Pharmacophore 2014, Vol. 5 (4), 658-665 USA CODEN: PHARM7 ISSN 2229-5402

Pharmacophore

(An International Research Journal)

Available online at http://www.pharmacophorejournal.com/

Review Article

PHYTOPHARMACOLOGICAL USES OF *TEPHROSIA PURPUREA* - A REVIEW

Baranwal Akanksha*, Mazumder Avijit, Chakraborthy G.S., Gupta Seema

Department of Pharmaceutical Technology, Noida Institute of Engineering & Technology (NIET), Greater Noida, India

ABSTRACT

Tephrosia purpurea (Linn.) Pers (Fabaceae) is a perennial herb. In the Ayurveda system, *Tephrosia purpurea* is referred to as *Sarwa wran vishapaha* which implies that it can heal any type of wound. *Tephrosia purpurea* has played an important role in the traditional medicine. Thus, the modern pharmacological and clinical investigation of *Tephrosia purpurea* is a valuable herbal therapy that has an antioxidant, antimicrobial, anti-inflammatory, anti-viral and antiulcer properties. Whole plant has been used to cure tumors, ulcers, leprosy, allergic and inflammatory conditions such as rheumatism, asthma and bronchitis. The aqueous extract of *Tephrosia purpurea* seeds has shown significant in vivo hypoglycemic activity in diabetic rabbits. The flavanoids isolated from the plant has been reported to have antimicrobial activity. It has also been reported to acquire hepatoprotective, mast cell stabilizing and erythrocyte membrane integrity enhancing effect in various animal models. Phytochemical investigations on *Tephrosia purpurea* have revealed the presence of various phytoactive constituents such as glycosides, rotenoids, isoflavones, flavanones.

Keywords: *Tephrosia purpurea*, Herb, Antioxidant, Antimicrobial, Anti-inflammatory, Anti-viral and antiulcer.

INTRODUCTION

Tephrosia purpurea or Sarpunkha belongs to family Leguminosae (Sub family-papilionaceae). The genus Tephrosia comprises between 300 to 400 species of annual and perennial woody herb, distributed in tropical and subtropical regions of the world. Plant have high economic value due to the presence of phytochemicals like flavonoids, alkaloids, carbohydrates, tannins and phenols, gums and mucilage, fixed oils and fats and saponins and lipids. Flavonoids have antioxidants and they have strong antimicrobial activity.[13]

Flowers

Flowers are red or purple in leaf opposed racemes, bracteoles usually absent; pedicel 2-6 mm long; flower 4-8.5 mm long, purplish to white.

Leaves

Leaves imparipinnate; stipules narrowly triangular, 1.5-9 mm x 0.1-1.5 mm; rachis up to 14.5 cm long, including the petiole of up to 1 cm.

Seeds

Seed rectangular to transversely ellipsoid, 2.5-5 mm x 1.8-3 mm, light to dark brown to black, sometimes mottled.

Root

They are cylindrical, tapering, posses characteristic odour, brownish yellow in colour and has a complex bitter taste.

Fruits

Fruits of *Tephrosia purpurea* are large and 2-12 cm long, very densely villous or tomentose.

Distribution

They are distributed throughout the plains of India, Ceylon, Mauritius, Tropical Africa and subtropical regions.

Vernacular Names

English: Fish poison, Wild indigo
Hindi name: Sarphonk, Sharpunkha
Rajasthani: Masa
Gujarati: Unhali
Sanskrit: Sharpunkha

Scientific Classification

Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Fabales
Family: Leguminosae (Fabaceae)
Genus: *Tephrosia*
Species: *villosa* Pers.

