



Full Length Article

Critical evaluation of the potent antidiabetic drug plant *Gymnema sylvestre* (Retz) R. Br. of *Asclepidaceae* and *Merremia dissecta* (Jacquin) Hallier f. of *Convolvulaceae*

Syed Sabiha V

Department of Botany, Shri.Shivaji College Parbhani-431401(M.S.)
sabahajuned18@gmail.com

ABSTRACT

The present paper deals with the critical evaluation of the potent antidiabetic drug plant *Gymnema sylvestre* and *M. dissecta* because now a days this plant is substituted by *Merremia dissecta* jacquin Hallier f of *Convolvulaceae* family plant which is a common weed plant waste land commonly called as Kaliaphumari in this region. Therefore for the correct identity of *G. sylvestre* plant the critical evaluation of this plant was carried out by using the morphological, anatomical and histochemical parameters were discussed in the current paper for the proper guidance to the ayurvedic practitioners as well as for the researchers.

Key Words: *G. sylvestre*, antidiabetic, *M. dissecta* Kaliaphumari.

INTRODUCTION

Indian folk medicine comprises hundreds of herbal prescriptions for therapeutic purposes which used as a source for relief from illness and Indian flora is extensively utilized as a source of many drugs mentioned in the traditional system of medicine. It has been estimated that over 7500 species of plants are used as medicine by several ethnic communities (Anthropological survey of India 1994). According to WHOM, eighty percentage of the world's population primarily those of developing countries rely on plant derived medicine for their health care needs (Gurib Fakim, 2006).


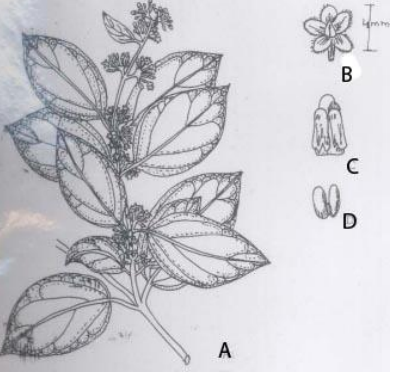
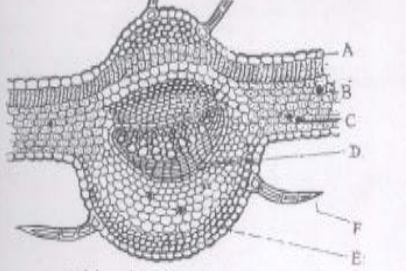
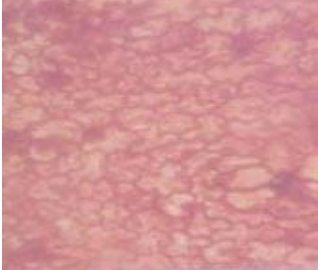
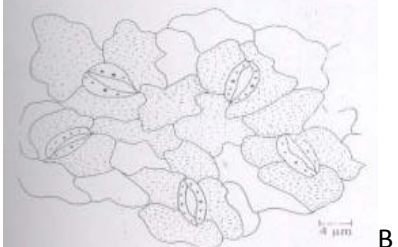
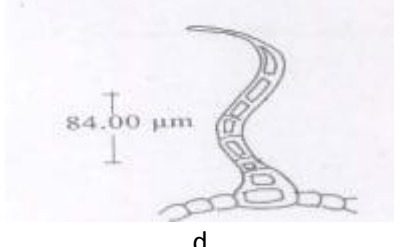

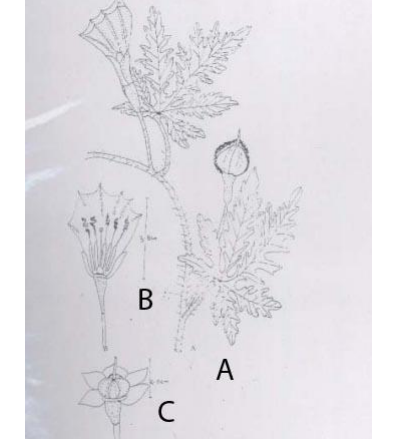
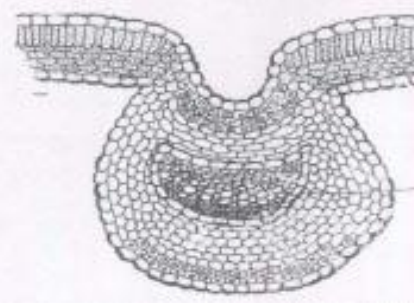

