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Pharmacognostical, preliminary phytochemical evaluation, estimation of phytoconstituents and in-vitro anti-oxidant activity of *Bauhinia purpurea linn*

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ABSTRACT

Bauhinia purpurea is a moderate sized ornamental evergreen tree belongs to the family caesalpinioideae. Kathkors & Gondas tribes of India used young pods, mature seeds are used to treat ulcer, glandular swelling and stomach tumor as laxative, anthelmintic, piles & blood dysentery, diarrhea, goiter, carminative, gripping pain from stomach and bowel, astringent, anti-obesity, respiratory disorder, mensuration trouble, fibrolytic, lymphadenitis, asthma, cyto-toxic, anti-malarial, cytotoxic and leucorrhoea. Phytochemical review showed the presence of glycosides, phenolic compounds, saponins, flavonoids, tri terpenoids, fatty acids and phyto sterols. Literature review revealed the pharmacognostical preliminary phytochemical evaluation was not investigated. An attempt was taken to study the above including estimation and in vitro anti-oxidant activity. It bears compound leaf with reticulate venation, glabourous surface, orbiculate shape and entire margin. Microscopy of leaves showed the presence of collenchyma, cortex, epidermis, parenchymatous cells, pericyclic fibres, stomata, xylem and phloem region in transverse section of petiole, midrib and lamina. Powder microscopy showed reticulate vessels, palisade cells, fibre bundles, prismatic crystals. The quantitative microscopical parameters such as epidermal number (upper epidermis=2432-2720/mm^2, lower epidermis= 1790-2880/mm^2), vein islet (43-56/mm^2), vein termination number (11-15/mm^2), stomatal index (19/mm^2) and stomatal number (432-560/mm^2) was determined. Physicochemical parameters such as loss of drying (5.04±0.299%w/w), aqueous extractive value (36.80±0.679%w/w), ethanol extractive value (22.67±0.715%w/w), total ash (6.2±0.04%w/w) was determined. Phytochemical screening indicated the presence of phenols, sterols, tannins, aminoacids, carbohydrates and glycosides. Quantitative estimation of gallic acid (37mg/gm**)**, tannic acid (120mg/gm**)** & rutin (547mg/gm**)** were determined and correlated with standard. Invitro anti-oxidant activities such as hydrogen peroxide (6.72µg/mL**)**, nitric oxide (7.39 µg/mL) and total anti-oxidant (16.92µg/mL) method were evaluated in comparison with ascorbic acid used as standard.

Keywords: *Bauhinia purpurea*, phytochemical investigation, antioxidant.

INTRODUCTION

Bauhinia purpurea popularly known as butterfly tree belongs to caesalpinioideae, moderate sized ornamental evergreen tree found in lower slopes of Himalayas, distributed in Assam, khasi hills and the western peninsular, occasionally cultivated in gardens,. North Circars, Deccan and Carnatic flowers are used as laxative, its buds are used for the treatment of dysentery. Roots are used as carminatives, bark are used as astringent, anthelmintic and used for the treatment of piles. Bark and root preparations are used for the treatment of haemorroids and goitre [1-4]. In India Kathkors & Gondas tribes, Srilanka and Pakistan tribes used young pods, mature seeds and the plant are used to treat ulcer, glandular swelling and stomach tumor [5, 6]. Tribals of Jalgaon district, Maharastra used the decoction of bark to treat lymphadenitis, asthma and other respiratory disorder [7, 8]. Lodhas, Mundas & Oraons tribes of Odissa, Jharkhand & West Bengal, used root bark paste for ripening of boils and stem bark in the treatment of rheumatism and dried flower powder as laxative and to cure cuts and wounds. Bhoxa tribes of Uttarkhand &Uttar Pradesh used the bark as an astringent, Khasi tribals of Meghalaya and non-tribals of Assam used stem preparations for the treatment of bone fracture, flower are used for indigestion, bark is used for curing of small pox. People of Sikkim, Bengal, Bihar, Orissa and south India, used the leaf preparations to treat jaundice, wounds, and stomach tumor. [9-17]. Phytochemical review showed the presence of glycosides, phenolic compounds, saponins, flavonoids, tri terpenoids, fatty acids and phyto sterols[18-20]. Pharmacological review of leaves revealed the presence of cytotoxic activity, amelioration of hyperthyroidism, antimicrobial, anti-diarrhoeal, antiepileptic, anti-depressant, anti-nociceptive, anti-inflammatory, antipyretics, nephroprotective, wound healing, anti-oxidant, anti-ulcer, anti-hyperlipedimic, hepatoprotective activities [21-37]. An elaborate study was strived to examine the pharmacognostical further findings and preliminary phytochemical evaluation, estimation of phytoconstituents and in-vitro anti-oxidant activity of this plant.

Fig 1: Habitat of *Bauhinia purpurea Linn*

MATERIALS AND METHODS

Plant collection and authentication

Leaves were collected from home garden, Thallakulam, Madurai, Tamil Nadu in the month of July 2021. The species for the proposed study was identified and authenticated by DR. Stephen, Professor, and Department of Botany American College Madurai-625002. The herbarium of this specimen was kept in the department for further reference.

Pharmacognostical studies

Fresh leaves were subjected to pharmacognostical studies includes organoleptic and morphological studies.

Morphological studies of *Bauhinia purpurea Linn*

Leaves were studied separately for its morphological characters and results were given in table 1 and fig 2.

