

***Elephantopus scaber* L.: 1. AN OVERVIEW**MOUMITA DAS^{a1} AND AMBARISH MUKHERJEE^b^{ab}CAS, Department of Botany, Burdwan University, Golapbag, Burdwan, West Bengal, India**ABSTRACT**

Elephantopus scaber L., a plant of considerable ethnobotanical reputation has evoked great interest among scientists of different disciplines. The present attempt is a synthesis of literature to disclose its various attributes especially those having beneficial implications. Although an exotic element, it has naturalized in different topographical and climatic regions having dry deciduous forest and has developed an intimate relation with the people in their proximity. To most of the tribes in India this plant remains known for its medicinal virtues.

KEYWORDS : CAM, Antidiabetic, Elescabrin, Antiasthmatic

Elephantopus scaber L., is a small herb belonging to the family Asteraceae of the order Asterales representing the subclass Asteridae. It is an exotic element in India with nativity probably in Mexico. Soon after introduction from outside (Neotropics, Europe, Asia, Africa and Australia) it dispersed in nooks and corners of the country and came in intimate contact with the people so as to gain entry into Indian traditions. Traditional knowledge about the herbal remedies in India has been contributing enormously towards worldwide development of a very reliable complementary and alternative system of medicine (CAM). The rejuvenation of interest in herbal medicines emanates mainly from the efficacy of ethnomedicinal plants in curing diabetes, scavenging free radicals and protecting liver from toxicity of biotic and abiotic origin. *Elephantopus scaber* L. is one of such plants which have tremendous reputation in indigenous traditional system of medicine in India by virtue of which it has drawn the attention and concern of scientists for validation of its medicinal properties through phytochemical and pharmacological evaluation.

MATERIALS AND METHODS

The information served in this paper about various uses of *Elephantopus scaber* L. has emanated from synthesis of empirical and interpretative approaches involving exhaustive survey of pertinent literature. The truth and rationality of information from one source was judged on the basis of comparison with the information gathered from another source. This investigation is a part of a work initiated in 2013 on understanding the medicinal potential of *Elephantopus scaber* L.

Literature Review

Earliest record of scientific work on *E. Scaber* dates back to Linnaeus, 1753 who triggered its inclusion in Floras and Taxonomic literatures. The species encounters the problem during germination, Scarification by sand paper, cold stratification at 5±1°C for a period of 40 days and gibberellic acid (GA) application at a conc. of 1000mg/L have been found to be more effective in breaking seed dormancy. Combination of scarification with GA treatment can enhance germination potential results into 75% more germination than seeds unscarified with GA combination (Rout et al., 2009).

Elephantopus scaber L. is known to contain a large number of bioactive compounds such as lipids, phytochemicals, pharmaceuticals and pigments. The names of ethyl hexadecanoate, ethyl-9, 12-octadecadienoate, ethyl-(Z)-9-octadecenoate, ethyl octadecanoate, lupeol, stigmaterol, glucoside, deoxyelephantopin and two new germacranolide sesquiterpene lactones named 17, 19-dihydrodeoxyelephantopin and iso-17,19-dihydrodeoxyelephantopin can be cited as examples. (Ahmad et al., 2009). A number of several other phytochemicals have also been isolated from this plant, such as deoxyelephantopin 11, 13, dihydrodeoxyelephantopin, lupeol and epifriedelinol (Ho et al., 2009). A dicaffeoyl derivative, 1a, 2b-O-dicaffeoylcyclopentan-3b-ol along with four dicaffeoylquinic acids could be isolated from the rhizomes of this plant. The structure of the new compound was elucidated on the basis of extensive spectroscopic analyses. (Geng et al., 2011), Elescaberin a new elemanolide sesquiterpene lactone, named together with two known

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compounds, viz., isodeoxyelephantopin and deoxyelephantopin was isolated from the whole plant. The structure of elescabrin was elucidated on the basis of spectroscopic analysis. All the three compounds exhibited significant inhibitory activities against human SMMC-7721 liver cancer cells in *vitro* (IC50 8.1814.08mmol/l) (Liang et al., 2008). Acetone extract of the ethnomedicinal plant, reduced the blood glucose levels in streptozotocin-induced diabetic rats significantly. Acute toxicity studies revealed the 28Nor-22(R) with a 2, 6, 23-trienolide. Biological testing of the compound demonstrated a significant antidiabetic activity by reducing the elevated blood glucose levels and restoring the insulin levels in streptozotocin-induced diabetic rats. This compound can be made a useful candidate to treat diabetes (Daisy P et al., 2009).

