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REVIEW ON BOTANICAL AND MEDICINAL ASPECTS OF *HEMIDESMUS INDICUS* (L.) R.BR.

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Abstract

Hemidesmus indicus (L.) R.Br. is highly valued in Indian system of medicine. Current review studies were based on the available literature regarding botanical and medicinal aspects of plants has been evaluated. It was found that a wild less known plant are having specific botanical characters that include fragrance in root as well as different parts of plants are used for medicinal purpose. Extracted plant materials are used in manufacture of Ayurvedic, Unani and Homeopathic medicine. Due to its demands micropropagation as practice in this plant and various medicine has been recorded as per the available literature.

Key words: *Hemidesmus indicus*, Indian Sarsaparilla, Medicinal Plant and Botanical Study.

Introduction

Hemidesmus indicus (L.) R.Br. is widely distributed medicinal plant in India commonly known Indian Sarsaparilla. It is found growing under mesophytic to semi dry condition in the plains and up to the high altitude (Satheesh *et al.* 2008). It has been used as a traditional medicine in the treatment of various diseases (Nadana Saravanan & Namasivayam Nalini, 2008). Medicinal properties of *H indicus* were reported by Hiremath *et al.* (1997), Ahmad *et al.* (1999), Prabhakar *et al.* (2000), and Ravishankara *et al.*(2002). Chemical properties were reported by Prakash *et al.* (1991), Das *et al.* (1992), Chandra *et al.* (1994), Deepak *et al.(*2005), Roy *et al.* (2000), Nagaragan *et al.* (2001), Nagranjan & Rao (2003), and Anonymous (2005). Detailed studies on seeds germination have been done by Warrier *et al.* (2000). Rao *et al.* (2000) reported enhanced rooting when treated by 'quick dip' method with different concentration of hormones (IBA, IAA, NAA). Rooting was slow in the absence of hormone treatment but all species attained >70% rooting. Effect of cryopreservation on seed germination of *H. indicus* has been reported by Decruse *et al.* (1999). Jagtap & Singh, 1999, studied on the Chromosome Number: 2n=22. Chromosome analysis of *in vivo* and *in vitro* plants, are done by Soma *et al.* (2003). Enhancement in the absorption of water and electrolytes from rat intestine by water extract of roots of *H. indicus* has also been

reported by Evans *et al.* (2004) and Radiation protection of DNA and membrane *in vitro* by extract of *H. indicus* has been reported by Shetty *et al.* (2005).

Micro and macro morphological studies of the vegetative and reproductive characters with phytochemical studies of the accession from different agro climatic zones of India have been reported by George *et al.* (2006). Phytochemical studies of volatiles of *H. indicus* were reported by Nagarajan *et al.* (2001) with steam distillation methods. Roy *et al.* (2000) have done phytochemical studies of *H. indicus* in comparison with other plants. Two novel glycosides, namely hemidescine and emidine, were isolated from dried root of *H. indica* by Chandra *et al,* (1994).

Tissue cultures studies are reported on vitro propagation of *H. indicus* by Malathy & Pia (1998), Jayanti and Patil (1995), Sharma and Yelne (1995), *Yelne et al.* (1999), Ramulu (2001), and *Saha et al.* (2003). *Neeta et al.* (2003) were reported Clonal propagation of *H. indicus.* Studies on steroids in cultured tissue and mature plant have been reported by Heble & Chadha (1978). Improvement in Clonal prorogation of *H. indicus* through adenine sulphate has been reported by *Neeta et al.* (2003). Somatic embryogenesis and plant regeneration from leaf cultures of *H. indica* have been reported by Swaroopa and Dixit (2006). Comparative in vitro on plant regeneration from axillary shoot derived callus was studied by *Siddique et al.* (2006) with 92% of callus induction results on MS medium supplemented with 1.0 mg per lit NAA and 6-benzyladenine (BA).

Methology for production, separation and enhancement of chemical compounds production from extract of H. indicus are also reported. Productions of 2-hydroxy 4-methoxy-benzaldehyde using root cultures were studied by *Sreekumar et al* (1998).Validation of detection methods of 2-hydroxy 4-methoxy-benzaldehyde and 2-hydroxy 4-methoxy-benzoic acid from root organs of *H. indicus* by HPLC done by *Sircar et al.* (2007). Chakraborty *et al.* (2008) reported the phenylalanine ammonia-lyase-mediated biosynthesis of 2-hydroxy 4-methoxy-benzaldehyde in roots of *H. indica.* By using elicitation treatments of chitosan increased in production of phenolic compounds.

