



# PHYTOCHEMICAL ANALYSIS AND TOTAL TANNIN CONTENT (TTC) OF *DELONIX REGIA* (BOJER EX. HOOK) RAF. BARK BY USING DIFFERENT SOLVENTS COLLECTED FROM SAURASHTRA REGION

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## ABSTRACT

*Delonix regia* (Bojer ex. hook) Raf. is belongs to Leguminosae (Fabaceae) family and Sub family Caesalpiniodeae. Usually it's called gulmahor in Gujarati. It is used as an ornamental plant but it has some bioactive constituents which are useful in medicinal level. *Delonix regia* (Bojer ex. hook) Raf. is a beautiful, semi-deciduous and roadside avenue tree. It is cultivated in rural and urban area in India. It has medicinal properties such as antimicrobial and antifungal activities or as antibiotics. In this present study, qualitative and quantitative estimation of *Delonix regia* (Bojer ex. hook) Raf. bark from Saurashtra region. The preliminary phytochemical analysis and quantification for total tannin content was performed by using two different solvents (Acetone and Ethanol). The phytochemical analysis revealed that the presence of various phytochemicals such as phenols, tannins, flavonoids, proteins etc. Based on experiment, various bioactive constituents were present so it's important for pharmaceutical level.

**Keywords:** Fabaceae, Tannin, quantitative analysis, *Delonix*

## INTRODUCTION

Plants synthesize active constituents which occur naturally in plant is known as phytochemicals (Kousalya P. and Jayanthi V., 2016). *Delonix regia* belongs to Leguminosae (fabaceae) family and subfamily caesalpinioidae. The generic name 'Delonix' is derived from the Greek words: Delos means visible and onyx means claw. The 'regia' is from Latin word 'Regis' (royal). *Delonix regia* is commonly called as gulmahor in Hindi. In French it's called flamboyant, poinciana, royal. In Hindi, Gulmohar, sunkesula. In English, gulmohur, flame tree, royal Poinciana, peacock flower. It is a roadside avenue tree plant 10-15 m high and girth of up to 2 m. These plants contain many branches and umbrella shaped crown. Leaves are biparinnate, alternate, light green and feathery, 10-25 pairs of pinnae, each having 12-40 pairs of small leaflets. Slightly fragrant orange-red flowers were observed, which literally cover the tree May to June. Broadly spoon shaped petals and its size 5-6.5 cm, 2-3 cm wide (Sharma S. and Arora S. (2015). When planted in fully sun location, *Delonix regia* will provide full flowering and the best growth (Shanmukha, I., et al. (2011). *Delonix regia* is widely planted in tropical areas, such as Taiwan, India, Vietnam, Malaysia and Central region of South America (Wang L. S. et al. 2016). Nagarajan S.S. et al. (2016) reported that *Delonix regia* is used as traditionally and it has various medicinal properties including anti-inflammatory, anti-oxidant, anti-diabetic, anti-microbial, anthelmintic, wound healing and gastro protective activity. Singh, S., & Kumar, S. N. (2014) reported that flower is also used as tablet binder. The roots of *Delonix regia* are important as a potent against abdominal pain. Leaves are useful for as anti-inflammatory, antibacterial activity.

## MATERIALS AND METHODS

Authentication of plant material

Selected plant *Delonix regia* (Bojer ex. hook) Raf. was authenticated by Prof. Dr. Bharat

Maitreya from Department of Botany, Bioinformatics and Climate Change Impacts Management, Gujarat University, Ahmedabad.

#### Collection of plant materials

Bark of *Delonix regia* (Bojer ex. hook) Raf. were collected from Saurashtra region and dried at room temperature then crushed it. Dried powder stored in the air tight bottle for analysis.

#### Preparation of plant extract

10 gm of plant's bark powder were added into 100 ml selected solvents (Acetone and Ethanol). Then shaken well and kept it overnight for soaked. After 24 hours filter the samples through whatman filter paper no.1 and these filtrate was collected in petriplates and allowed it till solvent was evaporated. Collected the extract and stored it 20° C for further analysis.

#### Phytochemical analysis:

The phytochemical screening of acetone and ethanol crude extracts by cold extraction method was individually performed for the presence of tannins, phenols, carbohydrates, alkaloids, proteins, amino acids and glycosides etc by standard procedure. Quantitative estimation of Total Tannin Content (TTC) was also done.

#### Qualitative analysis [Panchal, P.M., (2012), Banu, K.S. and Cathrine, L., (2015)]

For Tannins:

- 1) **Lead acetate test:** The 50 mg extract was dissolved in 5ml of distilled water and to this 3ml of 10% lead acetate solution was added. A bulky white precipitate obtained.
- 2) **Test with KMnO<sub>4</sub>:** Few ml extract was taken and 1 ml potassium dichromate solution was added. Discoloration of KMnO<sub>4</sub> observed.