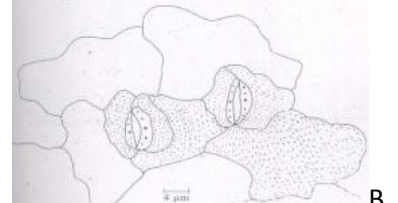
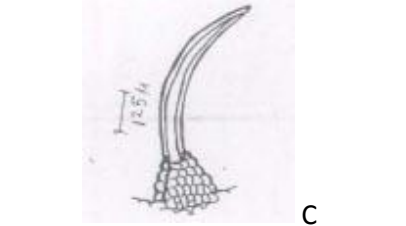
The prevalence of diabetes has increased in the recent years Beckles (1998) *G. sylvestre* is an Indian herb used in Ayurveda in the ancient medicine system of India. The antidiabetic action of the leaves was first documented in 1930 by Mhasker *et al.*, differs from the rapid effect of many hypoglycemic drugs as *Gymnema* leaves raises insulin levels (Mahesker *et al.*, 1930) due to generation of b cells in the pancreas (Shanmugasundaram *et al.*, 1981). The leaves are

also noted for lowering serum cholesterol and triglycerides (Shanmugasundaram *et al.*, 1990). Such potent antidiabetic drug plant is now a day substituted by *Merremia dissecta* of *Convolvulaceae* Family which is used as sedative and use in tisanes (Roigl, 1945), this plant is also used for chest problems, inflammation, for cold (Grant, 1995), for sprains (Hawthorne *et al.*, 2004) and on snake bite (Mansoor, 2001).

Now day's peoples from region using kaliaphumari as a substitute to aphumari plant therefore the critical evaluation of both these plants *G. sylvestre* and *M. dissecta* was carried out in the current paper by considering their morphological, anatomical and histochemical characters.

MATERIALS AND METHODS

For the Morphological studies the aerial plant parts of *G. sylvestre* and *M. dissecta* were collected from different localities of Marathwada region were identified with the help of floras like Flora of Presidency of Bombay, (Cook, 1958), Flora of Marathwada (Naik, 1998) and deposited in the departmental herbarium as voucher specimen.

 <p>Fig. 1: A <i>Gymnema sylvestre</i> Habit</p>	 <p>Fig. 1 <i>Gymnema sylvestre</i> A: Sketch and habit of the <i>G. sylvestre</i> B: V.S. of flower; C: Gynostegium D: pollinia</p>	 <p>a: Line drawing of T.S. of Leaf A: Upper epidermis B: Mesophyll C: Crystal D: Vascular bundle E: Hypodermis F: Trichome</p> <p>Fig. 2, A: Upper epidermis B: Messophyll C: Crystal D: Vascular bundle E: Hypodermis F: Trichome of leaf of <i>G. sylvestre</i></p>
 <p>Fig. 2 A: Microphotographs of <i>Gymnema sylvestre</i> stomata</p>	 <p>Fig. 2 B: Sketche of the Stomata of <i>G. sylvestre</i></p>	 <p>Fig. 2 d: Line drawing of <i>G. sylvestre</i></p>
 <p>Fig. 3 A: <i>M. dissecta</i> Habit</p>	 <p>Fig. 3 A: <i>M. dissecta</i> Sketch B: L. S. of flower C: Fruit</p>	 <p>Fig. 4 : Line drawing of <i>M. dissecta</i> stomata. A: upper epidermis B: Mesophyll C: Vascular bundle</p>
 <p>Fig. 4 A: Microphotographs of <i>M. dissecta</i> stomata</p>	 <p>Fig. 4 B: Line drawing of <i>M. dissecta</i> stomata</p>	 <p>Fig. 4 B: Line drawing of <i>M. dissecta</i> Trichome</p>

The fresh as well as preserved material is used for anatomical details by taking sections of the leaves, stained by double staining methods and for histochemical tests powdered material as well as fresh materials was used by using the techniques suggested by Johansen (1940) and Jayaraman (1981) were followed and the observation and results are discussed here.

