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Bhangari (*Blepharis sindica* T. Anders): A review

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Abstract

Blepharis sindica T. Anders of family Acanthaceae is an important medicinal plant which is mainly used as an invigorating tonic, given to cattle to increase milk production and its roots are used for urinary discharge & dysmenorrhoea. It is commonly known as “*Bhangari*” It is extensively used traditionally as *Vajikaraka* and *Vrishya* (Aphrodisiac) by local Vaidyas of Rajasthan and Gujarat. The seeds of *Blepharis sindica* T. Anders are the official part of the plant for its medicinal values and also as the promise of its future. A little work is done on this medicinal plant till date. The present article provides review on Bhangari and pharmacological studies conducted till date.

Keywords: *Bhangari*, *Blepharis sindica* T. Anders, *Vaidyas*, Acanthaceae

Introduction

The seeds of *Blepharis sindica*-T. Anders are mainly marketed in herbal markets of Rajasthan like Jaipur, Jodhpur under the trade name *Bhangari*, *Uttingana* or *Uchhata*. Seeds are mainly used in the preparation of herbal medicines and it is used as aphrodisiac. The first description of this plant was done under the name *Acanthodium grossum* auct. non Nees in 1830; Wight. Later on, Thomas Anderson discussed this plant as *Blepharis sindica* in 1867. He mentioned few species *Barleria acanthoides*, *Blepharis edulis* of Acanthaceae extend into northern Hindostan from the adjoining arid countries to the west of Indus. Two true desert forms, *Ruellia longifolia* and *Blepharis sindica*, are confined to Scinde. Two species of *Blepharis* genus are found in Ceylon, three in western peninsula, two species are found in central India, and four in northern India¹. Later on botanists included the *Blepharis sindica* T. Anders in their floras and ethnobotanical texts. This is an intriguing genus which is composed of 129 species among three subgenera. This is an Afroasiatic genus, which is widely distributed in tropical and southern Africa, southern parts of the Middle East and central Asia, India, southern China, with the occurrence of one species in Indonesia².

Taxonomy

Kingdom -	Plantae
Subkingdom -	Viridiaeplantae
Phylum -	Tracheophyta
Subphylum -	Euphyllophytina
Infraphylum -	Radiatopses
Class -	Magnoliopsida
Subclass -	Lamiidae
Super order -	Lamianae
Order -	Scrophulariales
Family -	Acanthaceae
Genus -	Blepharis
Specific epithet -	sindica
Botanical name -	<i>Blepharis sindica</i>
Synonym -	<i>Blepharis linariaefolia</i> Pers.

Distribution

Blepharis sindica-T. Anders is an endangered species whose natural population is decreasing due to unscientific exploitation and habitat destruction³. It has been declared as threatened species in the report of UNDP -CCF II Project and given A2cd Vulnerable category as per IUCN red list⁴. This is mainly distributed in South Western India. Rock gravelly habitats in western desertic zones. Rajasthan Gujarat, Punjab, Haryana and Indus delta region of India, Southern Pakistan (Sind, Baluchistan) and Karachi (Jemadar ka Landa near Karachi, tolerably common in Sind. Hub Dureji Road (District Lasbela) near Rocky slopes mostly consisting of limestones⁵.

