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PHARMACOGNOSTIC EVALUATION OF SARIVA, *Hemidesmus indicus* (L.) R. BR. W.S.R. OF ANCIENT AYURVEDIC PHARMACOPEIA TEXTS

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Abstract: *Ayurveda is recognized as one of the oldest of the traditional systems of medicine (TSMs) accepted worldwide. The ancient wisdom given by acharyas in their ancient texts like Charaka Samhita, Sushruta Samhita, Bhavaprakash Nighantu, Bhaishjya Ratnawali are still not exhaustively explored. Sariva has been one of the most important plant used in folk medicine. The blood purifier or raktapittashamak properties of sariva were recognized in the ancient Indian, Chinese, Greek, and Roman civilizations. Sariva etymology in Sanskrit is sheery-annte-annya dosha means it correct all the doshas of our body. It is traditionally used to heal wounds, relieve itching and swelling, and is known mainly for its anti-inflammatory, antibacterial and anti poisonous properties. This review aims to bring into limelight the medicinal uses of very effective medicine of tribal plants shweta sariva (hemidesmus indicus) and krishna sariva (Cryptolepsis buchanani).This would help the budding scholars, researchers and practitioners gain deeper explicitness of folk herbs describe in ayurvedic texts.*

Keywords: *Shweta and Krishna Sariva, Hemidesmus Indicus* , Ayurveda, TSMs

Introduction: Hemidesmus indicus commonly known as Indian sarasaparilla, and *krishna sariva* (cryptolepsis buchanani) are belonging to the family asclepiadaceae (milkweed family). These plants are slender lactiferous, twining, sometimes prostrate or semi erect shrub, occurring over the great part of india including rajasthan's Udaipur region. Hemidesmus indicus exists with two variants namely var. indicus and var. pubescens. *H. indicus* found throughout India from upper Gangetic plains, eastwards to Assam, throughout Central, Western and Southern India upto an elevation of 600 m. It is also known to grow in Malaysia, Indonesia, Pakistan, Bangladesh and Sri Lanka. [1,2,3,4]

In the *ayuevedic* system *shweta sariva* is the content of *mahavishgarbha* oil, *mahamanjishthadi* decoction, *sarivadyasavam* and *manasmitra vatakam*. Ethnobotanical studies on H.indicus revealed its benefits towards various elements, like scorpion sting, snake bite, fever [5] and as a blood purifier [6].

Synonyms and Vernicular Names

Synonyms	Vernacular Names
Asclepias pseudosarsa Roxb. ; *Cosmostigma cordatum* (Poir.) M.R.Almeida; *Hemidesmus cordatus* (Poir.) Schult.; *Hemidesmus pubescens* Wight & Arn.; *Hemidesmus wallichii* Miq. *ex* Hook. fil.; *Periploca cordata* Poir.; *Periploca indica* L.; *Periploca malabarica* Burm. *ex* Decne	The different vernacular names known are *Ananta-mula, aasfota, Ananthamoola, Asclepias pseudosarsa,Country Sarasaparilla, Durivel, East Indian Sarsaparilla, Eternal root, False Sarsaparilla,Fragrant one, Gadisugandhi, Gopakanya, Hemidesmus pubescens, Hemidismus Indica-Radix,Kapuri, Karibandha, Magrabu, Muttavapulagamu, Naga-jihva, Naruninti, Nunnari, Nunnery root, Onontomulo, Periploca indica, Sariva, Smilax aspera, Sogade, Sugandhi-pala, Sugandi root, Upalasari, White Sariva* [7]

Morphologically Difference between *Hemidesmus indicus* and *Cryptolepsis buchanani*: Now the Milkweed family has been incorporated in the Oleander family [8].