Taxonomic Discourse

Elephantopus scaber L., W. Roxburgh, Flora Indica, 3: 445, 1832; Prain, Bengal Pl., 1: 590, 1903; Chopra et al., Glossary of Indian med. plants, 105-106, 1956; Meherotra and Rastogi, Compend. Indian. Med. Plants 1: 172, 1990., 2: 291, 1991. and 3:262, 1993.

Indian names: Bengali: Hasti Pad; English: Prickly leaved elephant's foot ; Hindi: Adhomukha, Bantambakhu, Gobhi; Kannada: Aanekaalu Gida, Hasti Pada ; Konkani: Hakkarik; Malayalam: Koonjirikka, Ottaveran, Thomunji, Aanayadiyan, Aanayadi, Aanachuvadi ; Marathi: Hastipata, Pathari ; Oriya: Mayurachula ; Sanskrit: Prastarini, Gojihva Or Gojihva, Kharaparnini, Adhapata; Tamil: Yanai-c-cuvati; Telugu: Eddupattu; Urdu: Gobhi.

A terrestrial, scabrescent, aromatic, erect, stiff, perennial herb, upto about 60 cm in height. Leaves mostly radical in basal rosette and a few are cauline, finely dentate, obovate-oblong. Capitula numerous homogenous, arranged in terminal dichotomous cymose clusters. Flowers small, actinomorphic, epigynous, purple to dull pink, each clusters supported by a rigid ovate leaf like bract; inner bracts leafy, distinct, pale green. Cypsela finely 10 ribbed, cuneate below; pappus bristly, hairy. Flowering and fruiting season: August to December.

To have a glimpse of the distribution of the species

in India and elsewhere, the specimens preserved in the Central National Herbarium (CAL) of the Botanical Survey of India were scientifically documented and complied with the information available from different Floras. The distributional data scored through herbarium documentation were graphically plotted on a state wise basis to reveal its preponderance. From among the 19 states, specimen-collections from West Bengal were maximum, most of which were collected from the tropical deciduous forested areas of the state.

Medicinal Uses

The plant parts of this herb have been used traditionally for the treatment of a number of diseases in many countries. Sesquiterpene lactones, triterpenoids, steroids, flavonoids and essential oil constituents have been reported from various parts of the plant. The plant has been extensively screened for anticancer activity (Raj Kapoor et al., 2002). Sesquiterpene lactones such as deoxyelephantopin, isodeoxyelephantopin, scabertopin, and isoscabertopin have been found to be prominent anticancer constituents (Kabeer et al., 2013). Many such biological activities as antimicrobial (Anitha et al., 2012) hepatoprotective, antioxidant, antidiabetic, anti-inflammatory, analgesic, antiasthmatic, antiplatelet activities and wound healing property have been reported. (Hiradeve and Rangari., 2014)

The whole plant of *Elephantopus scaber* L. is well known as a herb of Chinese folk medicine which is widely used in the treatment of nephritis, edema, dampness, pain in the chest, fever and cough of pneumonia, scabies, and arthralgia due to wounding (Peer, 1980 and Tsai, 1999) It is also commonly used in China as a remedy for the treatment of gastropathy, hepatitis, nephritis, edema, chest pain, fever and cough of pneumonia, bronchitis, arthritis, and carbuncle.

The root decoction of *E. scaber* is widely used to treat diarrhoea, dysentery, stomach troubles and blood vomiting in tuberculosis in Nepal. (Ahamed et al., 2009 and Ho et al., 2009).

Root paste is known to be useful through external application as antivenom, antiseptic for cuts and wounds and in reducing fever. The fresh roots are chewed for getting