Microscopical studies of *Bauhinia purpurea Linn*

The method was adopted as per Wallis 1965. Thin sections were taken, was stained with routine reagents and was observed under microscope, Results were displayed in fig 3 to 5

Powder microscopy

The coarse powder was treated with routine reagent to identify the diagnostic features of the plant

and results were displayed in figure 6.

Quantitative microscopy of *Bauhinia purpurea Linn*

Determination of phyto –constants

Vein islet and vein termination number, stomatal index, stomatal number, petiole, palisade ratio of fresh leaves were determined as per standard procedure [38]. Results are displayed in table 2 and figure 7.

Preparation of leaf powder

The leaves were collected and shade dried coarsely powdered and stored in a well closed container. The powder was screened for the presence of special character, physicochemical constants.

Physio-chemical parameters

The powder was subjected to physiochemical parameters such as foreign organic matter, loss on drying, ash value, and extractive value with different solvents in increasing order of polarity and results are displayed in the table 3 [39].

Qualitative screening

Preparation of hydroalcoholic extract of *Bauhinia purpurea Linn* leaves (HAEBP)

The leaves were collected, shade dried and coarsely powdered, passed through sieve no 40, was extracted with 70% hydro-alcohol by maceration technique, was concentrated to dryness and stored in a closed container. The extract was analysed qualitatively and quantitatively.

Preliminary phytochemical screening

Hydro-alcoholic extract of *Bauhinia purpurea Linn* (Leaf) is subjected to qualitative chemical analysis and was determined as per Harbone method. [40]. Results were given in table 4.

Estimation of phyto-constituents

Determination of gallic acid content

The method was as per Singleton etal., 1999, About 1 mL (1mg/ml) of hydroalcoholic extract of *Bauhinia purpurea* (HAEBP), 0.5 mL of Folin-ciocalteu reagent (1N) were added and allowed to stand for 15 minutes. Then 1 mL of 10% sodium carbonate solution was added to the above solution. Finally the mixtures were made up to 10 mL with distilled water and allowed to stand for 30 minutes at room temperature and total phenolic content was determined spectrophotometrically at 760nm wavelength. The calibration curve was generated by preparing gallic acid at different concentration (2, 4, 6, 8 µg/mL). The reaction mixture without sample was used as blank. Total phenolic content of HAEBP extract is expressed in terms of mg of gallic acid equivalent per gm of extract (mg GAE/g) and results were displayed in table 5 and fig 8[41].

Determination of tannin acid content

The method was as per Rabianaz and Asghari Bano, 2013, 0.2 mL of (1 mg/mL) hydroethanolic extract of *Bauhinia purpurea*, was made up to 1 mL with distilled water. Then add 0.5 mL of Folin Denis reagent and allowed to stand for 15 mins, then 1 mL of sodium carbonate solution was added to the mixture and it was made up to 10 mL with distilled water. The mixture was allowed to stand for 30 mins at room temperature and the tannin content was determined spectrophotometrically at 760 nm. The calibration curve was generated by preparing tannic acid at different concentration (2, 4, 6, 8µg/mL). The reaction mixture without sample was used as blank. The total tannin content in the leaf extract was expressed as milligrams of tannic acid equivalent per gm of extract as per Rabianaz and Asghari Bano, 2013 and results were displayed in table 6 and fig 9[42].

Determination of rutin (flavonoid) content

The method was as per Zhishen etal., 1999, 1mL of hydro-ethanolic extract of *Bauhinia purpurea*, 0.1 mL of aluminium chloride solution, 0.1 mL of potassium acetate solution and 2.8 mL of ethanol were added and the final volume was then made up to 5 mL with distilled water. After 20 min the absorbance was measured at 415 nm. A calibration curve was constructed by plotting absorbance reading of rutin at different concentrations (10, 15, 20µg/mL). The sample without aluminium chloride was used as a blank. The total flavonoid content in the extract was expressed as milligrams of rutin equivalent per gram of extract and results were displayed in table 7 and fig 10[43].

In-vitro Anti-oxidant activity

Determination of scavenging activity against hydrogen peroxide

The method was as per MG. Rana *et al.*, 1996, To 1 mL of test solutions of different concentrations, 3.8 mL of 0.1 M phosphate buffer solution (pH 7.4) and then 0.2 mL of hydrogen peroxide solution were

added. The absorbance of the reaction mixture was measured at 230 nm after 10 min. The reaction mixture without sample was used as blank. Sample blank was also prepared without reagents. Ascorbic acid was used as standard. The percentage inhibition of hydrogen peroxide was calculated using the formula,

% inhibition = [(Control–Test) / Control] × 100

The concentration of the sample required for 50 % reduction in absorbance (IC_{50}) was calculated using linear regression analysis. Results were displayed in Table 8 and figure 11[44].

Determination of radical scavenging activity against nitric oxide

The method was as per Marocci etal., 1995, Nitric oxide scavenging activity was determined according to the method HAEBP extract, Ascorbic acid as standards in the range of 2 –10 µg were taken in respective tubes containing phosphate buffer saline, so that the volume in each tube was made up to 1ml. For controls, volume was made up to 3ml with phosphate buffer saline. Then 2ml of 10mM sodium nitroprusside added to all the tubes except the controls. Nitric oxide radicals were generated from the samples spontaneously during the incubation period of 150 min. 0.5ml of the solution taken from each tube to their respective tubes. To this 1ml of 0.33% sulphanilamide added and allowed to stand for 5 min for completing diazotization, followed by the addition of 1ml of NED (0.1%) to each tube. Then incubate for 30 min at room temperature. The nitrite ions released were measured at 516nm and % Nitric Oxide radical scavenging activity was calculated using the following formula. Results were displayed in table 9 and fig 12[45].

$$\text{\% inhibition of nitric oxide radical activity} = \frac{(\text{Abs of control} - \text{Abs of sample})}{\text{Abs of control}} * 100$$

Determination of total antioxidant activity

The method was as per Prieto *et al*., 1999)Hydro-alcoholic extract of *Bauhinia purpurea* in different concentration ranging from 2µg to 10 µg were added to each test tube individually containing 3 ml of distilled water and 1 ml of Molybdate reagent solution. These tubes were kept incubated at 95 °C for 90 min. After incubation, these tubes were normalized to room temperature for 20-30 min and the absorbance of the reaction mixture was measured at 695 nm. Mean values from three independent samples were calculated for each extract. Ascorbic acid was used as positive reference standard. Results were displayed in Table 10 and fig 13[46].