Hemidesmus Indicus *(L.) R.Br.* **(aerial parts)(fig.1.1)**

dry root of H. indicus (fig.1.2)[18]

Climber of *cyptolepsis buchanani with fruiting* (fig. 1.3)[9]

Part of plant	*Hemidesmus indicus*	*Cryptolepsis buchanani*
Climber	it is a vine, which trails on the ground and climbs by means of tendrils growing in pairs from the petioles of the	Wax leaved climber is a strong woody plant
Hight	tuberous rootstock, and can reach up to 1-3 m	It can grow to 6m long
Branches	pale gray	Pale gray
Leaf	Alternate, orbicular to ovate, evergreen leaves.	Oblong or elliptic, *jambupatra* or Indian blackberry leaf like
Flowers and flowering	The small, greenish flowers grow in auxiliary umbels. The flower cymes are stalkless. 5 petals, greenish on the outside and purple to yellowish orange on the inside/ October-January.	Greenish yellow or yellow white/ march- august
Fruits	Cylindrical follicle	Cylindrical follicle
Seeds	Flat, oblong, with a long soft of white silky hairs.	Pods is cylindrical and brownish ovate oblong

External Morphology and Organoleptic Properties: Roots of two "Sariva"species (both fresh and air dried samples were used) [8]

CHARACTER	***H. Indicus***	***C. Buchanani***
Shape	Cylindrical, Woody, Long, Lateral Roots	Cylindrical, Woody, Long, Lateral Roots Long,
Colour	Purplish Brown With a Yellow Centre	Dark Brown Or Blackish Brown
Surface	Smooth, Soft And Non-Exfoliating, Longitudinal When Dry. Easily Peel able	Longitudinally Ridges, Wrinkles Present Easily Peel able
Smell	Aromatic, Characteristic.	Indistinct

Taste And Texture	Sweetish ,Starchy		Fairly Sweetish, Starchy	

Medicinal Properties[10]

Rasa (taste)	*Guna* (qualities)	*Veerya* (potency)	*Vipaka* (metabolic effect)	Effect on *tridosha*
Madhur (sweet) *Tikta* (bitter)	*Guru* (heaviness) *Snigadha* (oily/unctuous)	*Sheeta*	*Madhura*-undergoes sweet taste conversion after digestion	*kapha vata rakta /kapha-pitta**

**Krishna sariva* properties same as *shweta sariva* besides its effect on *tridosha* with *rakta dosha*

Doshaghnata: *Tridoshashamaka;*

Rogaghnata*: Daha, Shotha, Netrabhisyanda, Aruchi, Agnimandya, Atisara, Pravahika, Vatarakta, Phiranga, Upadansha, Amvata, Gandmala, Pradara, Garbhasrava, Stanyavikara, Shukradaurbalya, Mootrakrichchhra, Paittika prameha, Kushtha, Visarpa, Visphota, Jwara, Daurbalya, Pandu, Visha, Kasa, Shwasa; Karma: Rochana, Deepana, Pachana, Anulomana, Raktashodhaka, Shothahara, Kaphaghna, Vrishya, Stanyashodhana, Garbhasthapana, Mootrajanand, Mootravirajaniuhya, Kushthagna, Jwaraghna, Dahaprashamana, Rasayana and Vishaghna*.[11]

Samhita Classification

***Charaka Samhita*[12]**	***Sushruta Samhita*[13]**	***Vagabhatta Samhita*[14]**
Stanyashodhan Mahakashaya-included in 10 herbs which are good for cleanse and detoxify breast milk	*Sarivadi Gana*	*Sarivadi gana:useful in burning,pitta,blood disorders and fever A.H.Su.15/11**
Purishsangrahaneeya Mahakashaya-included in 10 herbs which are good for improve bulk of feces	*Vidarigandhadi Gana*	
Jwarahara Mahakashaya- included in 10 herbs which are good for pyrexia	*Vallipanchmool*	
Dahprashmana Mahakashaya- included in 10 herbs which are good for subside burning sensation		
Madhura Skandha		