RESULTS AND DISCUSSION

The results of the evaluation of *Gymnema sylvestre* and *Merremia dissecta* were discussed in the following heads

Morphological characters

A) *G. sylvestre* (Retz.) R. Br. Belongs to family Asclepidaceae is commonly called as Aphumari in the local language of this region. In Sanskrit it is called as Madhunashini as it lowers down the blood sugar level. It is extensive, much branched twining shrub. Leaves 3-6x2-3 cms, ovate or elliptic-oblong, apiculate, rounded at base. Flowers minute, greenish yellow, spirally arranged in lateral pedunculate or nearly sessile cymes. Corolla lobes imbricate, follicles solitary, lanceolate, seeds ovate-oblong, glabrous, winged, brown. Flowering in August-March and fruiting in winter (Fig. 1, a,b)

B) *M. dissecta* (Jacquin) Hallier f., belongs to family *Convolvulaceae*. It is a common weed plant found on the hedges surrounding the villages, commonly called as Kali aphumari in this region, used as a substitute to aphumari *G. sylvestre* plant. It is a large perennial slender twiner. Stem is patently hirsute with yellowish hairs. Leaves are palmately divided to the base with five-seven pinnately lobed segments; the middle segment is larger than other segments, petiole smaller than blade. Peduncles axillary 1-4 flowered, pedicel 2cms long, thickened at apex. Calyx 1.8-2cm long, sepals subequal, lanceolate, acute enlarged and coriaceous in fruits. Corolla funnel shaped with a purple throat, pink with five distinct bands, stamens unequal, filament dilated near attachment, fruit a globose capsule. Seeds four, black glabrous. Flowers and fruits throughout the year (Fig. 3 a,b).

Chemical evaluation

The chemical evaluation was carried out by referring literature of compendium of Indian medicinal Plants (1993). The leaves of *G. sylvestre* contains chemicals like hentriacontane,

pentatriacontane, pythin, tartaric acid formic acid, inositol, d-quercitol and different classes of gymnemic acids. Six oleanane type saponins were reported, gymnemasins A, B, C, & D were isolated from the leaf. The leaves and the seeds of *M. dissecta* contains chemicals like Prunacin and 6-O-MalonylPrunacin along with chlorophyll a,b (Rastogi and Mehrotra, 1993), Merredissine, calystegine B2 (Alman-Frias *et al.*, 1972), lupeol beta sitosterol (Garcia-Argez *et al.*, 1999).

ANATOMICAL EVALUATION

The anatomical evaluation of the leaves of *G. sylvestre* and *M. dissecta* was carried by taking the fresh sections of both leaf materials stained by double staining methods and permanent slides were prepared for ready references. The dermal studies were carried out and the stomata and trichomes were studied for correct identification of the samples in crude form.

Anatomy of leaf of *G. sylvestre*

Epidermis is single layered on both sides covered by uniseriate slightly bulbous based trichomes. The mesophyll consists of single layered palisade tissue and 5-7 layered spongy chlorenchyma. The palisade ratio is 3.5. In the midrib region the epidermis is followed by 2-3 layers of collecnchymatous cortex. A large arc shaped vascular bundle is present in centre of midrib, it consists of 8-10 xylem strands followed by 4-6 layers of phloem. Crystals of oxalate of lime is found in the mesophyll and mid vein, sclerenchymatous hypodermis is observed. The rubiaceous and cruciferous type of stomatas are observed predominantly (Fig. 2 a,b,c ,d).

Anatomy of leaf of *M. dissecta*

Epidermis is unilayered on both surfaces studded with oil glands. The mesophyll consists of single palisade layer and 3-4 layered spongy chlorenchymatous cells. In mid-rib region a vascular bundle is present. Rubiaceous type of stomatas are predominant (Fig. 4 a, b, c, d).

Histochemistry

For histochemical studies free hand sections of the material was taken and treated with respective reagent to localize the components viz. Starch, Proteins, Tannins, Saponins, Fat, Glucosides and Alkaloids in the tissues as per method given by Johansen (1940)

Table 1: Biochemical analysis of *G. sylvestre* and *M. dissecta*

Sr.No	Test	<i>G. sylvestre</i> leaf	<i>M. dissecta</i> leaf
1	Starch	+	+
2	Protein	+	+
3	Tanins	-	-
4	Saponins	+	+
5	Fats	+	+
6	Glucosides	+	+
7	Alkaloids	+	+

From the above table it is observed that except tannins all other chemicals were reported from both the plant leaf sample. The information related to antidiabetic property of *G. sylvestre* Retz R.Br and the Morphological, anatomical properties of both the plants i.e *G. sylvestre* and *M. dissecta* was compared with the literature published by Muly and Sharma (2013); Vijigiri Dinesh *et al.*, 2013 and Koyuncu *et al.*, 2014 which help in the critical evaluation of *G. sylvestre* and *M. dissecta*