RESULTS AND DISCUSSION

Macroscopy

Leaves are green coloured, 10 to 18 cm, broad and long; deeply divided into 2 acute or rounded lobes, petiolate, petiole 2 to5 cm long; 8 to 11 nerved; taste and odour not distinct

Dorsal view

ventral view

Fig 2: Macroscopy of leaf

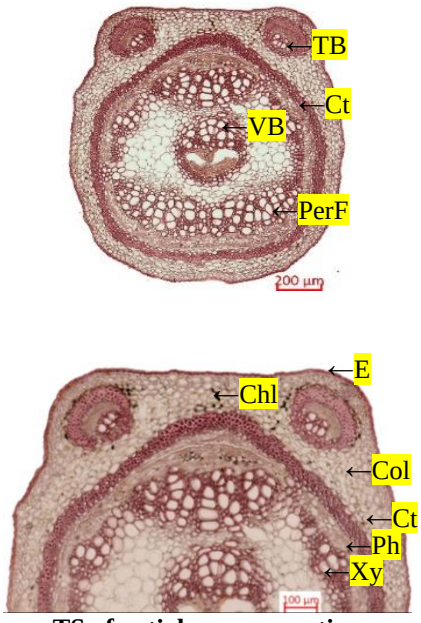
Table 1: Determination of morphological characters of *Bauhinia purpurea Linn*

S.no	Characteristics	Reports
1	Colour	Green
2	Odour	No characteristic
3	Taste	Slightly bitter
4	Type	Simple
5	Arrangement	Alternate with 3-11 leaflets in one branch
6	Size	Length-10 to 18cm broad and long
7	Shape	Orbiculate
8	Apex	Carduate
9	Base	Stipulate
10	Margin	Entire
11	Venation	Reticulate
12	Texture	Coriaceous
13	Surface	Glaburous
14	Petiole	Length 2 to 5cm long and 8 to 11cm nerved

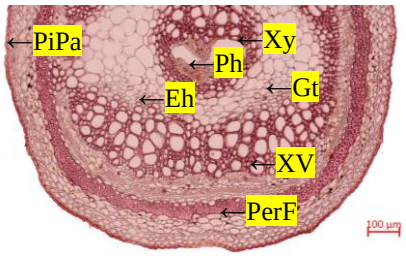
Microscopy

Petiole

TS of petiole shows oval shaped with upper wings; epidermis is single layered with thin cuticle followed by 2 to 4 layer of narrow collenchymatous hypodermis and cortex; cortex is made up of thin walled parenchymatous cells and a few cells contain chlorophyll pigment. Trace bundles are found in each winged region; it is made up of conjoint, collateral, closed vascular bundle surrounded by pericyclic fibre; wide region of the section is occupied by a ring (or discontinuous ring) of vascular tissue surrounded by thick-walled pericyclic fibre. Vascular bundle is conjoint, collateral; xylem consists of endarch vessels with radial multiplication, pitted parenchyma, tracheid and fibres; phloem tissue made up of thin-walled cells with usual elements. Ground tissue contains parenchymatous embedded with a vascular bundle at the centre (Fig 3.1- 3.2).



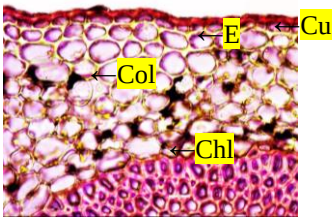
TS of petiole upper portion



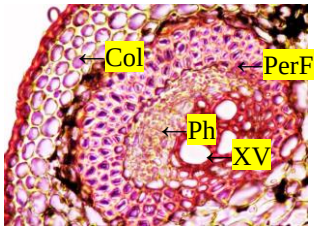
TS of petiole lower portion

Chl - chlorenchyma; **Col -** Collenchyma; **Ct -** Cortex; **E** - epidermis; **Eh -** endarch; **Gt -** ground tissue; **PerF-** Pericyclic fibre; **Ph -** phloem; **PiPa -** pitted parenchyma; **TB -** Trace bundle; **VB -** Vascular bundle; **XV -** Xylem vessel.

