

Benefaction of Medicinal Plant *Uraria picta*

Harsha Kashyap

Abstract

Medicinal plants are very significant as they not only maintain the health and vitality but most importantly also cure the various ailments in humans and animals without causing any toxic side effects. These are readily available and cost effective therapeutic agents. *Uraria picta* was first proposed by Desvaux, (1813), is highly medicinal and critically endangered plant species found throughout India and other parts of the world like Africa, Australia, Philippines, Malaysia, Japan, Nigeria etc. This herb is full of antiseptic, anti-inflammatory, antimicrobial, anti-emetic, aphrodisiac, analgesic, cardiovascular and expectorant properties. Due to its high therapeutic use and growing need, the plant is becoming rare and endangered, therefore it is necessary to create awareness of this plant to support its propagation in large numbers. This herb also shows properties of anti-cancer and anti-cholinergic properties hence can manage depressions, anxiety, sleeping problems. Analgesic property helps in reducing body pain.

Keywords: Medicinal plants, health, cost effective, therapeutic, endangered, awareness

1. Introduction

Medicinal plants are very significant as they not only maintain the health and vitality but most importantly also cure the various ailments in humans and animals without causing any toxic side effects. These are readily available and cost effective therapeutic agents. India is known as the “Botanical Garden of the World” as it produces largest medicinal plant wealth. Over the past few decades, herbal medicines from the medicinal plants have been accepted universally. Therefore the efforts are being taken all over the globe in exploring and documenting the ethnomedicinal and pharmacological scientific research data on plants [1].

Uraria picta was first proposed by Desvaux, (1813), is highly medicinal and critically endangered plant species found throughout India and other parts of the world like Africa, Australia, Philippines, Malaysia, Japan, Nigeria etc. [2, 3]. The plant has been extensively used in Ayurvedic system to treat various ailments. All the plant parts are packed with therapeutic properties from flowers, leaves to the fruits and seeds. This herb is full of antiseptic, anti-inflammatory, antimicrobial, anti-emetic, aphrodisiac, analgesic, cardiovascular and expectorant properties [3]. This herb is a major ingredient of well-established Ayurvedic medicine called Dashamoola which is formulation of 10 herbs. The description of the plant can also be seen in classical ancient books of Ayurveda Medicines like Charak Samhita, Sushrut Samhita and Vaghabhatta. There are other formulations in Ayurveda where



Figure 1.
U. picta whole plant.



Figure 2.
U. picta plant roots.

Prishnaparni is used like Abana, Amrutharishtha, Angamarda prashamana kashaya churna, Vyaghri taila, Madhyama Narayana taila, Dasamularishtha.

U. picta is found to be an erect [4, 5], branched, perennial herb [6, 7] (Figures 1 and 2).

Classification of *U. picta* [8]:

Kingdom	Plantae
Phylum	Tracheophyta
Class	Magnoliopsida
Order	Fabales
Family	Fabaceae
Genus	<i>Uraria</i>
Species	<i>Picta</i>

2. Morphology

Stem: Suffruticose undershrubs which is 1–1.9 m tall stout stem, hooked hairs.

Leaves: Alternate, compound, unipinnate, imperipinnate, 15–30 cm long approximately.

Leaflets: Subcoriaceous, 6–20 x 1–4 cm rounded at base acute green blotched with white and glabrous above minutely pubescent beneath, entire margin.

Stipels: Subulate, 4.5 mm long lower leaves often 1–3 foliolate sometime 5–9 foliolate leaflet, sub orbicular or oblong.

Flowers: Flowers in close fascicles along the rachis of spicate, cylindric racemes 10–30 cm long curving upwards with ages pubescent. Standard 5–6 mm long pink or purple.

Pods: Pods glabrous 4–6 jointed joints smooth, polished.

Seeds: Seeds ovate, 2 mm long light brown in color.

Roots: Stout, nodulated, branched.

Synonyms.

There are various synonyms of *U. picta* that are *D. picta* Roxb., *Hedysarum pictum* Jacq., *U. aphrodisiaca* Welw., *U. leucantha* Span., *U. linearis* Hassk.

