# TEPHROSIA PURPUREA (SARAPUNKHA): A REVIEW

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**Summary**

Tephrosia purpurea, a commonly used herb in Ayurvedic medicine. This review article is presented to compile all the updated information on its pharmacological activities, which were performed by widely different methods. Studies indicate Sarapunkha possesses anti hyperglycemic, antilipidperoxidative ,wound healing, immuno modulatory, relative toxicity against *corcyra cephalonica,* anti carcinogenic, antibiotic,anti-*Helicobacterpylori*,cancer chemopreventive, hepatoprotective, antioxidant antilithiatic, antimicrobial, antileishmanial ,antituberculosis activity.These results are very encouraging and indicate this herb should be studied more extensively to confirm these results and reveal other potential therapeutic effects.

**Key words:** *Tephrosia purpurea*, tephrosin, Pharmacological activities.

## Introduction

The Sanskrit word Sarapunkha literally means Sara – an arrow and punkha – the wings; that is, if both the ends of its leaf are held and pulled, edges like that of an arrow are formed. It is also called as plihasatru meaning an enemy of the spleen (splenic diseases).The botanical name of sarapunkha is *Tephrosia purpurea* and it belongs to family Papilionaceae/Fabaceae. Two varieties are described in Ayurvedic texts as rakta or red, and shweta or white Sarapunkha.

The plant grows throughout India and Western Himalayas, up to an elevation 1500 meters. A much branched perennial, grows 30-60 cm in height, with spreading branches. The leaves are 4-14 cm long, imparipinnate, leaflets 12-21, lanceolate, glabrescent above and blaucous beneath. The flowers, purple, in racemes. The fruits, pods, 2.5-5 cm long and 0.5 cm broad. The seeds, 6-10 per pod, smooth and grey in color. The roots, leaves and seeds contain tephrosin, deguelin and quercetin, the roots contain isotephrosin and rotenone. In the roots and leaves 2.5% rutin is found. Purpurin, a flavonone has been isolated from the seeds, substituent such as 8- substituted flavonoid and 3- substitued oxygenated chalcones. Octacosanol, sitosterol- C- glucopyranoside and a flavone glycoside have been isolated from the whole plant. The whole plant and its roots are used for medicinal purposes. The herb is useful both, internally as well as externally.

Anti-dermatoses, antibiotic, anti-inflammatory cleansing and healing of the wounds and ulcers. In edema, skin disorders, glandular swellings like cervical adenitis and filariasis, quickly relieves the dental pains and arrests bleeding. The seed-oil is applied externally in various skin diseases like scabies, eczema etc .Internally, it imparts a stimulant action on the liver, is an appetizer and digestant as well as cholegouge. Hence, is rewarding in digestive disorders like anorexia, flatulence, abdominal pain, tumors, hemorrhoids, worms, liver and spleen.

**Antihyperglycemic and antilipidperoxidative activity**

Recent reports indicate that diabetic complications are associated with overproduction of free radicals and accumulation of lipidperoxidation by products. Enhanced oxidative stress has been well documented in both experimental and human diabetes mellitus. Different parts of *T.purpurea* have been used for diabetes mellitus in Ayurvedic and Siddha medicine.

Ethanolic seed extract of *Tephrosia purpurea* (TpEt) was evaluate for the antihyperglycemic and antilipidperoxidative effects in streptozotocin induced diabetic rats. Effect of plant drug (TpEt) was comparable to that of the reference drug Glibenclamide.

The level of blood glucose was significantly increased in streptozotocin alone treated rats as compared to control animals. However, the level of blood glucose was returned to near normal concentrations in diabetic rats treated with “TpEt” and glibenclamide. “TpEt” showed comparable effect to that of glibenclamide.

A significant decrease in hexokinase and increase in glucose-6-phosphatase activities were noticed in the liver of diabetic animals as compared to control animals. Oral administration of “TpEt” to diabetic animals revert back the enzyme activities to near normal concentrations. However, oral administration of “TpEt” at a dose of 300mg/kg bw revert back the levels of non-enzymatic antioxidants and activities of enzymatic antioxidants to near normal range in diabetic animals.

Reduced glutathione, a major endogenous antioxidant, plays a crucial role in the antioxidant defense. In this study, orally administered “TpEt” to diabetic rats at dose of 300 mg/kg bw for 45 days showed significant antihyperglycemic and antilipid peroxidative effects as well as improved antioxidant defense mechanism.