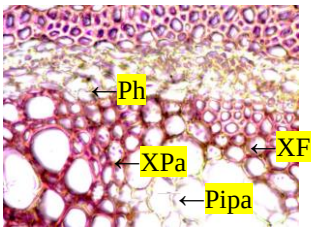
Fig 3.1: TS of Petiole



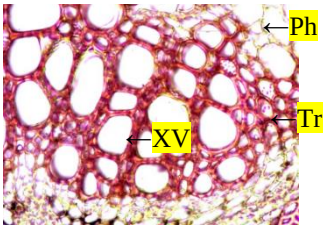
Upper portion enlarged



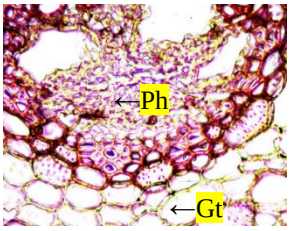
Wing portion with trace bundle enlarged



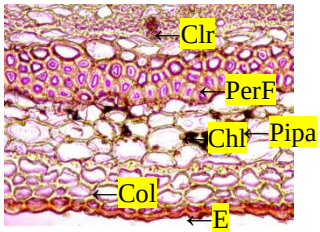
Vascular region



Central vascular (Xylem region)



Central vascular (Phloem region)



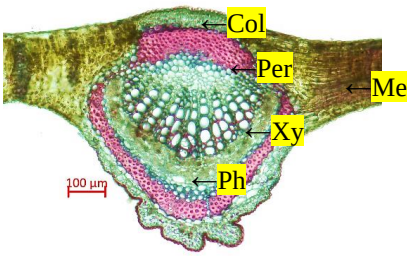
Lower portion enlarged

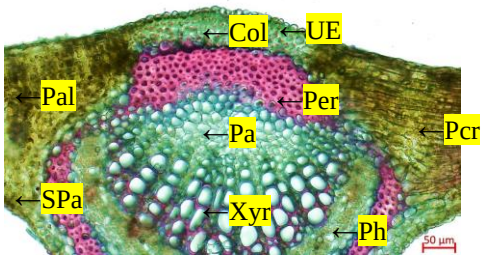
Clr – cluster crystals of calcium oxalate; **Cu** – cuticle; **E** - epidermis; **Ph -** phloem; **Pipa -** pitted parenchyma; **XV –** xylem vessel; **XF -** xylem fibre; **XPa -** xylem parenchyma; **Tr -** Tracheid.

Fig 3.2: **TS of Petiole enlarged view**

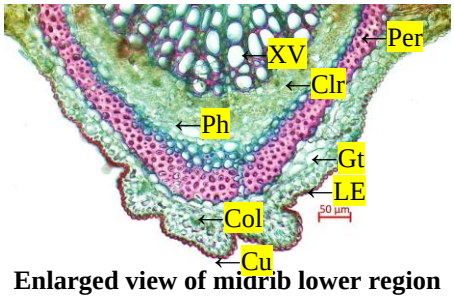
Midrib

TS of leaf passing through midrib shows single layer of upper and lower epidermis with thin cuticle; at the midrib upper region epidermis is followed by 3 to 4 layers of collenchyma cells. Centrally located well developed arc of conjoint and collateral vascular bundle caped by group of pericyclic fibre on both side; xylem and phloem tissue contain usual elements; prismatic and cluster crystals of calcium oxalates are distributed in phloem and parenchymatous ground tissue (Fig. 4).





Enlarged view of midrib upper region



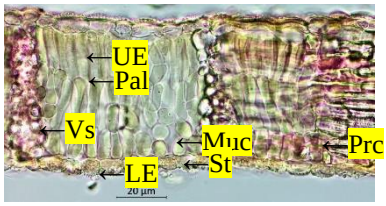
Enlarged view of midrib lower region

Clr - cluster crystals of calcium oxalate; **Col** - collenchyma; **Cu** - cuticle; **LE** - lower epidermis; **Me** - mesophyll cells; **Pa** - parenchyma; **Pal** - palisade; **Pcr** - prismatic crystals; **Per** - pericycle; **Ph** - phloem; **SP** - spongy parenchyma; **UE** - upper epidermis; XV – Xylem vessel; **Xy** - xylem; **Xyr** - xylem ray.

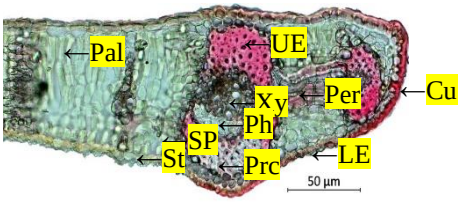
Fig 4: TS of Leaf passing through midrib

Lamina

TS of lamina shows tangentially elongated rectangular upper epidermis covered by thin cuticle followed by 3 to 5 rows of prominent palisade parenchymatous cells, rarely spongy parenchyma is present in between 3 celled rows of palisade and lower epidermal stomata; small vascular strands capped by pericyclic fibre in both side traverse the leaf lamina; prismatic and cluster crystals of calcium oxalates found throughout the lamina along the side of leaf veins; round to oval small sized epidermal cells with stomata in the lower side tissue (Fig. 5).



TS of lamina



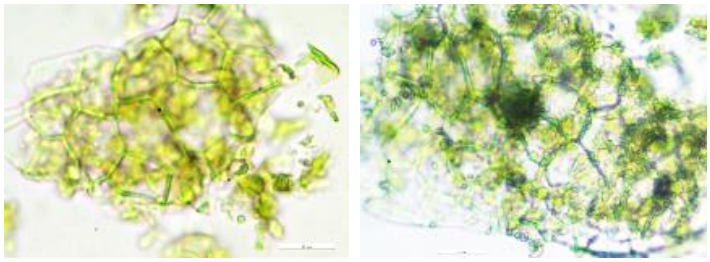
TS of lamina margin

Cu - cuticle; **LE** - lower epidermis; **Muc** - mucilage cavity; **Pal** - palisade; **Pcr** - prismatic crystals; **Per** - pericycle; **Ph** - phloem; **SP** - spongy parenchyma; **St**-stomata; **UE** - upper epidermis; **VS** - vascular strand; **Xy** - xylem.

