the parenchyma cells they are alternating the phloem cells, Two seed stalks are present which holds the seed, At the center of the fruit hallow space in that space seeds are present (fig 2).

Powder Characters

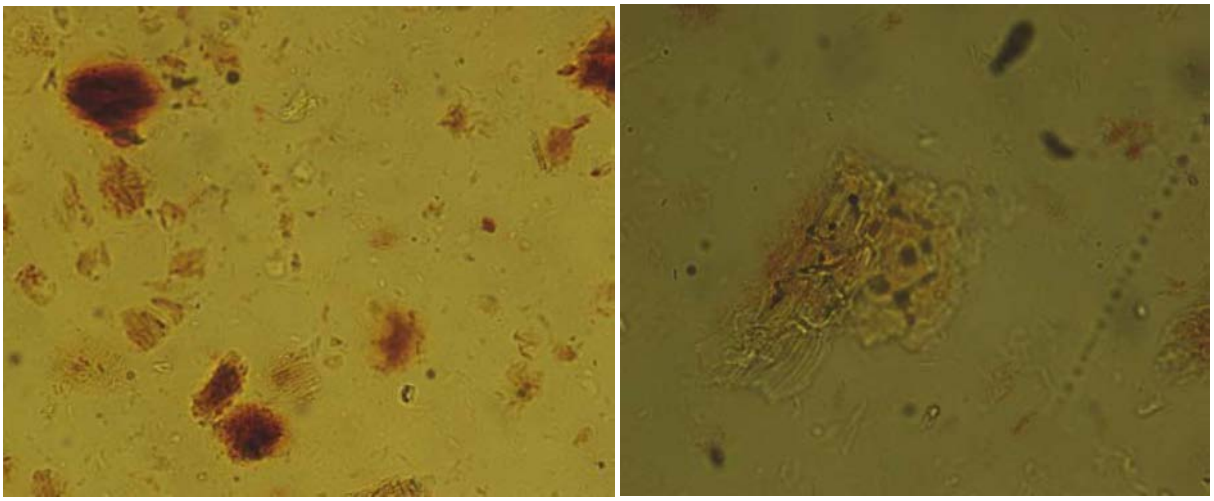


Fig 3: Powder characteristics of *Lycium*

1. Many numbers of parenchyma cells and fibers are seen,
2. Vessels like structure and starch grain present,
3. Fibers and polygonal parenchyma cells are present

Powder microscopy permits to acquire knowledge about the various broken bits of the sample that are specific and play a key role in the recognition of the raw sample (fig 3).

Microbial Limit Test
Total Aerobic Bacterial Count (TABC): 1.8 x 10^3
Total Yeast and Mould Count (TYMC): 0.2 x 10^3
(Microbial contamination limit for raw herbs - TABC: <10^7, TYMC: <10^5)
All criteria were within the limits specified by the WHO Guidelines and Indian Herbal Pharmacopeia.

Conclusion
In the proposed investigation, a pharmacognostic approach was taken to establish pharmacopeial standards for *Lycium*, an oriental medicinal plant. Physicochemical values were not under the limits suggested by Ayurevedic Pharmacopeia of India, which may include the presence of adulterants. The TLC profile will function as a fingerprint profile for the plant. Organoleptic, anatomical and powder microscopic evaluations are plant-specific. The microbial limit of the raw material was in line with the norms provided.

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