The antihyperglycemic activity of "TpEt" is probably due to stimulation of insulin secretion from remnant pancreatic β– cells, which in turn enhance glucose utilization by peripheral tissues of diabetic rats. The observed increase in hexokinase activity and decrease in glucose-6-phosphatase activity in diabetic rats treated with "TpEt" suggest its stimulatory effects on glycolysis and inhibitory action on gluconeogenesis in diabetes mellitus. The observed increase in antioxidant status and decline in TBARS concentration in "TpEt" treated diabetic rats suggests its potent antilipidperoxidative and antioxidative effects[1]

**Wound healing potential**

The wound healing potential of ethanolic extract of *Tephrosia purpurea* (aerial part) in the form of simple ointment using three types of wound models in rats as incision wound, excision wound and dead space wound was studied. The results were comparable to standard drug Fluticasone propionate ointment, in terms of wound contraction, tensile strength, histopathological and biochemical parameters such as hydroxyproline content, protein level, etc.

Wound area was measured by tracing the wound margin using a transparent paper in each 2 days interval and healed area calculated by subtracting from the original wound area.

On day 4, the wound contraction of standard and extract ointment treated groups was found to be significant ($P < 0.05$) in comparison to simple ointment base treated group. On day 16, standard ointment treated wound was completely healed while extract ointment treated group was also almost at complete healing stage. On day 18, extract ointment treated group healed100%and simple ointment base treated group showed 95.71% healing.

Effect of ethanolic extract of *Tephrosia purpurea* in wistar rats incision and dead space type of wounds shown significant healing as in epithelialization, collagenation (C),fibroblasts cells (F) and angiogenesis. The result showed that ethanolic extract ointment possesses a definite prohealing action. Also plant reported to have antioxidant activity may be responsible to support wound healing. Thus the enhanced wound healing may be due to the free radical scavenging action of the plant as well as enhanced antioxidant enzyme level in granuloma tissues.

*Tephrosia purpurea* have also been reported to contain same flavonoids, which may be one of the potential mechanisms contributing to enhanced wound healing. These finding could justify the inclusion of this plant in the management of wound healing[2]

**Immunomodulatory activity of flavonoidal fraction(FF*)***

Oral administration of FFTP (10–40 mg/kg) significantly inhibited sheep red blood cells (SRBC)-induced delayed-type hypersensitivity reactions. It also produced a significant, dose-related decrease in sheep erythrocyte-specific haemagglutination antibody titre.

In the present investigation, SRBC-induced delayed-type hypersensitivity was used to assess the effect of the fraction on cell-mediated immunity. In the control animals, the q48h and q72 h response was either equal or slightly more than the 0 h response, therefore, the peak edema at q24 h was taken as a parameter for evaluating the reaction.

*T. purpurea* flavonoid fraction (10–40 mg/kg, p.o.) produced a significant, dose-related decrease from DTH reactivity in mice.To evaluate the effect of the flavonoid fraction on humoral response, its influence was tested on sheep erythrocyte-specific haemagglutination antibody titre in mice.It was found to significantly suppress the production of circulating antibodies.Whether its suppressive effect on the antibody responses was a direct result of its action on the B cells or an indirect effect via suppression of helper T cell functions is not known.
The present study establishes the cellular and humoral immunomodulatory property of the flavonoid fraction of *T. purpurea* in vivo. Further studies are warranted to confirm these activities and explain its mechanism of action.[3]

**Relative toxicity against CORCYRA CEPHALONICA**
For sustainability of agricultural production, the use of phosphorus and chlorinated insecticides posess problems, such as poisoning in man and other animals (Pichaet & Philongene, 1993), pest resistance to pesticides (RameshChand & Pratap Birthal, 1997). About one third of the realizable global crop (worth rupees 6,000 crore) is estimated to be lost annually due to insect pests (Dhahwai& Arora, 1996). On account of above the environment dictates a need for safe, effective and economical insecticides. The toxicity of Annona squamosa,Tephrosia purpurea and Acorus calamus plants has been analysed against larvae of rice moth, *Corcyra cephalonica* (St.)
Patel *etal.* (1997) and Jaswanth *et al.* (2002) have studied the effect of different plant extracts on insect pests and found several to be toxic to different insects. In the present study on all the three plant extracts proved to be toxic and the effect of all was similar, i.e. the larvae became black that resulted in their death. Freshly emerged larvae were more sensitive.Percentage survival rate of the larvae decreased with increasing concentration. *Annona* seed extract was most toxic *Tephrosia* plant extract was least toxic among the three extracts [4]

**Anticarcinogenic activity**
Cancer of the oral cavity are frequently associated with chewing of betel quid containing tobacco, in addition to smoking and alcohol consumption. 7,12-dimethylbenz(a)anthracene DMBA)-induced hamster buccal pouch carcinogenesis, is a well suited model for studying precancerous and cancerous lesions of human oral squamous cell carcinoma, since it is morphologically and histologically similar to human tumors as well as, it expresses many biochemical and molecular markers that are expressed in humans.