External Morphology

It is a small, dichotomously branched, woody annual. Stem is short, sometimes almost zero, branches ash colored, slender, terete, clothed with very short hairs. Leaves are sessile in a whorl of 4, unequal, 2.5-6×0.2-0.4 mm, linear, acute, usually with a few small spinous teeth near the base, finely apiculate, rough with short stiff hairs, margins recurved, midrib prominent strong beneath. Flowers are in strobilate sub sessile hairy spikes 2.5-7.5 cm long, in the forks of the branches, solitary or few (5-7) on the top of very short stout woody peduncle, usually numerous in the lowest fork, solitary in the upper. Flowers are blue or pinkish in colour. Calyx is divided almost to base, softly hairy on both surfaces. Corolla is 8-13 mm long one lipped, the lip 3 lobed; mid lobe quadrate, slightly larger than the lateral lobes which are rounded at apex, tube 4mm long, brown, constricted below the limb. 4 didynamous stamens. Fruits are Capsules 8×5mm, ellipsoid, compressed, narrowed at both ends glabrous and shining brown. Seeds are 4mm. long, compressed, densely clothed with thick hygroscopic hairs which are longer than the nucleus. Flowering and fruiting period is from August to January. Seed and whole plant is used for its medicinal properties [6]. It grows on loose soils, along the crop fencings and much especially on dune slopes. Sandy soil with heavy percolation is much preferred by this plant. After a successful completion of life cycle (July to December), capsules loaded spikes remain attached to the dried plant and provide a special distinguishable appearance to the species. Seeds within capsules remain open to face the extreme of winter and summer temperatures till their first imbibition. Habitat limitation plays an excellent role for this species as sand shifting and eolian deposition cause to bury the spikes which trigger microbial decomposition of lignified bracts. The plant emerge through seeds after first rain as soon as fruit wall split explosively from distal tapered end and release seeds to imbibe [7].

Vernacular Names- Bhangari; Bhongir, Bhangri (Jaisalmer), Asad, Jasad (Lasbela), Unṭa kantalo, Oontha-Kantela, Minni panjiya (Bikaner). Billikhoja, Sindhi uttingana (Gujarat) [8-9].

Organoleptic characters of seed

Touch (*Sparsha*) - velvety smooth. (*Snigdha, Mridu*)

Colour (*Rupa*) - yellow blakish whitish (*Kinchit shyam pitabh shveta varna*)

Taste (*Rasa*) - pungent Sweet (*Madhura -Tikta*)

Smell (*Gandha*) - Somewhat oily (*Mrittika evam Vishista Tail Vat*)

Chemical Composition- Allantoin, Betaine, beta - sitosterol, oleanolic acid, apigenin, terniflorin, /purin- 6'' -0- coumarate, blepharin, coumaroyl flavone glucoside [10] 9 hydroxy do decanoic acid [11] are found in seed.

Uses- The seeds are boiled in milk and taken as tonic. It is also given to cattle to increase milk production [12] Compressed seeds with densely clothed hygroscopic hairs are used in the preparation of herbal medicines and it is used as aphrodisiac [13]. A decoction is used as a wash the wound and powder of dried plant material is applied locally on infections [14]. The

seeds are also used in the treatment of earache [15]. Its roots are used for urinary discharge and dysmenorrhoea. Powdered plant is applied locally on the infections of genitals and on the burns [16]. The seeds are also used for the purpose of *Pumsavana Karma* by Vaidya of Rajasthan.

Ecological studies on *Blepharis sindica* T. Anders

A study regarding germination behavior of seeds in polluted waters and polluted soil extracts was carried out and it was found to be identical, only a few species behaved differently. *Blepharis sindica* T. Anders showed a stimulating effect of polluted water on germination, whereas low germination was observed when their seeds were treated with the soil extract of the same site [17]. In field experiments at Karachi in 1988-90, the growth trends of *Blepharis sindica* T. Anders was observed soon after rainfall. This plant initially showed a high level of mortality leaving only a few seedlings to continue their life cycle [18]. In ecological research, reproductive traits of the lignified annual plant, *Blepharis sindica* T. Anders were studied in relation to the formation of an 'aerial seed pool' on dead plants in arid grassland in the Thar Desert of northwestern India. It was observed that dead plants remained standing on the soil surface and retained fruits for more than one year. Aerial seed pools developed about 6 cm above the ground. There were no seed pools on or below the ground surface. Only 5.7% of seeds died on dead plants because of insect predation or fungi infection during one year. Seed release was cued by rainfall, and a fraction of seeds on the aerial seed pools was released in each rainfall event. After 13 rainfall events during the monsoon season, 25% of seeds still retained on the plants. Seed predation on the ground surface was intensive; all cones placed on the soil surface were removed within four days, and 97% of fruits were removed within 10 days. Fifty percent of seeds germinated within 3.5 h, and there were no differences in viability and time required for germination between first year seeds and older seeds. It has been concluded that the aerial seed holding on dead plants of *Blepharis sindica* T. Anders is an available way to avoid seed predation in harsh desert environments where seed predation is intense and favorable periods for growth are temporally limited and unpredictable [19].