Chemical Constituents

The constituents of *Tephrosia purpurea* include alkaloids, saponins, glycosides, tannins, flavonoids etc. Some of the constituents may have direct activity and the other inert substances may increase bioavailability and reduces the toxicity.[2] Roots contain tephrosin, dengulin, quercetin, isotephrosin and rotenone. In the roots and leaves 2.5% rutin is found. A new β-hydroxychalcopurpurnone, Isolonchocarpin, pongamol, Lanceolatin A, Lanceolatin B, Karanjin, Kanjone and β-sitosterolis isolated from roots.[9]

Uses

According to Ayurveda literature this plant has also given the name of "Sarwa Wranvishapaka" which means that it has the property of healing all types of wounds. It is an important component of some preparations such as Tephroli and Yakrifit used for liver disorders. In Ayurvedic system of medicine various parts of this plant are used as remedy for impotency, asthma, diarrhoea, gonorrhoea, rheumatism, ulcer and urinary disorders. The plant has been claimed to cure diseases of kidney, liver spleen, heart and blood. The dried herb is effective as tonic laxative, diuretics and deobstruents. It is also used in the treatment of bronchitis, bilious febrile attack, boils, pimples and bleeding piles.[2]

The roots and seeds are reported to have insecticidal and pesticidal properties and also used as vermifuge. The roots are also reported to be effective in leprous wound and their juice, in the eruption of skin. An extract of pods is effective for pain, inflammation and their decoction is used in vomiting. The aqueous extract of seeds has shown significant *in vivo* hypoglycemic activity in diabetic rabbits. The ethanolic extracts of *Tephrosia purpurea* possessed potential antibacterial activity. The flavanoids were found to have antimicrobial activity. The phytochemical investigations on *Tephrosia purpurea* have revealed the presence of glycosides, rotenoids, isoflavones, flavanones, chalcones, flavanols, and sterols.[1-2]

Pharmacological Activity

Root

Antiulcer Activity

Deshpande *et al.*, (2003) studied the antiulcer activity of aqueous extract of *Tephrosia purpurea* in rats in which gastric ulcers were induced by oral administration of ethanol or 0.6 M Hcl or indomethacin or by pyloric ligation and duodenal ulcers were induced by oral administration of cysteamine HCL. The antiulcer activity of *Tephrosia purpurea* was assessed by determining and comparing the ulcer index, gastric total acid output and pepsin activity were estimated in the pylorus ligated rats. The antiulcer property of plant extract was more prominent in HCL, indomethacin and pyloric ligation models. The results suggested that the plant extract possesses significant antiulcer property which could be either due to cytoprotective action or by strengthening of gastric and duodenal mucosa and thus enhancing mucosal defence.[4]

Anti-carcinogenic and Anti-lipid Peroxidative

Kavitha *et al.*, (2006) studied the chemopreventive potential of ethanolic root extract of *Tephrosia purpurea* on 7,12-dimethylbenz (a) anthracene (DMBA)-induced buccal pouch carcinoma in hamster. Oral administration of test extract significantly prevented the incidence, volume and burden of the tumor. Ethanolic extract has potent

chemopreventive efficacy in DMBA-induced oral carcinogenesis.[11]

Anti-Inflammatory and Analgesic

Gopalkrishan *et al*., (2007) studied the ethanolic Extracts of the aerial and root parts of *Tephrosia purpurea* for antiinflammatory and analgesic activities. The extract (250, 500 mg/kg, b.w.) produced dose-related inhibition of carrageenan-induced paw edema and cotton pellet-induced granuloma in rats. At the same doses, analgesic activity was also observed by tail immersion method in which temperature was maintained at 55°C. The results obtained from the two models showed that *Tephrosia purpurea* ethanol extracts can effectively reduce inflammation in both the acute and chronic phases and it can significantly inhibit the responses to thermal stimulus, when compared to the standard drug Indomethacin.[5]

In-Vitro Antioxidant

Shah Rumit *et al*., (2010) performed the *in-vitro* antioxidant activity on hydroalcoholic extract of shade dried roots of *Tephrosia purpurea* .The hydroalcoholic extract was prepared and evaluated for its primary phytochemical analysis for total phenolic content and *in-vitro* antioxidant activity study by DPPH free radical scavenging activity, super oxide free radical activity and nitric oxide scavenging activity. The hydroalcoholic extract of *Tephrosia purpurea* showed antioxidant activity by inhibiting DPPH and hydroxyl radical, nitric oxide and super oxide anion scavenging, hydrogen peroxide scavenging, and reducing power activities. Results indicate that hydroalcoholic root extract of *Tephrosia purpurea* have marked amount of total phenols which could be responsible for the antioxidant activity.[20]