In DMBA- painted hamsters (Group II), a 100% tumor formation with mean tumor volume (472 $mm^3$) and tumor burden (2029 $mm^3$), was observed. Oral TpEt (300 mg/ kg, b.w.) significantly prevented the incidence, volume and burden of tumor in DMBA-painted hamsters (Group III). No tumor was observed in control (Group I) as well as TpEt alone treated animals (Group IV).
A myriad of histopathological changes (severe keratosis, hyperplasia, dysplasia and squamous cell carcinoma of the epithelium), were observed in hamsters painted with DMBA alone (Group II). A mild to moderate preneoplastic lesions [hyperplasia (++), keratosis (+) and dysplasia (+)], were noticed in Group III animals (DMBA + TpEt).

The concentration of TBARS was increased, whereas the levels of nonenzymatic antioxidants (GSH, Vitamin C and Vitamin E) and activities of enzymatic antioxidants (SOD, CAT and GPx), were significantly decreased in group II (DMBA alone), as compared to control animals. Oral administration of TpEt significantly decreased the levels of TBARS and improved the antioxidants status in DMBA- painted hamsters. TpEt alone- treated hamsters showed no significant difference in TBARS and antioxidants status, as compared to control animals.

Decrease in TBARS concentration and alterations in the antioxidant status were noticed in cancer animals (Group II) as compared to control (Group I). However, oral administration of TpEt (Group III), reverted the concentration of TBARS and antioxidants to near normal range in DMBA painted animals. Hamsters treated with TpEt alone (Group IV) showed no significant difference in TBARS and antioxidants status, as compared to control animals.

In the present study, oral administration of TpEt at a dose of 300 mg/kg, b.w., reduced tumor incidence, volume, burden and the number in DMBA- painted hamsters. Our results thus indicate, that TpEt possess significant chemopreventive potential against DMBA- induced buccal pouch carcinoma.

Furthermore, TpEt significantly reduced the levels of TBARS and enhanced the status of antioxidants in the circulation of DMBA- painted hamsters. We also noticed an elevation of TBARS level and improvement in antioxidant defense system in the buccal mucosa of DMBA-painted hamsters, after treatment with TpEt. The study reveals, that the chemopreventive effect of TpEt in DMBA- painted animals, is probably due to its antilipidperoxidative and antioxidant properties [5]

**Antibiotic Activity**

Being secondary metabolites, the production of these antibiotic compounds by plants are affected by various stress conditions experienced by the plants. A decoction of *T. purpurea* is prescribed in traditional medicinal systems for the treatment of these conditions (Jayaweera,1982). Furthermore, the decoction of roots is believed to be efficacious against dyspepsia,chronic diarrhoea and colic. This indicates its possible role against coliforms revealed in this study. The absence of antibiotic activity in the water extracts (which were boiled) of *Tephrosia* could be due to heat sensitivity of the antibiotic compound. Another possible reason may be that the compound is more soluble in alcohol than in water (due to higher polarity). From the results of the current study, it can be concluded that the ethanolic root extract of *T.purpurea* shows significant activity against *Pseudomonas aeruginosa*, two other *Pseudomonas* strains and two coliform strains. The ethanolic bark extract of *M. elengi* shows significant activity against three *Staphylococcus* isolates including *S. aureus.* Ethanolic leaf extracts and water extracts of *T.purpurea* shows no activity against any of the isolates [6]

**Anti-Helicobacter pylori activity**

*Tephrosia purpurea* (Linn.) Pers. (Fabaceae) has traditional use in curing different types of wounds including gastroduodenal ulcers, it was of interest to evaluate the *in vitro* anti-*Helicobacter pylori* activity profile of the plant extract.