Another important study has been carried out on the seed production, and seed dispersal patterns in desert lignified annual, *Blepharis sindica* T. Anders (Acanthaceae). It has been observed that this plant has relatively large seeds (7.8 mg dry mass) and unique structures: lignified stems, spiny hard bracts, and hard, lignified capsular fruits. It was observed that Seed size and/or number may decrease with an increase in allocation to lignified stems, branches, bracts, and capsular fruits. However, these non-seed structures may play important roles with respect to reproductive success in desert environments. Reproductive allocation and seed output (total resources devoted to seeds) decreased and relative allocation to stems increased as plant size increased. Seed size increased rapidly at a certain plant size and held relatively constant above that size. The number of seeds produced did not increase below the critical resource level; however, seed number increased exponentially above this level. Seed dispersal correlated to plant size: larger plants tended to disperse lower proportions of seeds. These results suggest that non-seed maternal efforts in

this annual plant are important for the establishment of a seed bank and the regulation of seed dispersal [20]. Recently another research regarding ecological properties of this plant has been done which deals with its aphrodisiac properties also. The ecological studies provide details of various parameters observed about *Blepharis sindica* T. Anders. About Biomass study it has been reported that the site and season factors and their interaction contributed to seed biomass; being maximum during summer season. Also maximum seed output and seed weight were recorded in summer period. The seed output was observed to be positively related with cover and soil nitrogen while negatively with soil pH [21].

Phytochemical studies on *Blepharis sindica* T. Anders

A hitherto unknown hydroxy acid has been isolated from *Blepharis sindica* T. Anders seed oil that was identified as 9-hydroxydodecanoic acid by IR, NMR and Mass spectral studies. Chemical transformations further supported the structure of this acid [22]. In Pakistan, the chemical analysis of *Blepharis sindica* T. Anders has been done in 1989 [23]. In Phytochemical analysis, it was seen that soluble sugar as well as insoluble sugar remain present maximum in seed. During the summer, seeds of this plant showed the maximum steroidal sapogenin compared to other season and plant parts. In this investigation the linear positive relation between the seed protein and steroidal sapogenin were recorded. The maximum phenol content was recorded in seed collected during summer period. The maximum Zn concentration (0.35 mg g⁻¹) was recorded in stem collected during summer period while seed collected during rainy period had maximum iron (2.97 mg g⁻¹) content. As far alkaloids are concerned, it was highest in seed. In seed the total sugar and alkaloids were found to be related in power path, similarly the alkaloid production increased the concentration of steroidal sapogenin in parabolic pattern [24].

Pharmacological studies on *Blepharis sindica* T. Anders

A very little work is done on this plant. The 50 percent ethanolic extract of flowers of *Blepharis sindica* T. Anders showed gross behavioural effects, potentiated barbiturate induced hypnosis in mice and anticancer activity against human epidermoid carcinoma of nasopharynx in tissue culture. The anticancer activity confirmed in fractionated extract. It was devoid of antibacterial, antifungal, antiviral, antifertility, hypoglycemic and diuretic activities and effects on respiration, preganglionically stimulated nictitating membrane and CVS in experimental animals and isolated guinea pig ileum. LD₅₀ of the extract was found to be 93mg/kg i.p in mice²⁵. In this research, the impact of crude extract on mice has been reported. In bioassay study, it has been concluded that seeds of *Blepharis sindica* T. Anders possessed strong androgenic compounds and weak estrogenic compounds. The vital organs of animal reflected normal histology, meanwhile in treated group the weight of different vital organs like heart; kidney and liver increased which showed that the drug was not having toxic effects [26].

Conclusion

The present review indicates the importance of Bhangari. Bhangari is a plant of very limited distribution, it deserves

protection and cultivation. Apart from Aphrodisiac property, new studies should be done to explore more activities.

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