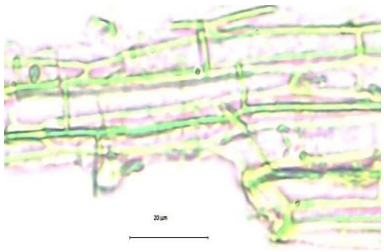
Fig 5: TS of lamina

Powder microscopy of Leaf

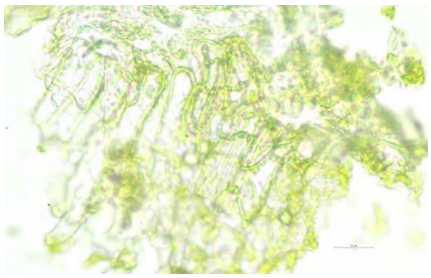
The powder is light green coloured with indistinct smell and taste, it shows the characters such as epidermal cells in surface view, parenchyma cells from petiole, palisade cells, vessels with reticulate and bordered pitted thickenings, thick-walled fibre with narrow lumen, fibre bundles, prismatic and cluster crystals of calcium oxalates distributed throughout lamina along the side of Veins tissue (Fig.6).



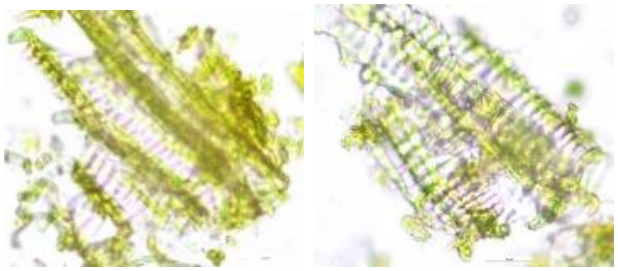
Upper epidermal cells in surface view



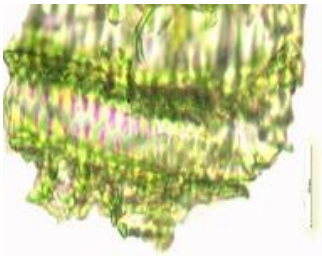
Parenchyma cells from petiole



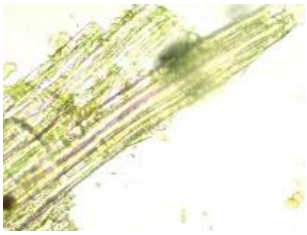
Palisade cells



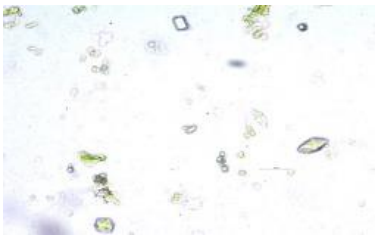
Reticulate vessels



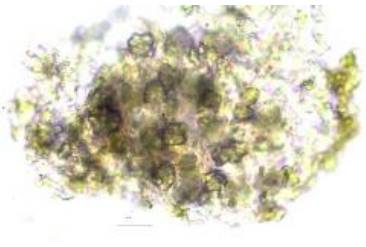
Bordered pitted vessel



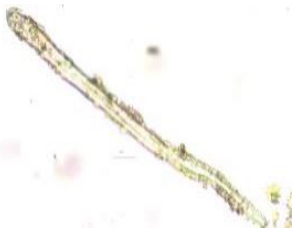
Fibre bundle



Prismatic crystals



Cluster crystals



Thick walled fibre

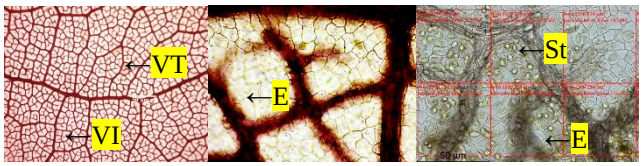
Fig 6: Powder microscopy of *Bauhinia purpurea*

Quantitative microscopy

The quantitative parameters obtained during microscopic observation of epidermal peelings of leaves were recorded in Table 2. The leaves showed anomocytic stomata and paracytic stomata on lower surface tissue (Fig.7)

Table 2. Quantitative microscopy of *Bauhinia purpurea* leaf

S.No	Parameters	Upper epidermis (/mm^2)	Lower epidermis (/mm^2)
1	Epidermal number	2432-2720	1790-2880
2	Stomatal number	----------	432-560
3	Stomatal index	----------	19
4	Palisade ratio	3-6	----------
5	Vein islets number	43-56	----------
6	Vein termination number	11-15	----------



E – Epidermis; **St** – Stomata; **VI** – Vein islet; **VT** – Vein termination.

Fig 7: Quantitative microscopy of *Bauhinia purpurea*

Table3: Determination of physicochemical parameters of *Bauhinia purpurea Linn*

S.no	Physio-chemical constant	Reports %w/w
1	Foreign matter	Nil
2	Bitterness value	Nil
3	Loss on drying	5.04±0.299
4	Total solids	94.96
5	Petroleum ether extractive	18.35 ±0.729
6	Ethyl acetate extractive	25.49 ±0.639
7	Chloroform extractive	41.07 ±0.879
8	Ethanol extractive	22.67 ±0.715
9	Aqueous extractive	36.80 ±0.679
10	Total ash	6.2±0.04
11	Water soluble ash	2.2±0.05
12	Acid insoluble ash	1.2±0.02

Table 4: Preliminary phytochemical screening of hydro alcoholic extract of *Bauhinia purpurea Linn*

s.no	Phyto constituents	HAEBP
1	Test for carbohydrates	present
2	Test for alkaloids	absent
3	Test for glycosides	present
4	Test for protein	present
5	Test for Flavonoid	Trace
6	Test for Saponins	Present
7	Test for Sterols	Present
8	Test for Tannins	present

Quantitative analysis of *Bauhinia purpurea Linn* (HAEBP)

HAEBP was subjected to quantitative estimation of gallic acid, tannin acid, rutin and results was displayed in table 6, 7, 8 and fig 8,9,10 respectively.