The methanolic extract of *Tephrosia purpurea* (TPME) exhibited potent anti-*Helicobacter pylori* activity as compared with aqueous or 50% hydroalcoholic extracts Acid stability study of such samples indicated marginal increase in MIC and MBC values compared with those of the untreated samples Thus, such samples are expected to remain effective in the acidic pH prevailing in the stomach. With a view to investigating the therapeutic potential of the extract TPME and its two a polar fractions (TPME-Fr-H and TPMEFr-C), it was of necessity to evaluate the killing efficacy at stomach acidic pH, proneness to resistance development like metronidazole, and synergistic potential with commonly used anti-*Helicobacter pylori* antibiotics. The kill kinetics profile (pH 7.2 and at acidic pH of 5.0 (mimicking stomach acidic pH) revealed that the efficacy of all the three samples increases with decrease in pH unlike clarithromycin whose efficacy decreases with decrease in pH TPME-Fr-C is most effective, indicating its potential for anti-*Helicobacter pylori* therapeutics.
The combination of extract and/or fraction(s)with metronidazole appears to have resulted in the development of sensitivity among metronidazole-resistant strains.
The methanolic extract of *Tephrosia purpurea* and its two relatively less polar fractions showed potent anti-*Helicobacter pylori* activity against clinical as well as standard strains, demonstrated functional efficacy at acidic pH mimicking stomach environment, did not develop drug resistance upon repeat exposure, and also exhibited synergistic potential with common antibiotics The investigation investigation also tends to justify the ethnomedical use of the plant in gastroduodenal ulcers[7]

**Cancer chemopreventive activity**
The effect of *Tephrosia purpurea*on 12-O-tetradecanoyl phorbal-13-acetate (TPA; a well-known phorbol ester) induced cutaneous oxidative stress and toxicity in murine skin was assessed. In spite of many uses hypothesize that *Tephrosia purpurea* suppresses its toxicity if given as pretreatment to animals receiving 12-O-tetradecanoylphorbal-13-acetate (TPA).Recently, shown that *Tephrosia purpurea* suppresses benzoyl peroxidemediated cutaneous oxidative stress and toxicity.
TPA-alone treatment resulted in the depletion of cutaneous glutathione level and decreased the activities of glutathione reductase, glutathione S-transferase and catalase to about 66, 69, 46 and 50%, respectively,as compared to acetone-treated control animals. Pretreatment of animals with *Tephrosia purpurea* resulted in the significant partial recovery of the glutathione level and in the inhibited activities of antioxidant enzymes.
Treatment with TPA alone resulted in a 4.5-fold increase in cutaneous ODC activity as compared to acetone-treated control animals. The pretreatment of animals with *Tephrosia purpurea* resulted in a significant inhibition of TPA-mediated induction of cutaneous ODC activity in a dose-dependent manner.The recovery in the ODC activity ranged from 22 to 47% as compared to the TPA-alonetreated control. At the higher dose of *Tephrosia purpurea*, the level of ODC activity almost reached the value of acetone-treated control animals.TPA alone treatment resulted in about a two-fold enhancement in the incorporation of [3H]thymidine in cutaneous DNA as compared to acetone-treated control animals. However, in *Tephrosia purpurea* pre-treated animals, this enhancement was significantly less as compared to the TPA-alone-treated group.
*Tephrosia purpurea* inhibits a dose-dependent skin tumorigenesis. This inhibition was evident when tumor data were considered as the percentage of mice with tumors and the

number of tumors per mouse. After the 8 weeks of experiment, the occurrence of skin papilloma was noted in the DMBA-initiated croton oil (phorbolester)-promoted animals (control group). However, with the pre-treatment of animals with *Tephrosia purpurea* in croton oil (phorbol ester)-mediated DMBA-initiated mice, the occurrence of skin papilloma was noted in 8–14weeks, as compared to that of the control group (DMBA C croton oil). At the termination of the experiment at 25 weeks, the control group alone exhibited a 100% tumorincidence. *Tephrosia purpurea* pre-treatment inhibited dose dependently tumor incidence and the number of tumors per mouse from 20 to 55% and 48 to 88%,respectively, as compared to the control group. Mice treated with DMBA alone, *Tephrosia purpurea* alone and TPA alone yielded no tumors (data not shown).