*A.H.Su.=Ashtanghradayam sutra

Therapeutic Uses in Nighantus

Ancient Text	**Medicinal Uses in**
Dhanwantari nighantu [15]	*Shweta sariva:* *Kushtha* (skin disorders); *Kandu*(itching,pruritis) *Jwara*(pyrexia); *Meha* (urinary tract disorders) *Durgandhanashne* (relieves bad odor); *Krishnamooli* or *Krishna sariva*: *sangrahi* (absorbing); *Shishira*(coolant); *Trishna* (useful in excessive thirst); *Aruchi*(anorexia); *Raktapittahara* (blood and bile related disorders)
Raj nighantu [16]	*Shweta sariva:* *Kushtha* (skin disorders); *Kandu* (itching, pruritis) *Jwara* (pyrexia); *Meha* (urinary tract disorders) *Durgandhanashne* (relieves bad odor); *Krishnamooli* or *Krishna sariva*: *sangrahi* (absorbing); *Shishira* (coolant); *Trishna* (useful in excessive thirst); *Aruchi* (anorexia); *Raktapittahara* (blood and bile related disorders)
Kaiyadev nighantu[17]	*Shukrala* (aphrodiasic); *Hima* (coolent); *Gurvi* (weight increaser); *Jwara* (fever); *Atisaar* (diarrohea); *Aam*(toxin) *Vishapaha* (anti poisonous); *Agnisada* (useful in low digestion strength); *Aruchi* (anorexia); *Shwaaskas* (useful in respiratory disoreders); *Asrapradarnuta* (useful in menorrhagia)
Bhavprakash nighantu[18]	*Shukrakaram* (aphrodiasic);*Guru (*weight increaser) *Agnimandya* (useful in low digestion strength); *Aruchi* (anorexia) *Shwas-Kaas* (useful in respiratory disoreders); *Aam*(toxin); *Vishnashnam* (anti poisonous) Asrapradar (useful in menorrhagia); *Jwara*(pyrexia) *Atisarnashnam* (antidiarroheal)
Madanpal nighantu [19]	*Shukrakaram* (aphrodiasic); *Guru* (weight increaser) *Agnimandya* (useful in low digestion strength); *Aruchi*(anorexia) *Shwas-kaas* (useful in respiratory disoreders); *vaami*(emetic);

	trishapaham (useful in excessive thirst) *Vishnashnam* (anti poisonous) *Asrapradar* (useful in menorrhagia); *Jwara* (pyrexia) *atisarnashnam*(antidiarroheal)
Sodal nighantu [20]	*Both type of sarvia considered same properties: Kushtha* (skin disorders); *Kandu* (itching, pruritis) *Jwara* (pyrexia); *Meha* (urinary tract disorders) *Durgandhanashne* (relieves bad odor);

Some Therapeutic Uses Described in Ancient *Ayurvedic* Texts

S.N.	TEXT NAME	THERAPEUTIC USE
1.	*Sushruta Samhita* [13]	1. In *Skandha Graha* And *Apsmaar* : The root of *sariva* Take on children's back region to safety reason .(su. u.a.29) 2.In Piles: Use of *sariva* root powder by making of buttermilk (su. chi.6) 3.Plague Disease: *Sariva* root powder with formulated ghee (su.k.6) 4.Cough and Asthma : Made a formulated *ghee* (clarified butter) with the help of decoction of *sariva* root.(su.u.a. 51/52)
2.	*Charak Samhita* [12]	1.In *Visarp* (Erysipelas): Local paste using with *sariva* root powder (ch.chi.21/76,88) 2.In *Hikka- shwas* (hiccups and asthma): *Sariva(aasfota*) root powder paste with hot water taken. (ch.chi.17/110) 3.*Unmaad* Disease : In *kalyanak ghrit* preparation used both types of sariva; (ch.chi.9/35) 4.Apsmar Disease : In *triphaladi tail shyama* word using as *sariva*. (ch.chi.10/44) 5.In *Raktapitta Doshaj Vikar* : Both types of *sariva* used. (ch.chi.4/103) 6.V*isham jwara*(malaria fever): Decoction was used((ch.chi.3/201)
3.	*Chkradatta* [21]	1.Wound Healing and Eye Cleaning : By the help of *sariva* root decoction 2.vataja jwar: (cd.chi/76.77.78)
4.	*Vangsen*	*Vata* disease : Root of *sariva* and *vasa (adhatoda vasica)* leaves with milk