#### Quantitative analysis

##### Total Tannin Content (Padma, R. et al., (2013))

Quantitative analysis of total tannin content (TTC) for bark of *Delonix regia* by Folin Denis method with some modifications. Tannic acid was used as standard. Tannic acid was prepared with different concentration with different solvents. The ethanol and acetone extract mixed with 0.1 ml Folin Denis reagent (1:10) then 1 ml sodium carbonate (7.5%) was added. These mixtures shaken well and allowed it to 30 minutes for incubation at room temperature and measured the absorbance at 700 nm using UV-visible spectrophotometer. Total tannin content was calculated as mg tannic acid equivalent from equation obtained from a calibration curve.

## RESULTS

The powdered of *Delonix regia* (Bojer ex. hook) Raf. bark extracted using different solvents (Acetone and Ethanol).

Table 1. Phytochemical screening of *Delonix regia* (Bojer ex. hook) Raf. bark extracts

No.	Name of metabolites	Test name	Saurashtra	
			<i>Delonix regia</i> Bark (Ethanol)	<i>Delonix regia</i> Bark (Acetone)
1.	Alkaloids	a) Mayer's test	-	-
		b) Dragendorff test	-	-
		c) Wagner's test	-	+
2.	Flavonoids	a) Alkaline reagent test	++	+
		b) Zinc hydrochloride reduction test	+	-
		c) Pew test	+	-
		a) Ferric chloride test	++	+
		b) Lead acetate test	+++	+++
		c) Potassium	+++	-

3.	Phenols	dichromate test		
		d)Alkaline reagent test	++	++
4.	Tannins	a)Lead acetate test	+++	+++
		b)Potassium dichromate test	+++	-
5.	Steroids	Libermann-sterol test	-	-
6.	Glycosides	Keller-killani test	-	-
		a) Molisch's test	+	+
		b)Fehling's test	-	-
7.	Sugar/Carbohydrates	c)Benedict's test	-	-
		d)Iodine test	-	-
		a)Millon's test	+++	+
		b)Ninhydrin test	-	-
8.	Protein/ Amino acid	c)Xanthoproteic test	+	-
9.	Fixed oil		-	-

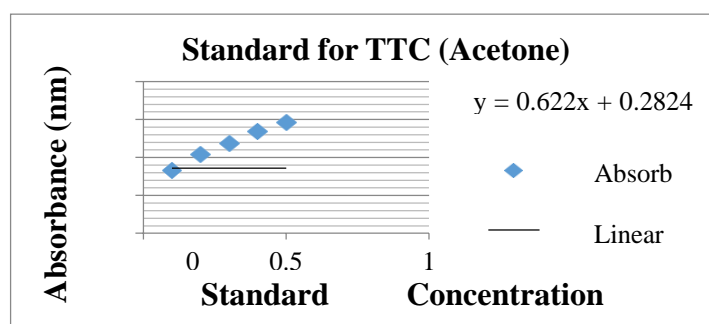
Here – (Not present), + (Slightly present), ++ (Quite present), +++ (Highly present)

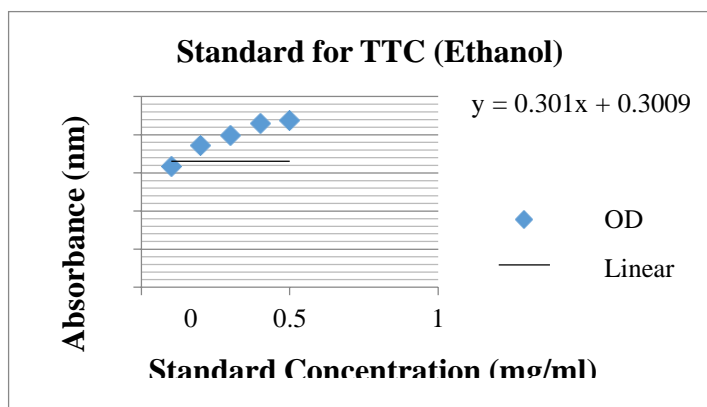
### Phytochemical screening

Phytochemical analysis of *Delonix regia* (Bojer ex. hook) Raf. bark has been done for the selected Saurashtra region. Selected solvents are used for extractions which are depended on solvents polarities. In this present study, phytochemical screening test and quantification for tannin was done using two different solvents: ethanol and acetone. Phytochemical screening of *Delonix regia* (Bojer ex. hook) Raf. bark revealed that presence of various bioactive constituents such as phenols, tannins, flavonoids, sugar /carbohydrates, protein/amino acid etc were present in both solvent. Glycosides, steroids were absent in both solvent. But alkaloids were absent in ethanolic extract.