Table 6: Determination of gallic acid equivalent in HAEBP)

S.No	Concentration of gallic acid	Absorbance of gallic acid	Concentration of HAEBP	Absorbance of HAEBP
1	2	0.204 ± 0.00115	10	0.061± 0.00088
2	4	0.403 ±0.00088	20	0.092 ±0.00057
3	6	0.546 ±0.00185	30	0.121 ±0.00088
4	8	0.704 ±0.00057	40	0.158 ±0.00066
5	10	0.775 ±0.00115	50	0.182 ±0.00057
			GAE	**37mg/gm.**

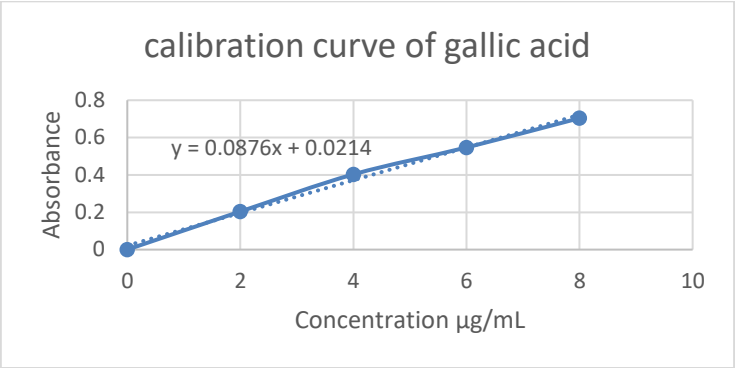


Fig 8: Calibration curve of gallic acid

It is evaluated that hydro-alcoholic extract of *Bauhinia purpurea* contains total gallic acid equivalent (GAE) 37mg/gm.

Table 6: Determination of tannic acid equivalent in hydro-alcoholic extract of *Bauhinia purpurea* (HAEBP)

S.No	Concentration of tannic acid	Absorbance of tannic acid	Concentration of HAEBP	Absorbance of HAEBP
1	2	0.076± 0.00176	10	0.025± 0.00088
2	4	0.124 ±0.00088	20	0.076 ±0.00088
3	6	0.175 ±0.00057	30	0.123 ±0.00033
4	8	0.214 ±0.00066	40	0.172 ±0.00088
5	10	0.355 ±0.0991	50	0.212 ±0.00088
			TAE	**120mg/gm.**

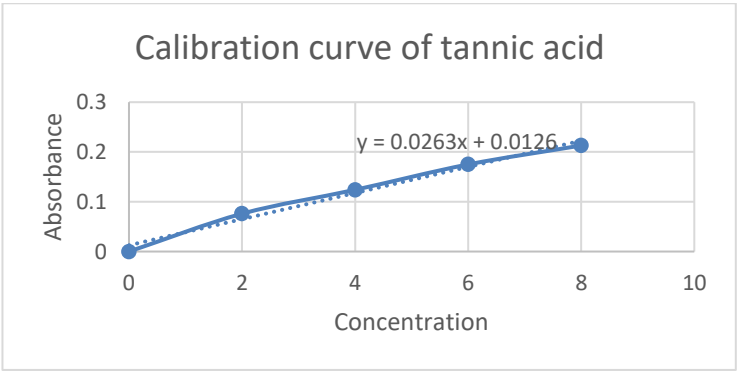


Fig 9: Calibration curve of tannic acid

It is intimated that hydroalcoholic extract of *Bauhinia purpurea* contain total tannic acid equivalent (TAE) 120mg/gm.

Table 7: Determination of rutin equivalent in hydroalcoholic extract of *Bauhinia purpurea* (HAEBP)

S.No	Concentration of rutin	Absorbance of rutin	Concentration of HAEBP	Absorbance of HAEBP
1	8	0.084± 0.00088	10	0.074± 0.00120
2	10	0.092 ±0.00066	20	0.080 ±0.00066
3	15	0.104± 0.0017	30	0.086± 0.00145
4	20	0.109 ±0.0014	40	0.094 ±0.00251
5			50	0.099 ±0.00288
			RAE	**547mg/gm.**

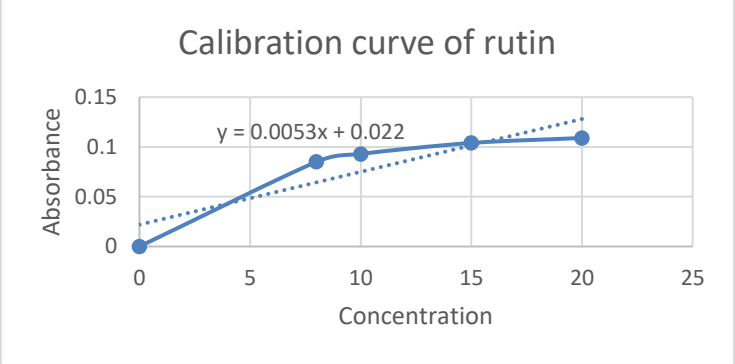


Fig 10: Calibration curve of rutin

It is determined that hydro-alcoholic extract of *Bauhinia purpurea* showed total rutin equivalent (RE) 547mg/gm.