*su. chi.=Sushruta Samhita Chikitsa; su.k.=Sushruta Kalpa; Su.u.a.=Sushruta uttara tantra adhyaya, ch.chi=Charaka Chikitsa; cd.chi=Chkrdatta Chikitsa

Phytochemical Studies[4]

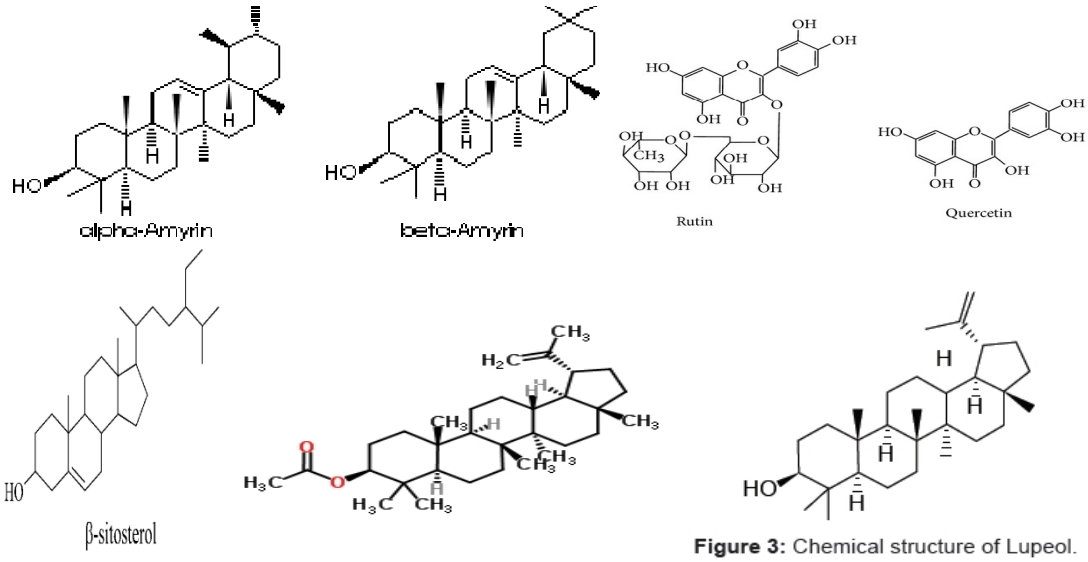

Figure 3: Chemical structure of Lupeol.

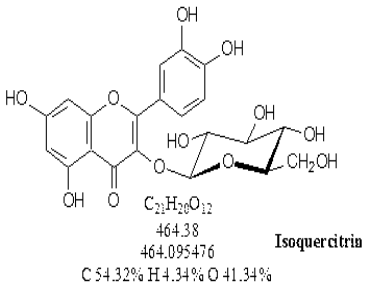

Figure 4 : Phytochemicals of *Hemidesmus Indicus*

Phytochemicals are secondary metabolites found in plants which are responsible for colour, organoleptic properties, provide protection against insect attacks, plant diseases and for its consumers exhibit a number of protective functions [22]. Phytochemical studies have been carried out on roots, stem, leaves and entire plant. Different phytochemicals were found in preliminary chemical tests and same on isolation from the different parts and whole of plant, the studies revealed the presence of steroids, terpenoids, flavonoids, coumarins, aldehydes, pregnane glycosides and others. The root oil constituents were found to be rich with terpenoids, aldehyde and aliphatic acids. The frequently occurring active constituents of *H. indicus* are benzoids, pregnane glycosides, terpenoids and others [23, 24, 25, 26, 27].