Scientific classification:-

Hemidesmus indicus (L.) Was formerly placed under the family Asclepidaceae, but recently transferred to Periploceae based on the pollinial characters. (Anita *et. al.* 2010, S. C. Sahu *et. al.* 2010, and K. Muthukumareand *et. al.*2010),

Division: - Angiosperms
Sub Division: - Dicotyledonous
Class: - Asterids
Order: - Gentianales
Family: - Apocynaceae
Subfamily: Periploceae
Genus: - *Hemidesmus*
Species: - *indicus*
Binomial name: - *Hemidesmus indicus* (L.) R.Br.
Synonyms: - *Periploca indica* L. (Jagtap *et. al*. 1999)

***Hemidesmus indicus* (L.) R. Br.**

Distribution: In India, the plant found within almost throughout all parts. It is found from the upper Gangetic plain eastwards to Assam and throughout central, western and southern India (*V. Gopiesh et al* 2007). The Moluccas and Sri Lanka are the other places of its distribution *(Globalherbal et al, 2005).*

Morphology: Root is long rigid, cylindrical, little branched, consisting of aligneous center, a brownish corky bark, furrowed and with annular cracks.

Stem and Branches: elongate, narrow, twine anticlockwise are profusely laticiferous, narrow, woody and deep purple or purplish brown color with the surface slightly ridged at the node (*Satheesh G. et. al. 2008*). Leaves: simple, petiolate, exstipulate, opposite, entire, apiculate acute or obtuse, dark green above but paler and sometime pubescent below. Leaves of the basal part of the shoot are linear to lanceolate (Warrier 2000). Flowers: Small, greenish yellow to greenish purple outside, dull yellow to light purplish inside, axillary, sessile racemes, imbricate with flowers, followed with scale-like bracts. Fruit: Two long slender spreading follicles. Seeds: many, flat, oblong, with a tuft of white silky hairs (Prasad & Wahi 1965, Warrier 2000).

Medicinal important

This plant useful in treatment of Inflammatory condition, Fever, Rheumatism, Leprosy, liver disorders (Nadanasaravanan and Namasivayam Nalini 2008), Leucoderma,*(D. Sircar et al 2007,G. M. Mohana et al 2005* Severcan 2005*),* Itching, Skin disease, Asthma, Bronchitis, Leucorrhoea, Dysentery, Diarrhea, Piles, Sypilis, Paralysis and also in several free radical-mediated disease*(Neeta Misra et al 2005,& Jegadeesan et al 2003).* It contains Aromatic, Anti-microbial, Anti-cancer, Anti-viral, Anti-inflammatory, Anti-pyretic, Anti-dysenteric actions *(Satheesh G. et al 2008),* Anti-oxidant, & Anti-hepatotoxic activities *(G. M. Mohana et al 2005).*

The roots are used as addition in main treatment of snakebite and scorpion sting (*D. Sircar et al 2007*). It improves the general health; plumpness, clearness, and strength, succeeding to emaciation, said to be useful in affections of the kidneys, scrofula, cutaneous diseases, thrush, scrofula, venereal disease, nephritic complaints, for sore mouths of children. It promotes health and energy and always cures all kinds of diseases caused by vitiated blood *(Pioneerherbs et al 2005).* As medicine "Anantmool' holds a reputed place in all systems of medicine in India (*Neeta Misra et al 2005*). Due to multiple use of this plant has been indiscriminately collected from its natural habitat and becoming extremely rare by overexploitation (*Sreekumar et al 2000*). The natives use the roots internally in treatment of premature graying of hairs, jaundice, eye related diseases.