3. Geographical distribution

U. picta is widely distributed throughout India [2]. It is commonly found in dry grasslands, growing densely and producing poorly viable seeds and it also extend upto Tarai Region of the Himalayas [9]. Apart from India it can also be found in various parts of Asia including China, Japan, Bangladesh, Pakistan, Bhutan and Nepal. The plant is also found in regions of Africa like Nigeria, Egypt, Ethiopia, Congo, South Africa, Queensland Australia [10], and in Philippines, Malaysia [3].

4. Plantation and agroclimatic factors

The plant can grow well in tropical and subtropical regions. It can germinate in humus and sand in comparison to red earth [5]. Loam to clay-loam soil is suitable for its cultivation and the species can grow in the soil pH upto 8.5 [9]. Okusanya et al. (1991) found that the species showed a significantly better growth in wet and moist soil conditions than dry and waterlogged conditions. They also reported that the species responded identically to pH range 3.5, 5.5 and 7.5. The plant also has salinity tolerance [5].

5. Ethnomedicinal importance

According to Charak Samhita this is one of the major ingredient for Dashamoola, Angamardhaprashmana- group of herbs that help to relieve bodyaches, Shothahara-group of herbs having anti-inflammatory properties, Sandhaneeya-group of herbs that are used in fractures and dislocations. Charak suggested liquid formulation cooked with Prishnaparni for diarrhea, cooked with Prishnaparni, parched paddy and processed with *S. cordifolia* for bleeding piles and hemorrhage. According to Sushruta, for gout, milk cooked with Prishnaparni added with honey was given, and promoting adhesion of fractured bones, powdered roots of the Prishnaparni were given [11, 12]. The root decoction of this plant is being used to treat Fever, cough and cold [2, 4, 11, 13]. Yusuf et al. (2007) suggested leaf paste can be applied on boil to burst [14]. Igboechi et al. (1989) studied the ethnomedicinal properties of the plant in Nigeria, can be used in the control of ectoparasites in men and domestic animals [15]. Plant was also assessed for acaricidal activity on *Ixodes ricinus*.

According to Billore et al. (2004) the plant can be used for gynecological disorders [16]. The plant is also effective for the treatment of gonorrhea [17]. Leaves of the plant are used as a diuretic, aphrodisiac, general antiseptic and to cure oral sores [5]. Whole plant shows the antivenom activity against *Echis carinata* [2, 18]. Extract of dried arboreal parts of plant species reported to show antimicrobial properties [7, 19]. This herb also used to cure malarial fever. Also shows cardiovascular properties. This also used to maintain the good HDL level in body and lowers level of LDL and maintains the healthy blood pressure in body. This herb also shows properties of anti-cancer and anti-cholinergic properties hence can manage depressions, anxiety, sleeping problems. Analgesic property helps in reducing body pain.

6. Phytochemical constituents

Phytochemical constituents show specific physiological action individually or in combination with other constituents on human body [20]. Phytochemical constituents include both Primary and secondary metabolites and hence form the backbone of the modern medicine [21]. Important Phytochemical constituents of *U. picta* include alkaloids, flavonoids, steroids, terpenoids, pterocarpan, saponins, phenols, tannins, carbohydrates, proteins, cardiac glycosides etc. [22, 23]. Various mineral components or inorganic nutrients are also required for the human health. This herb is packed with essential minerals that are Sodium, Magnesium, Potassium, Calcium and Phosphorus [24]. Among these phytochemicals, flavanoids, alkaloids and pterocarpan are the bioactive compounds (Figure 3).

Quantitative phytochemical study by Madhikatti, 2011 shows that the *U. picta* is packed with primary and secondary metabolites [23] (Figure 4).

Saxena et al. 2014 studied the mineral contents (Figure 5.) of the *U. picta* in different plant parts which showed the ample amount of mineral elements. This becomes useful when requirements of these minerals in the body are considered [20].