IN-VITRO ANTI-OXIDANT ACTIVITY

HAEBP was screened for in-vitro anti-oxidant activity and was carried out by hydrogen peroxide, nitric oxide method & total anti-oxidant capacity. Results were displayed in table8, 9, 10 and figure 11, 12, 13 respectively.

Table 8: Determination of hydrogen peroxide scavenging effcet of *Bauhinia purpurea* (HAEBP)

S. No	Concentration of ascorbic acid & HAEBP (µg)	Percentage inhibition of ascorbic acid	Percentage inhibition of HAEBP
1	2	94.83 ± 0.00016	73.29±0.00181
2	4	94.88 ±0.00881	66.42±0.00111
3	6	95.87 ±0.00564	57.52±0.00185
4	8	95.37 ±0.00066	47.81±0.00138
5	10	95.17 ±0.00872	38.98±0.00262
	IC_{50}	**0.72µg/mL**	**6.72µg/mL**

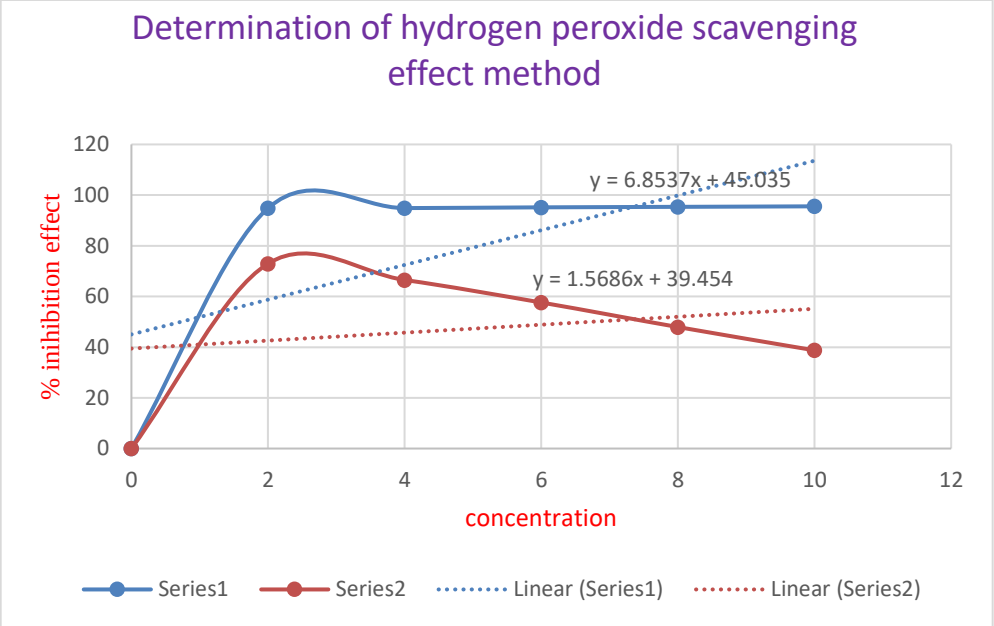


Fig 11: Determination of hydrogen peroxide scavenging effect against *Bauhinia purpurea* (HAEBP)

It is observed that hydrogen peroxide scavenging effect of *Bauhinia purpurea* (HAEBP) was found to be 6.72µg/mL against percentage inhibition of ascorbic acid 0.72µg/mL.

Table 9: Determination of nitric oxide scavenging method of *Bauhinia purpurea* (HAEBP)

S. No	Concentration of ascorbic acid & HAEBP (µg)	Percentage inhibition of ascorbic acid	Percentage inhibition of HAEBP
1	2	67.71 ± 0.1058	44.54±0.00535
2	4	76.96 ± 0.0200	51.50±0.00322
3	6	81.41 ± 0.0480	49.20±0.00277
4	8	84.47 ± 0.0240	48.75±0.00037
5	10	86.38 ± 0.00666	51.22±0.0011
	IC_{50}	**2.67µg/mL**	**7.39 µg/mL**