Chemical Components: The flavanoid glycosides recognized in the flowers, were hyperoside, isoquercitin and rutin in the leaves, only hyperoside and rutin were identified *(Subramaniam & Nair et al 1968, Gupta et al 1992).* Tannins 2.5 % present in leaves. Roots are reported to contain sitoserol *(Chatterjee & Bhattacharya et al 1955)*, 2-hydroxy 4-methoxy benzaldehyde which is responsible for fragrance in root(*D. Sircar et al 2007*) , 3-hydroxy 4-methoxy benzaldehyde, 2-hydroxy 4-methoxy benzoic acid, hemidesmin-1, hemidesmin-2, hemidesminine, phytosterol, hemidesterol, saponins, ledol, linalyl acetate *(Das 1992 et al, Gupta et al 1992, Chandra et al 1994, Deepak et al 1995, Roy et al 2000, Sharma et al 2000, Nagarajan et al 2001, Nagarajan & Rao et al 2003, Alam et al. 1994, Roy et al. 2001, Nadanasaravanan and Namasivayam Nalini et al 2008, and Anonymous et al 2005).* A new ester identified as lupeol octacosanoate in addition to the known compounds viz., Coumarins, triterpenoid saponin, essential oil, starch, tannic acid, and triterpenoid saponin present (*Globalherbal et al 2005).*

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Reference

- Andreia Araujo Morandim, Massuo Jorge Kato, Alberto Jose Cavalheiro and Maysa Furlan. Intraspecific variability of dihydrochalcone, chromenes and benzoic acid derivatives in leaves of *Piper aduncum L.* (Piperaceae). *African Journal of Biotechnology* Vol. 8 (10), pp.2157-2162, 18 May 2009
- Anita Murali, Purnima Ashok, V. Madhavan. Effect of Leaf of *Hemidesmus Indicus* (L.) R. Br. Var. *Pubescens* (W. & A.) Hk.F. (Periplocaceae) - An *In Vitro* Analysis : A Research. *International Journal of Drug Formulation & Research Oct-Nov. 2010, Vol. 1 (II) 162-175*
- D. Sircar, . G. Dey, A. Mitra., A Validated HPLC Method for Simultaneous Determination of 2-Htdroxy-4-methoxybenzaldehyde and 2-Hydroxy-4-methoxybenzoic Acid in Root Organs of *Hemidesmus indicus , Chromatographia,* 65, 349-353, 2007

- Dipjyoti Chakraborty, Debabrata Sircar, Adinpunya Mitra. Phenylalaine ammonia-lyase-mediated biosynthesis of 2-hydroxy-4-methoxybenzaldehyde in roots of Hemidesmus indicus. *Journal of Plant Physiology* 165 (2008) 1033-1040
- G.M. Mohana Rao, Ch. Venkateswararao, A.K.S. Rawat, P. Pushpangadan and A. Shorwaikar, Antioxidant and Antihepatotoxin Activities of *Hemidesmus indicus* R.Br. *Acta Pharmacutica Turcica*, 47: 107-113, 2005
- K. Muthukumareand A. Selvin Samu. Traditional Herbal Medicines of the Coastal Diversity in Tuticorin District, Tamil Nadu, India. *Journal of Phytology 2010, 2(8): 38–46*
- Karabournitis G. and C. Easses. The defense indumentums with its polyphenol contain may replace the protective role of the epidermis in some young xeromorphic leaves. *Con. J. Bot.* 1996, 74. 347-351
- Latiporn Udomsuk, Kanokwan Jarukamjorn, Hiroyuki Tanaka, Waraporn Putalun. Improved isoflavonoid production in Pueraria candollei hairy root cultures using elicitation. *Biotechnol Lett (2011) 33: 369-374*
- M. I. Alam and A. Gomes. Viper venom-induced inflammation and inhibition of free radical formation by pure compound (2-hydroxy-4-methoxy benzoic acid) isolation and purified from Anantamul (*Hemidesmus indicus R. Br.)* root extract. *Toxicon V*ol. 36, no.1, pp. 207-215, 2008
- M. N. Ravishankar, Neeta Shrivastava, Harish Padh and M. Rajani. Evalution of antioxidant properties of root bark of *Hemidesmus indicus* R. Br. (Anantmul). *Phytomedicine,* Vol.9 153-160, 2002
- N. A. Siddique, Jaime A. Teixeira da Silva, M. Anisuzzanman and M. A. Bari. Comparative in vitro Study of Plant Regeneration from Axillary Shoot Derived Callus in *Aristolochia indica* Linn. And *Hemidesmus indicus* (L.) r. Br.-Endangered Medicinal Plants in Bangladesh. *Journal of Plant Sciences* 1 (4): 286-296, 2006
- N. A. Siddique, M. A. Bari, N. Khatun, M. Rahman, M. H. Rahman and S. Huda. Plant Regeneration from Nodal Segment Derived Callus on *Hemidesmus indicus* (L.) R. Br (Anatamul) an Endangered Medicinal Plant in Bangladesh. Pp 1158-1163
- Nadna Saravanan and Namasivayam Nalini., *Hemidesmus indicus* PROTECTS AGAINSTED ETHANOL-INDUCED LIVER TOXICITY. *Cellular & Molecular Biology Letters* 13: pp 20-37, 2008
- Nandana Saravana and Namasivayam Nalini. *Hemidesmus indicus* Protects Against Ethanol-induced Liver Toxicity. *Cellular & Molecular Biology Letters*, Vol 13, 2008, pp 20-37
- Neeta Misra, Pratibha Misra, S. K. Data and Shanta Mehrotra., In Vitro Biosynthasis of Antioxidant from *Hemidesmus indicus (L.)R, Br*. Cultures. *In-Vitro Cell. Dev. Biol. Plant* 41: 285-290, 2005
- Neeta Misra, Pratibha Misra, S. K. Datta, Shanta Mehrotra. Improvement in Clonal Propagation of *Hemidesmus indicus R. Br*. Through Adenine Sulphate. *J. Plant Biotechnology* Vol, 5 (4), pp 239-244, 2003