7. Pharmacological properties

The medicinal value of the plant is characterized by the phytochemical constituents and their pharmacological properties. Alkaloids possess various pharmacological properties such as antiarrhythmic, anticholinergic, analgesic, antitumor, antihypertensive, antipyretics, antimalarial, stimulant, anti-HIV, antileukemic etc., and are often utilized as recreational drugs [20, 25]. Flavonoids are the commonly found polyphenolic compounds in the human diet and these are present all over the plant. The pharmacological property of flavonoids include CNS activity, cardiogenic, lipid lowering, antiulcer, hepatoprotective, anti-inflammatory, anti-neoplastic, antimicrobial, antioxidant and hypoglycemic activity. Intake of food containing Flavonoids lowers risk of certain free radical related pathophysiology [26]. Therapeutic uses of terpenoids include antimicrobial, antifungal, antiviral, antihyperglycemic, anti-inflammatory, antioxidants, antiparasitic, immunomodulatory, and as skin permeation enhancer. Luo et al. (1999) have reported terpenoids can decrease the blood sugar level in animals. Steroids can possess the analgesic properties [27]. They are also used to treat a variety of inflammatory diseases and conditions. Cardiac Glycosides also show therapeutic properties and are used in the treatment of congestive heart failure and cardiac arrhythmia [28]. Phenols or phenolic compounds show antimicrobial, antioxidant, anticarcinogenic, or antimutagenic and anti-inflammatory effects. Also contribute to their inducing apoptosis by arresting cell cycle, regulating carcinogen metabolism and ontogenesis expression,

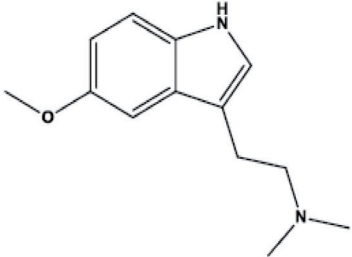
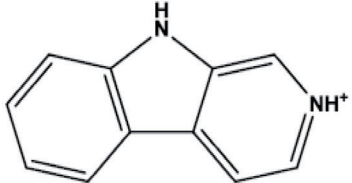
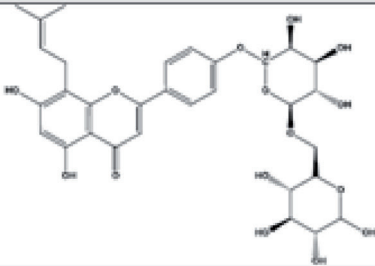
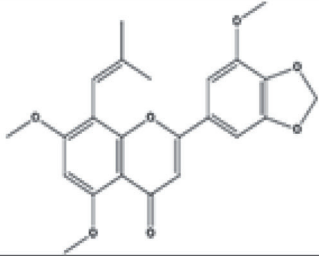
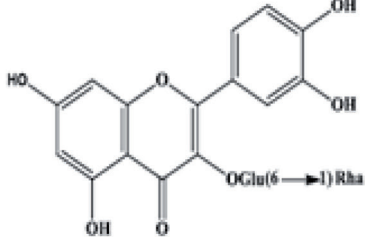
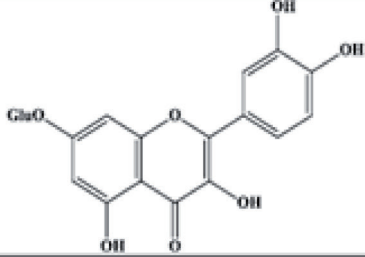
Alkaloids Isolated From Aerial Parts Of Plant	
5-Methoxy N, N-Dimethyl Tryptamine	
B-Carbolinium Cation	
Flavones Isolated From Aerial Parts Of Plant	
4,5,7-Trihydroxy-8-Prenylflavone 4-O-A-L-Rhamnopyranosyl-(1→6)-B-D-Glucopyranoside	
8-C-Prenyl-5, 7, 5-Trimethoxy-3, 4-Methylenedioxyflavone	
Rutin	
Quercetin-7-O-B-D-Glucopyranoside	

Figure 3.
 Chemical structures of active phytochemical constituents representatives isolated from *U. picta*.

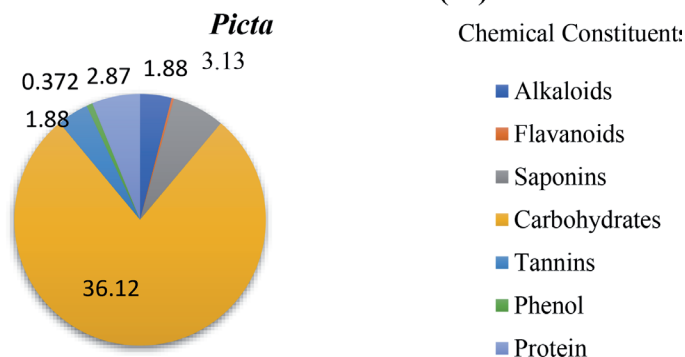
Phytochemical constituents distribution(%) in *U. picta*

Figure 4.
Graphical representation of the quantitative data of phytochemical constituents.