Antimicrobial Activity

Rangama *et al.*, (2009) screened for their antimicrobial activity of *Tephrosia purpurea.* Preliminary testing of antimicrobial activity of *Tephrosia purpurea.* against 3 standard cultures (*Staphylococcus aureus, Pseudomonas aeruginosa*, *E. coli* and one clinical isolate of Candida spp. was performed with water extracts of leaves, pods and roots using the 'Disc Diffusion Bioassay'. Subsequently, the antimicrobial activity of ethanolic root extract against the above three standard isolates and clinical isolates of two strains of *Staphylococcus*, two strains of *Pseudomonas* and nine *coli forms* were tested using the 'Well Method'. The active extracts were subjected to the Minimum Inhibitory Concentration (MIC) agar dilution method, to determine the minimum inhibitory concentration of each extract. Further, the effect of plant maturity was tested on the antimicrobial activity of *Tephrosia purpurea*. Ethanolic root extracts of *Tephrosia purpurea* were found to be active against Pseudomonas aeruginosa, two other Pseudomonas strains and two coli form strains.[18]

Leaves

In Vitro Anthelmintic Activity

Manjula *et al*., (2013) study the anthelmintic activity of aqueous and methanolic extract of leaves of plant *Tephrosia purpurea* by taking the various concentrations of aqueous and methanolic extract on adult Indian earthworms, *Pheretima posthuma*. The activities were compared with the standard drug Albendazole. Data revealed that methanolic extract of *Tephrosia purpurea* leaves possessed dose dependent and significant anthelmintic activity when compared with the standard drug albendazole on earthworm.[15]

Anticancer Activity

Gulecha Vishal *et al*., (2011) investigated the anticancer activity of different fractions of *Tephrosia purpurea* (Sharapunkha, Fabaceae) and *Ficus religiosa*. The fractions of *Tephrosia purpurea* was prepared and tested for *in vitro* anticancer activity using human MCF 7 cell line by trypan blue exclusion method. The present study showed anticancer potential of TP and FR fractions in MCF 7 cell line.[7]

Whole Plant

Antidiarrheal

Khalid *et al*., (2013) evaluated the Anti diarrheal activity of methanolic extract of whole plant extract of *Tephrosia purpurea* against castor oil induced diarrhea in mice. Castor oil was administered orally to mice to induce diarrhoea and subsequently, different doses of *Tephrosia*

purpurea were administered orally to see the possible anti diarrhoeal activity in the control group of animals the frequency of diarrhoea induction was high and almost all of the treated animals were found to develop diarrhoea. The mice treated with verapamil were found to be highly protected (80%) from diarrhea and only one mouse was found to develop diarrhoea. The group of mice to whom 300 mg/kg *Tephrosia purpurea* exract was administered partial protection (40%) from diarrhoea was observed, whereas group of mice treated with 500 mg/kg of *Tephrosia purpurea* exhibited 80% protection from diarrhoea, which is comparable to the protection provided to the verapamil treated group. thus oral administration of methanolic extract *Tephrosia purpurea* shows anti diarrheal activity against castor oil induced diarrhea.[8]

Seed

Antihyperglycemic and Antioxidant Effects in Streptozotocin-Induced Diabetic Rats

Pavana *et al*., (2009) evaluated the effects of aqueous seed extract of *Tephrosia purpurea* on blood glucose and antioxidant status in streptozotocin induced diabetic rats. Hyperglycemia associated with an altered hexokinase and glucose-6-phosphatase activities, elevated lipid peroxidation, disturbed enzymatic [Superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPx)] and non enzymatic [Glutathione, vitamin C and vitamin E] antioxidant status were observed in streptozotocin induced diabetic rats. Oral administration of *Tephrosia purpurea* at a dose of 600mg/kg body weight showed significant improvement in above mentioned parameters. results clearly indicate that *Tephrosia purpurea* has potent antihyperglycemic and antioxidant effects in streptozotocin-induced diabetic rats and therefore further studies are warranted to isolate and characterize the bioactive principles from *Tephrosia purpurea.*[17]