Furthermore, TPA is believed to function, at least in part, by interacting with and activating protein kinase C, an important enzyme involved in the regulation of a variety of biological processes, including cell growth and differentiation.[8]

**Hepatoprotective activity**

The administration of TAA *(Tephrosia purpurea* and stem bark of *Tecomella undulata* against Thioacetamide) resulted in a marked increase in serum AST, ALT, GGT, ALP, total bilirubin and liver MDA levels. However, the liver GSH level was decreased. The protective actions of aerial parts of *Tephrosia purpurea* and stem bark of *Tecomellaundulata* on hepatotoxicity induced by TAA are summarized in Maximum hepatoprotective activity was observed at 500mg/kg dose level of *Tephrosia purpurea* (aerial parts), which was comparable to that of silymarin. Extract of *Tephrosia purpurea* was found to be more potent than the extract of *Tecomella undulate.* Histological profile of the control animals showed normal hepatocytes with well preserved cytoplasm prominent nucleus,nucleolus and central vein. Pretreatment with *Tephrosia purpurea* at 100 and 300mg/kg dose showed reduction of necrosed area and inflammatory infiltrates in the centrizonalarea with disappearance of inflammatory infiltrate around portal triad *Tephrosia purpurea* at 500mg/kg dose showed greater reduction of the necrosed area and sparse inflammatory cell infiltration around the central vein as compared to300 and 100mg/kg dose. Pretreatment with silymarin at 50 mg/kg dose showed almost normal liver lobule with no sign of necrosis in the centrizonal area and portal triad.

Aqueous extract of *Tephrosia purpure a* was studied for hepatoprotective activity. A 60% ethanolic–aqueous extract was used in the present investigation for more efficient extraction of compounds which need more polar solvent (ethanol) for their extraction, while the use of ethanolic extract of *Tecomella undulata*

Hence a reduction in the levels of these enzymes Flavanoids present in *Tephrosia purpurea* could be responsible forthe membrane stabilizing activity, however, the active constituents of *Tecomella undulata* responsible for this activity is not clear.[9]

**Galactosamine hepatotoxic model**

In rats treated with galactosamine alone (Group II) there was significant ($P< 0.001$) rise in SGOT, SGPT and bilirubin values when compared to control. Pretreatment with Tephrosia purpurea resulted in significant ($P< 0.001$) protection against the increase of SGOT, SGPT and bilirubin in Group Ill rats compared to untreated Group.

Histologically, galactosamine treated animals showed central or submassive necrosis whereas in the *Tephrosia purpurea* treated animals necrotic lesions were absent and comparable with the control.

**$CCl_4$ hepatotoxic model:**

At the end of 8 weeks,22% mortality (11 out of 50 animals) was observed in $CCl_4$ group due to chronic $CCl_4$ toxicity as evidenced in their autopsy which showed congested and enlarged liver sometimes associated with intestinal bleeding and inflammation. However, no mortality was observed with either control or *Tephrosia purpurea* treated group. Blood samples from the surviving 39 animals of $CCl_4$group showed significantly ($P<0.001$) elevated levels of SGOT, SGPT and bilirubin as compared to the control. Administration of *Tephrosia purpurea* along with $CCl_4$ prevented the rise in SGOT, SGPT and bilirubin values. Histopathological study of $CCl_4$ treated group exhibited gross cirrhosis and nodules in the liver than the drug treated animals which were near normalcy. SGOT, SGPT and serum bilirubin are the most sensitive tests employed in the diagnosis of hepatic diseaseslo D-galactosamine HCI produces an experimental liver damage which histologically resembles viral hepatitis. The model, pretreatment with *Tephrosia purpurea offered* hepatoprotection as evidenced by the inhibition of the rise in SGOT, SGPT and bilirubin levels. Also the absence of necrotic lesions in liver samples from *Tephrosia purpurea* treated group, suggested that its hepatoprotective action may be due to its membrane stabilising effect on hepatic cells.

$CCl_4$ induced chronic hepatotoxicity study, also showed highly significant increase in serum transaminases and bilirubin values after 8 weeks. The cirrhotic and nodular changes induced by $CCl_4$were also effectively prevented by *Tephrosia purpurea* showing that it might be acting by stabilising the cell membrane.

*Tephrosia purpurea exerts* hepatoprotective action in both acute (galactosamine) and chronic ($CCl_4$) hepatatoxic models [10]

**Antioxidant activity**

Ethanol extract of *T. purpurea* (TP) exhibits free radical scavenging and antilipid peroxidation properties in the *in vitro* studies.,Ethanol extract was studied for its effects on the superoxide generation in peritoneal macrophages *in vivo* . In the PMA-induced superoxide generation assay, TP at the doses of 100, 200 and 400 mg/kg showed inhibition of superoxide generation to the extent of 0.9, 15.7 and 38.7%, respectively. The inhibition was significant at the dose of 400 mg/kg only.

*T. purpurea* has been reported to have mild antiinflammatory, antiallergic and antiasthmatic activities. It may be possible that the inhibition of superoxide generation in peritoneal macrophages is related to the antiinflammatory activity of the plant *T. purpurea*. TP at dose of 25, 50 and 100 mg/kg produced significant inhibition of lipid peroxidation induced by $CCl_4$ to the extent of 21.7%, 45.4% and 72.7%, respectively.