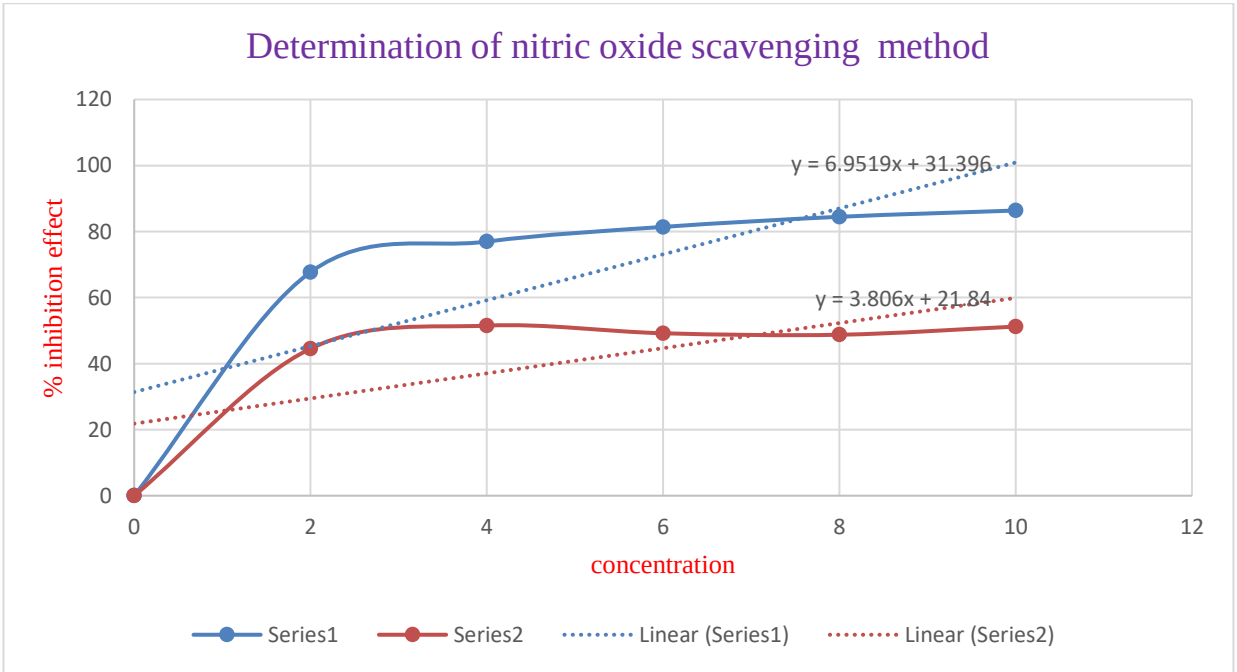


Fig 12: Determination of nitric oxide scavenging effect against *Bauhinia purpurea* (HAEBP)

It is noticed that nitric oxide scavenging effect of *Bauhinia purpurea* (HAEBP) was found to be 7.39 µg/mL against percentage inhibition of ascorbic acid 2.67 µg/mL.

Table 10: Determination of total anti-oxidant capacity of *Bauhinia purpurea* (HAEBP)

S. No	Concentration of ascorbic acid & HAEBP (µg)	Percentage inhibition of ascorbic acid	Percentage inhibition of HAEBP
1	2	93.66±0.00088	24.28±0.00049
2	4	94.06±0.00761	25.65±0.00071
3	6	94.46±0.00348	27.94±0.00103
4	8	94.72±0.00066	28.17±0.00035
5	10	95.01±0.00088	29.41±0.0014
	IC_{50}	**0.80µg/mL**	**16.92 µg/mL**

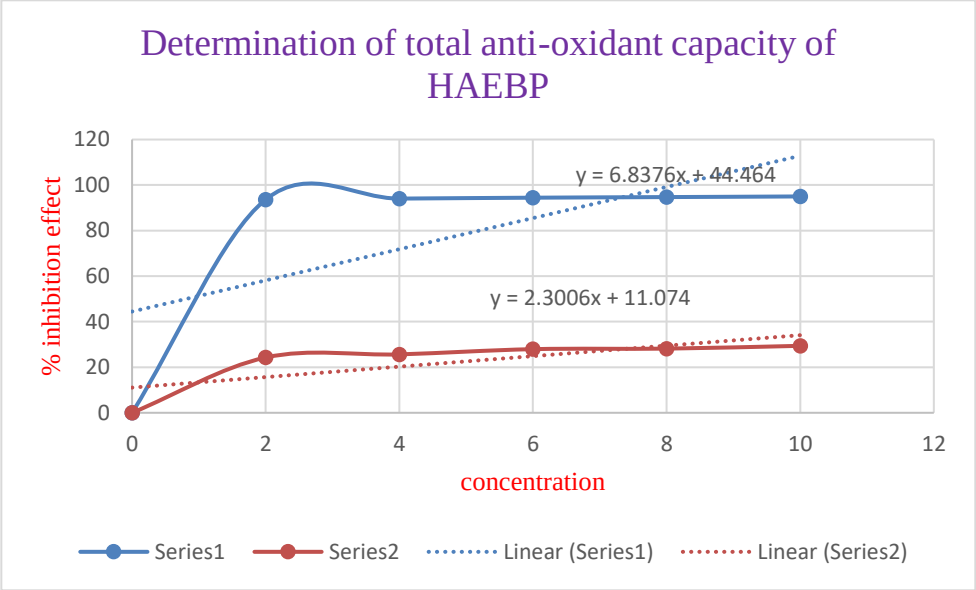


Fig 13: Determination of total anti-oxidant effect against *Bauhinia purpurea* (HAEBP)

It is estimated that total anti-oxidant capacity of Bauhinia purpurea (HAEBP) was found to be a **16. 92 µg/mL** against percentage inhibition of ascorbic acid **0.80µg/mL.**

CONCLUSION

The present research article draws some pharmacopoeial monographs for this medicinal plant which is used by tribal of Gondas and Kathkors, India to treat cancer. The observed parameters coincides with the pharmacognostical reviews. Therefore this medicinal plant can be turned into herbal preparation to treat such diseases. In the present study some of the additional microscopical characters had been investigated which would further add credits to additional pharmacognostical information. Characters such as collateral vascular bundles, rectangular upper epidermis, palisade parenchyma, prismatic & cluster crystals of calcium oxalates and anomocytic & paracytic stomata. Quantitative microscopical parameters such as epidermal number, vein islets number, vein termination number, stomatal index, stomatal number & palisade ratio were derived for this plant which slightly differ from previous article indicates the geographical variation. Physico-chemical parameters were derived and complied with previous research. Quantitative estimation of gallic acid, tannic acid and rutin were derived for this plant slightly differ from previous publication which may be due to the different solvent. The present phytochemical screening of HAEBP revealed the presence of carbohydrates, phenol, sterols, tannin, protein, glycosides. In-vitro anti-oxidant activity for HAEBP was determined by hydrogen peroxide, nitric oxide & total anti-oxidant method and was noticed that HAEBP showed moderate antioxidant effect in comparison with ascorbic acid used as reference.

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