Antioxidant

Kumar *et al.*, (2011) perform the antioxidant activity of Ethanolic extract of *Tephrosia purpurea* for in carbon tetrachloride-induced lipid peroxidation *in-vivo* and superoxide generation *in-vivo*. The ethyl acetate fraction of the same extract was studied for free radical scavenging and antilipid peroxidation activity. The IC50 values in both of these in-vitro assays were found to be significantly reduced for ethyl acetate fraction compared with the ethanolic extract of the plant. The observation was further supported by comparing the *in-vivo* antioxidant activity for both the ethanolic extract and its ethyl acetate fraction. The study concluded that the ethanolic extract of *Tephrosia purpurea* exhibits antioxidant activity *in-vivo* and the ethyl acetate soluble fraction has improved antioxidant potential than the ethanol extract.[18] Results revealed the chemical constitute of plant is responsible for their free radical scavenging activity and also responsible for their hepatoprotective activity.[12]

Flower

Antiviral Activity

Kokila *et al.*, *(* 2010) has evaluated the Methanolic flower extracts of *Tephrosia purpurea* investigated for antiviral activity by using viruses viz. HEL cell cultures, Hela cell cultures and Vero cell cultures and antibacterial in Gram +ve and Gram –ve bacteria. The results indicates antiviral activity of the extract of *Tephrosia purpurea* flowers against viruses and also very good antibacterial activity again strains Gram + ve, and Gram – ve, strains.[16]