In the DPPH assay, the $IC_{50}$ of EA was found to be 32.9 µg/ml compared to 62.1 µg/ml reported for TP. While in lipid peroxidation assay, The $IC_{50}$ was 31.9 µg/ml compared to 77.3 µg/ml reported for TP. Thus, we inferred that the EA fraction shows better antioxidant activity than the extract TP in both of these assays.

In the superoxide generation assay, EA at the doses of 100, 200 and 400 mg/kg showed significant inhibition of 25.9, 42.8 and 58.9%, respectively.
The ethyl acetate soluble fraction may provide an important lead in progressing towards isolation of the antioxidant principles from the plant *T. purpurea* . These sub-fractions or individual components can be exploited in the treatment of various diseases or design of agents with better antioxidant activity[11]

**Antilithiatic activity**
Aqueous extract of the roots of Tephrosia purpurea was evaluated for its antilithiatic activity, in two models of urolithiasis. Gentamicin (s.c.) and 5% ammonium oxalate mixed with rat feed was used to induce calcium oxalate stones; the foreign body implantation model which makes use of zinc discs, was used to induce magnesium ammonium phosphate stones. The present study evaluates the effect of aqueous extract of T. purpurea on the excretion and deposition of various calculi forming constituents like calcium, oxalate, magnesium and phosphate in urine, kidney and foreign body. The aqueous extract of T. purpurea was found to be effective in reducing the formation of and dissolving existing calcium oxalate and magnesium ammonium phosphate stone[12]

**Antimicrobial activity**
Two native plants, Tephrosia purpurea (Linn.) Pers. (Fabaceae) and Mimusops elengi (Linn.) (Sapotaceae) were screened for their antimicrobial activity. Preliminary testing of antimicrobial activity of T. 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 and leaf extracts against the above three standard isolates and clinical isolates of two strains of Staphylococcus, two strains of Pseudomonas and nine coliforms 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 T. purpurea. In addition, ethonolic extracts were prepared from the bark of M. elengi and tested for its antimicrobial activity against the above bacterial isolates.
Ethanolic root extracts of T. purpurea were found to be active against P. aeruginosa, two other Pseudomonas strains and two coliform strains. Ethanolic leaf extracts and all the water extracts showed no activity against any of the isolates. The bark extract of M. elengi showed activity against three Staphylococcus isolates including S. aureus. The MIC of ethanolic root extracts of T. purpurea and bark extract of M. elengi were both found to be 128mg/L. There were no differences between the antimicrobial activities of the extracts of T. purpurea plants at different maturity levels [13]

**Antileishmanial activity**
*Tephrosia purpurea* (family: Fabaceae), which is used in traditional remedies for the treatment of febrile attacks, enlargement and obstruction of liver, spleen, and kidney, was found to have significant antileishmanial activity, and has been extensively fractionated to locate the abode of activity. A fraction obtained from *N*-butanol extract of *T. purpurea* showed consistent antileishmanial activity at 50 mg/ kg × 5 days boral route against *Leishmania donovani* infection in hamsters.

Activity was further confirmed in a secondary model, i.e., Indian langur monkeys (*Presbytis entellus*). Thus, the fraction from this plant possesses potential to produce significant antileishmanial activity by oral route without producing any toxic side effects [14].

**Antituberculosis activity**

In-vitro sensitivity testing of the aqueous extract against M.tuberculosis H37Ra was performed in 96 well round bottomed ELISA plate by a broth microdilution method. However when compared with the corresponding wells in the same row of the control column(second column) the wells of the test column showed marked differences in the sizes of the pellet beads. The test columns showed a clear gradulation in size of the pellet beads with the decrease in conc of the phytosiderophore used. The size of pellet was maximum at phytosiderophore dose of 1µg/ml and minimum at a dose of 10mg/ml, where as no of inhibition was observed at the conc of 0.1, 0.01 and 0.001µg/ml respectively. The phytosiderophore inhibitied the growth of the bacterium and maximum percentage reduction in growth was observed at adose of 10mg/ml (the highest dose used), whereas the least percentage reduction was observed at 0.1µg/ml.

The phytosiderophore isolated from roots washing of Tephrosia purpurea has the capacity to inhibited the growth of the tubercle bacillus, M.tuberculosis strain H37Ra, invitro and could be a potent siderophore based drug[15]

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