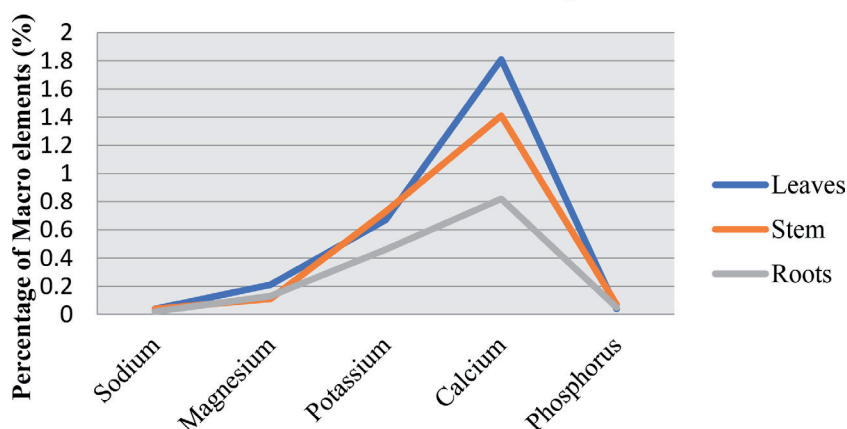
Mineral Distribution in *U. picta*

Figure 5.
Macro elements (mineral content) in different plant parts of *U. picta*.

inhibiting DNA binding and cell adhesion, migration, proliferation or differentiation, and blocking signaling pathways [29]. Saponins are being used commercially as dietary supplements and nutraceuticals in traditional medicine preparations. They also show hypocholesterolemic and antidiabetic properties [20]. As all these phytochemical constituents are present in the *U. picta*, all the pharmacological properties associated with these chemical compounds are found to be present in the plant as well. The earlier study conducted by Odubango et al. (2013) shows the plant possess the “Anticholinesterase property”. They analyzed this property against two enzymes namely AchE (Acetylcholinesterase) and BchE (Butyrylcholinesterase). Here the aqueous extract of the plant and tested for the amount of IC₅₀ Value. The result of the experiment showed the ample amount of dose dependent AchE and BchE inhibitory activity at the highest tested concentration [30]. Numerous studies have been done on “Antioxidant effect” of *U. picta*. Patel and Kamariya et al. (2011) studied the antioxidant behavior of aqueous extract of the plant. They analyzed the result statistically using regression method [31]. The significant antioxidant effect was calculated based on IC₅₀ Value in presence of phenolic, flavonoid, sterol and terpene derivatives [8]. Methanol extract of *U. picta* showed the “Myocardial protection” [8] upon Rat Ischemic Reperfusion Injury Model by invigorating Muscarinic Receptors. To explore the hepatoprotective effect of *U. picta*, Hem, et al.

(2017) used PCM-induced liver injury model. The experiment showed the ability of the extract to reduce the serum liver enzymes level ALT (Alanine Transaminase) and AST (Aspartate AminoTransferase) in the blood. They also studied the “Anti-Inflammatory properties” of the plant in dose dependent manner where the aqueous decoction of roots and aerial parts showed the significant activity against egg albumin-induced and formalin induced rats paw edema. Both pre-clinical and clinical experiments suggested that the plant possesses the quick fracture healing effect due to deposition of phosphorous and calcium [22, 32].

8. Conclusion and future aspects

This report is based on the comprehensive study conducted on *U. picta*, which summarizes the botany, geographical distribution, propagation, phytochemical constituents and pharmacological properties of plant. This shows that the plant treasures a great medicinal wealth as each part of the plant reportedly has various phytochemical constituents having their respective pharmacological properties. These pharmacological properties are providing the evidence to various ethnomedicinal uses of the plant which have been in practice in many continents for centuries. Hence the whole plant plays an important area of research and developmental properties for pharmacologists and researchers. Due to its high therapeutic use and growing need, the plant is becoming rare and endangered; therefore it is necessary to create awareness of this plant to support its propagation in large numbers.

The development of modern drugs from less toxic plant products with proven medicinal properties is now being supported globally. There is no doubt that the products of this plant consecrate bright prospects as a reliable cure for various ailments.