- Neeta Misra, Pratibha Misra, S. K. Datta, Shanta Mehrotra. In Vitro Biosynthesis of Antioxidants from *Hemidesmus indicus* R. Br. Cultures. *In Vitro Cell.Dev.Biol. Plant* (2005) 41: 285-290
- Ozgur Cakir and Sule Ari. Defensive and secondary metabolism in Astragalus chrysochlorus cell cultures, in response to yeast extract stereo. *J. Environ. Biol*. (2009) 30(1), 51-55
- Salheesh George, K. V. Tusar, K.P.Umrikrishna, K.M.Ilastim and Indira Balachandran. *Hemidesmus indicus* (L.)R.Br. A Review. *Journal of Plant Science* ,3 (2): 146-156, 2008
- S. C. SahuN. K. Dhaland R.C. Mohanty .Potential Medicinal Plants used by the Tribal of Deogarh District, Orissa, India. *Kamla-Raj 2010 Ethno Med (2010), 4(1): 53-61*
- S. Nagarajan, L. Jagan Mohan Rao and K. N. Gurudutt, Chemical composition of the volatiles of *Hemidesmus indicus* (L.) R. Br. *Flavor and Fragrance Journal*, 16: 212-214, 2001
- S. Sreekumr, S. Seeni and P. Pushpangadan. Production of 2-hydroxy 4-methoxy benzaldahyde using root cultures of *Hemidesmus indicus. Biotchnology Letters*, Vol 20, pp 631-635 July 1998
- Shanthi. A, R. Radha, N. Jayashree, R. Selvaraj., Pharmacognostic validation of root of *Hemidesmus indicus* (L.) R. Br. *J. Chem. Pharm. Res*, 2 (5): 313-322, 2010
- Soma Shaa, Madhumita J Mukhopadhyay and Sandip Mukhopadhyay. In vitro Clonal prppagation through bud culture of Hemidesmus indicus (L) R. Br. An Important Medicinal Herb. *J. Plant Biochemistry & Biotechnology* Vol. 12, 61-64. January 2003
- V. Gopiesh Khanna and K. Kannabiran., Larvicidal effect of *Hemidesmus indicus*, Gymnema sylvestre, and Eclipta prostrata against Culex qinquifaciatus mosquito larvqe, *African Journal of Biotechnology* Vol.6 (3), pp. 307-311, 5 feb 2007
- V. K. Dixit. Elicitation as yield enhancement strategy for glycyrrhizin production by cell of *Abrus precatorius* Linn. *In Vitro Cemm. Dev.Biol. Plant* (2010) 46:354-362
- Vijai Karwasara, Ranki Jain, Priti Tomar, and V. K. Dixit. Elicitation as yield enhancement strategy for glycyrrhizine production by cell culture of *Abrus precatorius* Linn. *In Vitro Cell.Dev.Biol. Plant* (2010) 46: 354-362
- Vinoth Kumar Megraj Khandelwal, R. Balaraman, Dezider Pancza, and Tana Ravingerova. *Hemidesmus indicus* and *Hibiscuc rosa-sinensis* Affect Ischemia Reperfusion Injury in Isolated Rat Hearts. Hindawi Publising Corporation, Evidence-Based Complementary and Alternative *Medicine*, Volume 2011, pages 8