Steroids: Steroids are a class of organic compounds with a chemical structure that contains the core of gonane or a skeleton derived from three cyclohexane rings and one cyclopentane ring. Hemidosterol and hemidesmol were isolated from the plant [28]. β-sitosterol (Fig-4**)** was reported from the roots [29, 30] and also from the stem [31], β-sitosteryl glucuronate was isolated from the roots [30].

Terpenoids: Terpenes are hydrocarbons resulting from the combination of several isoprene units. Terpenoids are modified terpenes, wherein methyl groups have been moved or removed, or oxygen atoms added. The essential oil of roots that possess many pharmacological activities has been studied and analysed presence of following terpenes using GCMS are 1,8cineol, camphor, pinocarveol, β-pinenoxide, pinocarvone, borneol, 4- terpenenol, bornyl acetate, myrtenal, α-terpineol, verbenone, myrtenol, linalyl acetate, isobornyl acetate, isobornyl acetate, dihydrocarvyl acetate, α-terpinyl acetate, β-elemene, ciscaryophyllene, Isocaryophyllene, β-selinene, nerolidol, ledol [32].

The terpenoids isolated from the *H. indicus* were lupeol, α-amyrin, β-amyrin (Fig-4**)** from roots and stem [33, 34, 29, 35]. The derivatives of above reported terpenoid isolated were lupeol acetate (Fig-3), β-amyrin acetate, hexatriacontane, lupeol octacosonate from roots [33, 35, 36].

Flavonoids: Flavonoids or bioflavonoids, chemically are 2-phenyl-1,4-benzopyrone.These belong to ubiquitous group of polyphenolic substances that are present in most plants, concentrated in the seeds, fruit skin or peel, bark and flowers fulfilling many functions [37]. Flavonoids isolated from *H. indicus* were rutin (Fig-4), quercetin (Fig-4), iso-quercitrin (Fig-4) from leaves and their glycosides from flowers [38].

***Cryptolepis buchanani*:** In *ayurvedic* practice, the root is used as a substitute for that of *Hemidesmus indicus* to treat gout, polyuria, wounds and leprosy. It is considered alterative refrigerant and tonic. The plant is used in Indian folkloric medicine (*Ayurveda*) for antidiarrhoeal, antiulcerative, anti-inflammatory, blood purifier, cough treatment, curing rickets in children and antibacterial. Phytochemical screening of methanolic extract of aerial Parts of Cryptolepis buchanani Constituents Results Alkaloid; Glycoside; Tannins; Sterols; Flavanoids; Saponins; Carbohydrates; Volatile oil. [39]

Pharmacological Activities

Anti Fungal Activity: The chloroform and ethanol (95%) extracts of roots of *H. indicus* have been shown to possess antifungal activity [4].

Anti Bacterial: Further chloroform extract possess antibacterial effect against *H. pylori* from humans. Antibacterial activity of chloroform and ethanol (95%) extracts of *H. indicus* roots was already been reported against different enterobacterial strains [4]. However, there is no report on the effect of aqueous root extract of *H. indicus* on pathogenic bacterial strains. the *H. indicus* root extracts possess a significant antibacterial activity over selected pathogenic bacterial strains.

Anti Diarrhoeal : Anti diarrhoeal effect of methanol extract of *H. indicus* against *S. typhimurium, E. coli* and *S. flexneri* was already been reported in an experimentally-induced diarrhoea in rats [4].

Anti Ulcer: Study on antiulcer property of the root extracts found that extracts of flowering season possess antiulcer properties that exhibited significant reduction in the formation of gastric and duodenal lesions in rats induced by pylorus ligation, aspirin induced peptic and cysteamine induced duodenal ulcers [4]. They found decrease in the aggressive factors like pepsin and proteins and an increase in the resistance factors like pH, hexose, hexosamine, fucose and sialic acid. Increase in hexosamine and carbohydrate/protein ratio and decreased pepsin content that supports for the increase in mucous secretion and ulcer protection that is comparable with standard drug Ranitidine and Omeprazole. These results

suggested that extract may be selectively inhibiting PGF2α [40].