Figure 1: *Tephrosia purpurea*

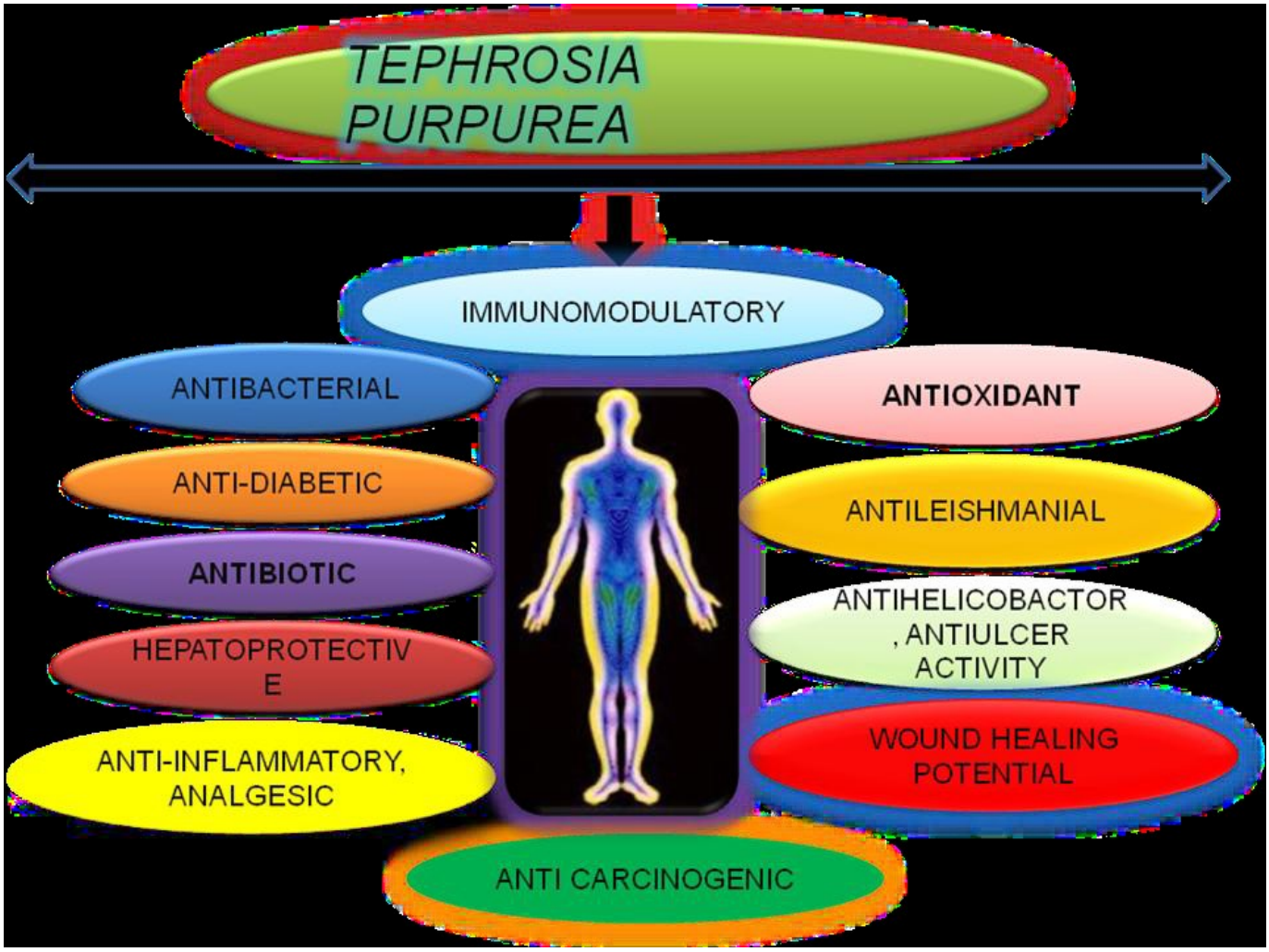

Figure 2: *Tephrosia purpurea*: A herb with various effects on biological system

Table 1: Traditional uses of *Tephrosia purpurea*

Parts	Constituents	Traditional uses
Roots	Tephrosin, diguelin, isotephrosin, rotenone(rotenoid), tannins, phytosterols, glycosides, purpurin, isolonchocarpin	Diuretic, enriches the blood, useful in bronchitis, wounds, boils, pimples, liver and spleen diseases, asthma, inflammation, hepatoprotective, used in poisoning due to snakebite, useful in enlargement of spleen, antidiarrhoeal. Given in tympanitis, dyspepsia and chronic diarrhea. In French Guiana it is used as fish poison.
Seeds	Tephrosin, diguelin, quercetin	Used in poisoning due to rat bite
Leaves	Osyritin, 2% glycoside, Rutin, rotenone(rotenoid), Tephrosin, Pongaglabol, Semiglabrin	Useful in Diseases of lungs and of the chest, tonic to intestines, improves the appetite, good in piles, syphilis, gonorrhoea
Whole plant	β sitisterol, ursolic acid, spinosterol, epoxyflavon, pongamol, tetratriacontane, rotenone(rotenoid), Tephrosin, Butelinic acid, 12-α-hydroxy rotenone, Dimethylglabranin.	Digestible, Anthelmintic, Alexeteric, Antipyretic, Cures diseases of liver, spleen, heart, blood, cures tumors, ulcers, leprosy, asthma, bronchitis, piles, caries of the teeth, laxative, blood purifier.

REFERENCES

1. Chopra, RN; Nayer, SL, and Chopra, IC (1956-92.), "***Glossary of Indian Medicinal Plants***", Council of Scientific and Industrial Research, New Delhi, India. Vol I, 241.
2. Chaudhari, TB; Tambe, DA and Chaudhari, SR (2012), "Phytopharmacology of *Tephrosia purpurea* Pers. (Fabaceae)-A Review", ***IJPI's Journal of Pharmacognosy and Herbal Formulations***, Vol. 2(8), 1-3.
3. Chadha, YR (1976), "***The Wealth of India***", Dictionary of Indian raw materials and industrials products, Vol. 5, New Delhi C.S.I.R, Raw materials, 198.
4. Deshpande, SS and Shah, GB (2003), "Pharmacological activity of *Tephrosia*

purpurea", ***American Association of Pharmaceutical Scientists Journal***, Vol 10, (S2).