CONCLUSION- From the above Morphological, Anatomical and Histochemical studies it is conclude that both these plants are totally different. These characters can be used for the correct identity of the original *Gymnema* plant in fresh as well as in crude form as a drug source

REFERENCES

Anthropological survey of India, 1994 *People of India Project Report*.
Beckles GLA, 1998. *Diabetes Care*, **21**:1432-1438.
Cook T, 1958 *Flora of presidency of Bombay Vol I-III*. Calcutta Reprinted edition, Government of India, India.
De Fillips 2006 - Medicinal plants of Guinas. <http://www.mnh.sr.edu/biodiversity/bdg/medicina/>.
Gholap S and Kar A, 2003. Effects of *Inularacemosa* root and *Gymnemasylvestre* leaf extracts in the regulation of corticosteroid induced diabetes mellitus: involvement of thyroid hormones. *Pharmazie*, **58**:413-5.
Grant, LC, 1995. Antigua and Barbuda: Country report to the FAO. *Int. Nat Technical conference on Plant Genetic Resources*. Leipzig, Germany.
Grover J K, Yadav S, Vats V, 2002. Medicinal plants of India with anti-diabetic potential *J Ethnopharmacol.* **81** (1):81-100.

Gurib Fakim A, 2006.- Review of Medicinal plants-Traditions of Yesterday And Drugs of Tomorrow *Mol. Aspects Med.* **27**:1-93.

Hawthorne, WD, D Jules, G Marcelle. 2004. Caribbean spice island plants. Trees, shrubs, climbers of Grenada, Carriacou and the petit Martinique: A picture gallery with notes on identification, history and other trivia. NHBS Environment Bookstore, Totnes, Devon, UK.

Koyunu, 2014. Comparative anatomical studies on twelve *Ornithogalum* (Asparagaceae) species belonging to subgen *Ornithogalum* and subgen. *Berllis*, growing naturally in *Eskisehir Journal of Scientific Research*, **3**(3):40-49.

Jayaraman J, 1981. Laboratory manual in Biochemistry. Wiley Eastern Limited, New Delhi.

Johansen D A, 1940. *Plant micro technique*. Tata McGraw Hill Publishing Company Ltd. New Delhi.

Mhasker KS, Caius JF, 1930. A study of Indian Medicinal Plants II *Gymnema sylvestre* R. BR. *Indian J Med. Res Memorirs*; **16**:2-75.

Muley JR and PP Sharma, 2013. Plants used in Treatment of Jaundice by Folklore of Ahmednagar district, Maharashtra, *India. Sci. Res. Rept.*, **3**(2):216-222.

Nahrstedt. AEA Sattar and SHHEI-Zalabani, 1990. Amygdalin acyl derivatives, cyanogenic glycosides from the seeds of *Merremiadissecta*. *Phytochemistry*, **29**(4):1179-1181.

Naik VN, 1998. *Flora of Marathwada Vol. I and II*. AmrutPrakashan Aurangabad.

Rastogi and Mehrotra, 1993 Compendium of Indian Medicinal Plants Vol. I-III CDRI and Publication and information Directorate, New Delhi.

Roig y Mesa, JT, 1945 *Plants Aeromaticas o Venenosas de Cuba*. Ministerio de Agricultura, Habana.

Shanmuga sundaram ERB, LeelaGopinath K, Radha Shanmuga sundaram K, Rajendran VM, 1990. Possible regeneration of islets of Langerhans in streptozotocin diabetic rats given gymnema sylvestre leaf extracts. *J Ethnopharmacol*, **30**:265-79.

Shanmuga sundaram KR, Panneerselvam C, Sumudram P, Shanmuga sundaram ERB, 1981.

Insulinotropic activity of *G. sylvestre* R. Br. and Indian medicinal herb used in controlling diabetes mellitus. *Pharmacol. Res. Commun*, **13**:475-486.

Vijigiri Dinesh, Shivaji Kashinath Bembrekar and P P Sharma, 2013. Herbal Remedies Used in the Treatment of Scorpion Sting from the Nizamabad District, Andhra Pradesh, India. *Sci. Res. Rept.*, **3**(2)142-145.

How to Cite this Article:

Syed Sabiha V, 2015. Critical evaluation of the potent antidiabetic drug plant *Gymnema sylvestre* (Retz) R. Br. of *Asclepidaceae* and *Merremia dissecta* (Jacquin) Hallier f. of *Convolvulaceae*. *Bioscience Discovery*, **6**(1):54-58.