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Conflict of interest

The authors declare no conflict of interest.

Author details

Harsha Kashyap
Department of Bioscience and Biotechnology, Banasthali Vidyapith, Rajasthan, India

*Address all correspondence to: dr.harshakashyap@gmail.com

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References

- [1] Ganie SA and Yadav SS. *Holoptelea integrifolia* (Roxb.) Planch: a review of its ethnobotany, pharmacology, and phytochemistry. BioMed research International 2014; 1-12. doi. org/10.1155/2014/401213
- [2] Kirtikar KR, Basu BD. Indian Medicinal Plants (Vol. 1). International Book Distribution, Dehradun. 1995;72:308-562. ISBN 10: 8121103541
- [3] Bhattacharya A, Dutta AK. Medicinal and Aromatic Plant Science and Biotechnology. Global Science Journal. 2010;4(1):1-4.
- [4] Burkill HM. The Useful Plants of West Tropical Africa (Vol. 3) In (Ed. Burkill HM.). Royal Botanic Gardens, London. 1985;895. http://plants.jstor.org/upwta/2_580
- [5] Okusanya OT, Lakanmi OO. and Oyesiku OO. Germination ecology of the woody herb *Uraria picta*, from Southern Nigeria. Journal of Tropical Ecology. 1991;7:139-146. DOI: <https://doi.org/10.1017/S0266467400005204>
- [6] Anand A, Lognay G, Wathelet B, Malaisse F. Micropropagation of *Uraria picta*, a medicinal plant, through axillary bud culture and callus regeneration. In vitro Cellular and Developmental Biology- Plant. 1998;34:136-140. DOI: 10.1007/BF02822778
- [7] Rahman MM, Gibbons S, Gray AI. Isoflavones from *Uraria picta* and their antimicrobial activity. Phytochemistry. 2007;68:1692-1697. DOI: 10.1016/j.phytochem.2007.04.015
- [8] Azmi L, Rastogi C, Shukla I, Verma P, Kant P, Rao Ch V. Review on *Uraria picta* - A Traditionally Medicinal Plant of India: A Herbal Benefaction. Elixir Application Botany. 2017;106:46806-46812.
- [9] AYUSH. Agro-techniques of Selected Medicinal Plants (Vol. 1). National Medicinal Plants Board, Government of India. 2008;211-213. ISBN 978-81-7993-154-7
- [10] Batianoff GN, Neldner VJ, Singh S. Vascular Plant census and floristic analysis of serpentine landscapes in Central Queensland. The Proceedings of the Royal Society of Queensland. 2000. 109:1-30.
- [11] Khare CP. Indian Herbal Remedies: Rational Western Therapy, Ayurvedic and Other Traditional Usage, Botany. (Ed. Khare CP.) Germany: Springer, Verlag, Berlin and Heidelberg GmbH & Co. Kg. 2003. ISBN 978-3-642-18659-2.
- [12] Pisharath DM. Comparative Pharmacognostic and Phytochemical Analysis of Four Species commonly used as *Prsniparni* in *Dasamula*, an Ayurvedic Formulation. International Journal for Green Pharmacy. 2008;1-42.
- [13] Singh AK, Raghubanshi AS, Singh JS. Medicinal ethnobotany of the tribals of Songhati of Sonbhadra district, UP, India. Journal of Ethnopharmacology. 2002;81(1):31-41. DOI: 10.1016/s0378-8741(02)00028-4
- [14] Yusuf M, Wahab MA, Yousuf MD, Chowdhury JU, Begum J. Some tribal medicinal plants of Chittagong hill tracts, Bangladesh. Bangladesh Journal of Plant Taxonomy. 2007; 14(2):117-128. DOI: <https://doi.org/10.3329/bjpt.v14i2.531>
- [15] Igboechi AC, Osazuwa EO, Igwe UE. Laboratory evaluation of the acaricidal properties of extracts from *Uraria picta* (Leguminosae). J. Ethnopharmacol. 1989; 26(3): 293-298. DOI: 10.1016/0378-8741(89)90102-5
- [16] Billore KV, Yelne MB, Dennis TJ, Chaudhari BG. Database on Medicinal

Plants Used in Ayurveda (Vol. 6),
Central Council for Research in
Ayurveda and Siddha, New Delhi.
2004;1: 314-320.