5. Gopalakrishnan, S; Vadivel, E and Dhanalakshmi, K (2010), "Antiinflammatory and analgesic activities of *Tephrosia purpurea* Linn. Aerial and root extracts", ***Journal of Pharmacy Research***, Vol. 3 (5), 1103-1106.
6. Gora, RH; Baxla, SL; Kerketta, P and Patnaik, S (2014), **"**Hepatoprotective activity of *Tephrosia purpurea* against arsenic induced toxicity in rats", ***Indian Journal of Pharmacology***, Vol. 46, 197-200.
7. Gulecha, V and Sivakuma, T (2011), "Anticancer activity of *Tephrosia purpurea* and *Ficus religiosa* using MCF 7 cell lines", ***Asian Pacific Journal of Tropical Medicine***, 526-529.
8. Hussain, JK; Qadir, IM.; Jan, A and Hassan, GA (2013), "Anti-diarrheal activity of methanolic extract of *Tephrosia purpurea*", ***Acta Poloniae Pharmaceutica ñ Drug Research***, Vol. 70 (2), 345-347.
9. Kumar, M and Gehlot, S (2012), "Systemic effect of *Tephrosia purpurea* (Sarapunkha) on G.I.T.-An Experimental Study", ***International Journal of Ayurvedic and Herbal Medicine***, Vol. 2, 328-335.
10. Kirtikar, KR and Basu, BD (1918), "***Indian Medicinal Plant***", Basu, Sudhindra Nath; M. B., Panini Office, Bhuwaneswari, Asrama, Bhadurganj, Vol. I, 719.
11. Kavitha, K and Manoharan, S (2006), "Anticarcinogenic and Antilipidperoxidative effects of *Tephrosia purpurea* (Linn.) Pers. (tpet) on 7, 12-dimethylbenz (a) anthracene (DMBA) - induced hamster buccal pouch carcinoma", ***Indian J Pharmacology***, Vol. 38 (3), 185-189.
12. . Kumar, VR; Kumar, S; Shashidhara, S; Anitha, S and Manjula, M (2011), "Comparison of the antioxidant capacity of an important hepatoprotective plants", ***International Journal of Pharma ceutical Sciences and Drug Research***, Vol. 3 (1), 48-51.
13. Kumari, S; Srivastava, M and Abbasi, P (2014), "Response of *Tephrosia purpurea* to salinity stress in relation to germination, carotenoid content and proline content", **An *International Quarterly Journal of Biology & Life Sciences***, Vol. 2, 276-281.
14. Mathews, AM; Sujith, K and Christina, AJM (2012), "Basic Research on The Herb *Tephrosia purpurea (l) Pers*.-The Translational Challenges–*A Review*", ***International Journal of Pharmaceutical and Chemical Sciences***, Vol. 1, 466-46.
15. Manjula, RR; Spandana, U; Joshi, AT and Sudheer, M (2013), "In vitro anthelmintic activity of aqueous and methanolic leaf extract of Tephrosia purpurea linn.", ***International Journal of Research in Pharmacy and Chemistry***, Vol. 3(1), 12-14.
16. Parmar, KA and Patel, AN (2010), "Preliminary Phytochemical Screening and study of antiviral activity and antibacterial activity of *Tephrosia purpurea* flower", ***Life sciences Leaflets***, Vol. 1, 7-13.
17. Pavana, P; Sethupathy, S; Santha, K and Manoharan, S (2009), "Effects of Tephrosia Purpurea Aqueous Seed Extract on Blood Glucose and Antioxidant Enzyme Activities in Streptozotocin Induced Diabetic Rats", ***African Journal Traditional Complementary Alternative Medicines***, Vol 6 (1), 78–86.
18. Rangama1, BNLD; Abayasekara, CL; Panagoda, GJ and Senanayake, MRDM (2009), "Antimicrobial activity of Tephrosia purpurea (Linn.) Pers. and Mimusops elengi (Linn.) against some clinical bacterial isolates", ***Journal of the National Science Foundation of Sri Lanka***,Vol. 37 (2), 139-145.
19. Soni, K; Kumar, PS and Saraf, MN (2006), "Antioxidant activity of fraction of *Tephrosia purpurea*", ***Publication of the Indian Pharmaceutical Association***, Vol. 68, 456-460.
20. Shah, R; Kathad, H; Sheth, R and Sheth, N (2010), "In vitro antioxidant activity of roots of Tephrosia purpurea linn", ***International***

Journal of Pharmacy and Pharmaceutical Sciences, Vol. 2(3), 30-33.

Correspondence Author:
Baranwal Akanksha
Department of Pharmaceutical Technology, Noida Institute of Engineering & Technology (NIET), Greater Noida, India
Email: akankshabarnwal1990@gmail.com

Cite This Article: Baranwal, Akanksha; Mazumder, Avijit; Chakraborthy, GS and Gupta, Seema (2014), "Phytopharmacological uses of tephrosia purpurea -A review", ***Pharmacophore***, Vol. 5 (4), 658-665