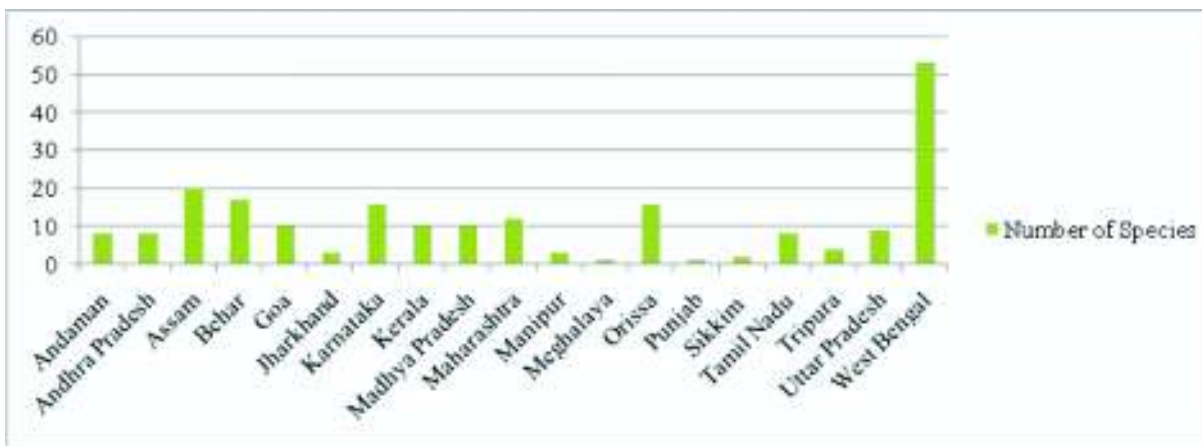


Figure 1: State-Wise Number of Specimens as Documented from CAL

relief in cold, cough and headache.

The antihepatotoxic activity of the plant was evident against CCl_4 induced hepatic damage in rats. (Lin et al., 2001). The ethanol fraction of the herb can show significant liver protection than a other fractions.

The findings of (Ho et al., 2009) also confirmed the traditional use of the herb as a liver tonic through their experiment on ethanol induced liver damage. Lipid peroxidation of membrane which is always the cause for liver injury by xenobiotics like CCl_4 could be prevented by scavenging free radicals in vitro and in vivo experiments with methanolic extract of root.

CONCLUSION

The Genus *Elephantopus* possess 73 species, of which *E. scaber* is the most important one due to its antimicrobial, hepatoprotective, antioxidant, antidiabetic, anti-inflammatory, analgesic, antiasthmatic, antiplatelet, anticancer and wound healing properties. This species is taxonomically interesting since it has close affinity with *Pseudoelephantopus spicatus*. *E. scaber* exists predominantly in tropical deciduous forest areas of India. It can convey benevolence to human through its sustainable use.

REFERENCES

Ahamed A., Alkarkhi A. F. M., Hena S., Khim L. H., 2009. International Journal of Chemistry. 1(1): 36-49.

- Anitha V.T , Marimuthu J. and Jeeva S., 2012. Asian Pacific Journal of Tropical Medicine. 5(1): 52-57.
- Chopra R. N., Nayar S. L. and Chopra I. C., 1956. In Glossary of Indian Medicinal Plants, CSIR, New Delhi, : 105.
- Daisy P., Jasmine R., Ignacimuthu S., Murugan E., 2009. Phytomedicine.16(2-3):252-7
- Hiradeve S. M. , Rangari V. D., 2014. Journal of applied biomedicine. 12(2): 49-61.
- Ho W.Y., Ky H, S. K., Rahim R. A., Omar A. R., Ho C. L. and Alitheen N. B., 2009. Journal of Medicinal Plants Research. 3(13): 1212-1221.
- Huang C. C., Lo C. P., and Shyur L. F., British Journal of Pharmacology.
- Hua-Wei Geng, Xiao-Li Zhang, Guo-Cai Wang, Xin-Xin Yang, Xia Wu, Yi-Fei Wang, Wen-Cai Ye and Yao-Lan Li., 2011. Journal of Asian Natural Products Research. 13(7): 665-669.
- Kabeer F A, Sreedevi G B, Nair M S, Rajalekshmi D S, Gopalakrishnan L P, Kunjuraman S., Prathapan R., 2013. J Integr Med. 11(4):269-77.
- Lin J K - Tsai S H - Lin-Shiau S Y., 2001. Drugs Fututre. 26: 145 - 157.
- Meherotra and Rastogi, 1990 (vol 1), 1991 (vol 2), 1993 (vol 3). Compendium of Indian medicinal plant. Central Drug Research Institute, Lucknow and Publication and Information Directorate, New Delhi.

DAS AND MUKHERJEE : *Elephantopus scaber* L: 1. AN OVERVIEW

- Prain D., 1903. Bengal Plants., Printers and Publishers. vol. 1 : 590.
- Qiao-Li Liang, Zhi-Da Min and Yu-Ping Tang. 2008. Journal of Asian Natural Products Research. 10(5): 403-407.
- Raj Kapoor B., Jayakar B. and Anandan R., 2002. Indian J Pharm Sci. 64: 71 - 73.
- Rout J. R, Das R, Prusti A. B. and Sahoo S. L., 2009. American-Eurasian J. Agric & Environ. Sci., 6(6): 689-691.
- Roxburgh W., 1832. Flora Indica., W. Thacker and Co. Calcutta and Parbury Allen and Co. London, 3 : 445.
- Peer L. M. and Metzger J., 1980. Medicinal Plants of East and Southeast Asia: Attributed Properties and Uses. The MIT Press. London.
- Tsai C. C. and Lin, C. C., 1999. J. Ethnopharm. 64: 85-89.