Antiarthritic Activity[6]: *H. indicus* root has protective activity against arthritis and the activity is might be attributed by presence of terpens, sterols and phenolic compounds in hydroalcoholic root extract, as well as in ethyl acetate fraction

Anticancerous Activity : Methanolic root extract of *H. indicus* have remarkable anticancer potentials against MCF7 Breast cancer cell line, cytotoxic effect against HT29 colon cancer cell line and Ehrlich Ascites Tumor too [41-43]. Moreover, it significantly enhanced antitumor activity of three commonly used chemotherapeutic drugs- methotrexate, 6-thioguanine, cytarabine [41].

Antivenom Activity: *H. indicus* root extracts effectively neutralized Viper venom induced lethal, haemorrhagic, coagulant, anticoagulant and inflammatory activity. Lupeol acetate isolated from *H. indicus* root extract significantly neutralizes lethality, haemorrhage, defibrinogenation, and edema; induced by *Daboia russellii* venom [44]. It also neutralized *Naja kaouthia* venom induced cardiotoxicity, neurotoxicity and respiratory issues in experimental models. Methoxy benzoic acid of *H. indicus* root particularly has antivenom potential.

Hepatotonic and Hepatotoxic: Oral treatment of ethanol extract of roots (100 mg/kg BW, for 15 days) [4] significantly prevented rifampicin and isoniazid-induced hepatotoxicity in rats with decrease in level of liver mitochondrial protein and the activities of isocitrate dehydrogenase, α-ketoglutarate dehydrogenase, succinate dehydrogenase, malate dehydrogenase, NADH dehydrogenase and cytochrome c. There was an increase in mitochondrial lipid peroxidation with a significant decrease in the activities of antiperoxidative enzymes such as catalase (CAT) and superoxide dismutase (SOD) [45]. The rats pretreated with methanolic extract of roots (100-500 mg/kg BW, p.o.) exhibited rise in the levels of enzymes namely serum glutamate pyruvate transaminase (SGPT), serum glutamate oxaloacetate transaminase (SGOT), alkaline phosphatase (ALP) but it was significantly less as compared to those treated with paracetamol or CCl4 alone [46]. The hepatoprotective effect of roots methanolic extract was comparable with the standard silymarin (100 mg/kg,BW) at a dose of 250 mg/kg BW in CCl4 induced damage while 500 mg/kg BW in case of paracetamol induced hepatic damage with altered serum enzyme levels. The studies were supported with histopathological changes which were near to normal [47].

Diuretic: Investigations on roots aqueous and ethanolic extracts at a dose of 400 mg/kg BW was carried out [4]. There was a significant increase in urine output with onset of this diuretic action was gradually within 5 h and lasted upto 24 h and the aqueous extract caused marked increase in urinary Na+ and K+ levels but the routine urinalysis showed nonsignificant alterations in pH and specific gravity [48].

Immunomodulatory Activity: Methanol: Iso-propyl alcohol: acetone extract of *H. indicus* shows an immunomodulatory activity related to IgG secretion and Adenosine deaminase (ADA) activity. Herbal extract promotes the release of IgG by lymphocytes in vitro and also the ADA activity after 72 h of culture [49].

Wound Healing Activity: Leaves of *H. indicus* possess marked wound healing activity and play a promising role in the treatment of wounds especially chronic wounds and in diabetic and cancer patients.The alcoholic extract of *H. indicus* formulated as 5% and 10% ointment increase the rate of wound contraction and period of epithelisation [49].