[17] Jain SK, Defillips RA. Medicinal
Plants of India (Vol.1), Algaano MI;
Reference Publication. 1991; 372.

[18] Allen ON, Allen KE. The
Leguminosae, University of Wisconsin
Press. Madison, W. 1981;672-673.

[19] Osazuwa EO, Igboechi AC. Anti-
microbial activity of a chemical isolate
from the leaves of *Uraria picta*.
Phytotherapy Research. 2006;2:204-206.
doi.org/10.1002/ptr.2650020413

[20] Saxena HO, Soni A, Mohammad N,
Choubey SK. Phytochemical Screening
and Elemental Analysis in Different
Plant Parts of *Uraria picta* desv: A
Dashmul Species. Journal of Chemical
and Pharmaceutical Research.
2014;6(5): 756-760. ISSN : 0975-7384

[21] Goh SH, Chuah CH, Mok JSL,
Soepadmo E. Malaysian Medicinal
Plants for the Treatment of
Cardiovascular Diseases. Selangor Darul
Ehsan: Pelanduk Publication. Kaula
Lumpur, Malaysia. 1995. ISBN 10:
9679785157

[22] Sagwan S, Rao DV, Sharma RA.
Phytochemical Evaluation and
Quantification of Primary Metabolites
of *Maytenus emarginata* (Willd.) Ding
Hou. Journal of Chemical and
Pharmaceutical Research. 2010;2(6):
46-50. ISSN No: 0975-7384

[23] Madhikatti UB. Phytochemical and
pharmacological investigations on
Uraria picta and its Substitutes. Rajiv
Gandhi University of Health Sciences,
Karnataka. 2011. <http://hdl.handle.net/123456789/5289>

[24] Njoku PC, Akumefula MI.
Phytochemical and Nutrient Evaluation
of *Spondias mombin* Leaves. Pakistan

Journal of Nutrition. 2007;6(6):613-615.
DOI: 10.3923/pjn.2007.613.615

[25] Tadzabia K, Maina HM,
Maitera ON, Ezekiel JS. Evaluation of
phytochemical and elemental contents
of *Haematostaphis barteri* leaves and
stem bark in Hong local government
area of Adamawa state, Nigeria. Journal
of Chemical and Pharmaceutical
Research. 2013;5(9):150-1567. ISSN:
0975-7384

[26] Duthie GG, Duthie SJ, Kyle AM.
Plant Polyphenols in Cancer and Heart
Disease: Implications as Nutritional
Antioxidants. Nutrition Research
Reviews. 2000;13:79-106. DOI:
10.1079/095442200108729016

[27] Luo J, Cheung J, Yevich E. Novel
Terpenoid-Type Quinines Isolated from
Pycnanthus angolensis of Potential Utility
in the Treatment of Type-2 Diabetes.
Journal of Pharmacology and
experimental therapeutics. 1999;288:
529-534.

[28] Malairajan P, Gopalakrishnan G,
Narasimhan S, Veni KJK. Analgesic
Activity of Some Indian Medicinal
Plants. Journal of Ethnopharmacology.
2006;19: 425-428. DOI: 10.1016/j.
jep.2006.03.015

[29] Sharma HL, Sharma KK. Drug
Therapy of Heart Failure. Principle of
Pharmacology, (1st Ed Sharma KK).
Paras Publishers. Hyderabad.
2007;13(3):977. doi.org/10.1177/1074248408320286

[30] Odubanjo VO, Oboh G, Ibukun EO.
Antioxidant and anticholinesterase
activities of aqueous extract of *Uraria
picta* (Jacq.) DC; Department of
Biochemistry, Federal University of
Technology, Akure, Nigeria. African
Journal of Pharmacy and Pharmacology.
2013;7(41):2768-2773. doi.org/10.5897/AJPP2013.3899

[31] Patel BD, Kamariya YH, Patel MB.
Antioxidant Potential Of Aqueous

Extract Of Entire Plant Of *Uraria picta*
Desv. International Journal for
Pharmaceutics. 2011;3(4):92-96.

[32] Jain V, Prasad V, Pandey R. Wound
Healing Profile of *Desmodium*
gangeticum Different Wound Models.
Journal of Plant Sciences. 2006;1(3):
247-253.