Cryptolepis Buchanani Roem & Schult.[50] (Asclepiadaceae), commonly known as *jambupatra sariva* and *Karanta*, is a climbing shrub. It is a well known *ayurvedic* plant found throughout india. The plant is used in Indian folkloric medicine (*Ayurveda*) for its antidiarrhoeal, anti ulcerative, anti-inflammatory, blood purifier, anti cough, antibacterial, demulcent, diaphoretic, and diuretic, antidote to mercury poisoning properties and in treatment of rickets in children [51].

Quantitative Standards: Foreign matter-Not more than 2.0% [52], Total ash-2.6-4.3%, Acid insoluble ash-15.5-18.8%, Alcohol soluble extractive-1.0-1.5%, Water soluble extractive-18.6-18.9% [53].

The Lists of Important Ayurvedic Preparations: *H. indicus* forms an ingredient of about 46 Ayurvedic preparations either alone or in combination with other drugs [54]. The lists of important Ayurvedic preparations are given below: *Dasamoolarishta, Dhanwamthararishta, Balamritham, Saribadyasavam, Anuthaila, Amrithadi enna, Aswagandhadi yamaka, Gandha taila, Chandanadi taila, Triphaladi taila, Dhanwamthara taila, Neeleedaladi taila, Pinda*

taila, Balaswagandhadi taila, Manjishtadi taila, Madhuyashtyadi taila, Mahabala taila, Lakshadi taila, Sanni enna, Sidharthadi taila, Agragrahyadi kashaya, Jeevanthyadi kashaya, Triphalamarichadi mahakashaya, Dasamoolabaladi maha kashaya, Drakshadi kashaya, Dhanwamthara kashaya, Mahathiktha kashaya, Mridweekadi kashaya, Vidaryadi kashaya, Satavaryadi kashaya, Saribadi kashaya, Marmagudika, Manasamithra vataka, Kalyanaka ghritha, Jathyadi ghritha, Dadhika ghritha, Naladadi ghritha, Panchagavya ghritha, Pippalyadi ghritha, Brihachagaladi ghritha, Mahakalyanaka ghritha, Mahakooshmandaka ghritha, Mahathiktha ghritha, Vasthyamayanthaka ghritha, Varahyadi ghritha, Madhusnuhi rasayana.

Powder Characteristics: The powder was creamy brown in color. The powder characteristics of the *Hemidesmus indicus* obtained were tabulated below [52]

S.N.	Characteristics	Findings
1.	Crystals	Prismatic crystals of various sizes
2.	Starch grains	Round or oval with various sizes occur as singly, dyad, triad or in groups
3.	Parenchyma	Shape vary from square to rectangular
4.	Resin block	Reddish brown Golden yellow
5.	Fibre	Long and small fibres were seen Wiry fibres were also seen Fibres with narrow lumen were seen
6.	Vessels	3 types vessels were seen 1.Spiral 2.Reticulate 3.Pitted

A Few Latest Research Articles

1. The methanol root extracts of *Hemidesmus indicus* R. Br. significantly neutralized the viper venom-[13] induced lethality and haemorrhagic activity in albino rat and mouse. Venom-induced coagulant and anticoagulant activity was also antagonized by both the extracts. No precipitating bands were observed between the plant extract and polyvalent snake venom antiserum. Maximum neutralization was achieved by *H. indicus* root extract.

2. Immunopotentiating Properties of *Cryptolepis buchanani* Root Extract: The ethanol extract (95%) of the root of the plant *Cryptolepis buchanani* (EECB) was investigated for immunomodulatory activity in mice and rats. The oral administration of EECB caused significant stimulation of the delayed type hypersensitivity (DTH) reaction and humoral antibody production. The oral LD_{50} was found to be more than 3 g/kg in both rats and mice [55].

3. Chondroprotective Activities of *Cryptolepis buchanani*: Analgesic, Anti-Inflammatory, and Chondroprotective Activities of Cryptolepis buchanani Extract: In Vitro and in Vivo Studies [56].

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