Table 2. Total Tannin Content for *Delonix regia* (Bojer ex. hook) Raf. Bark

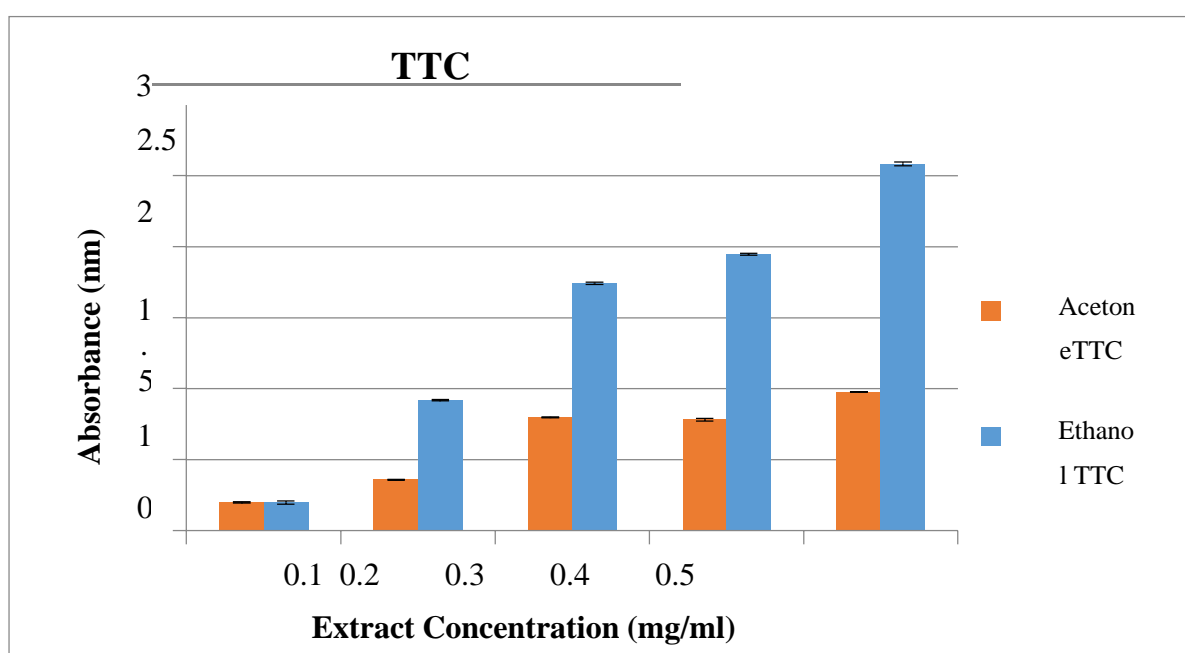
<b>Total Tannin Content (TTC)</b>						
<b>Delo nix regi a</b>	<b>Extract</b>	<b>Concentration (mg/ml)</b>				
		<b>0.1</b>	<b>0.2</b>	<b>0.3</b>	<b>0.4</b>	<b>0.5</b>
<b>Sau ra-shtr a</b>	<b>Aceto ne</b>	0.198±0.004	0.359±0.004	0.797±0.004	0.782±0.010	0.976±0.002
	<b>Etha nol</b>	0.199±0.011	0.919±0.005	1.743±0.008	1.949±0.006	2.584±0.013





**Figure 1: Tannic acid standard graph (Acetone)**

Figure 2: Tannic acid standard graph (Ethanol)



**Figure 3: For *Delonix regia* (Bojer ex. hook) Raf. bark total tannin content (Saurashtra) Quantitative analysis (Total tannin content)**

Total tannin content of *Delonix regia* (Bojer ex. hook) Raf. bark was estimated by Folin Denis method. TTC was calculated for acetone extract from regression equation of calibration curve ( $y=0.622x+0.2824$ ,  $R^2=0.9903$ ) and for ethanol extract from regression equation of calibration curve ( $y=0.301x+0.3009$ ,  $R^2=0.9299$ ). Total tannic content (TTC) was expressed as tannic acid equivalents. In Saurashtra area acetone extract showed total tannin content (TTC)  $0.976\pm0.002$  mg/ml at 0.5 concentration and ethanol extract showed total tannin content  $2.584\pm0.013$  mg/ml at

0.5 concentration of tannic acid equivalent. Ethanol extract showed that high amount of tannin content present in ethanol extract as compared to acetone extract.

## CONCLUSION

This presented study showed that, various phytochemical bioactive constituents were present in *Delonix regia* (Bojer ex. hook) Raf. bark. Based on quantitative analysis, total tannin content present in high amount which have good medicinal value. *Delonix regia* plants are used as roadside avenue tree as well as it is also important for pharmaceutical level and new drug development. Thus it's concluded that various phytoconstituents are very useful for the treatment of various diseases including inflammations, diabetes, diarrhoea, microbial



infections and gastric ulcers.

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## REFERENCES

- 1) Banu, K. S., & Cathrine, L. (2015). General techniques involved in phytochemical analysis. *International Journal of Advanced Research in Chemical Science*, 2(4), 25-32.
- 2) Kousalya, P., & Jayanthi, V. (2016). Evaluation of Phytochemicals and Quantification of Phenol, Flavonoids and Tannins of Pods of *Leucaena leucocephala* (Lam.) De Wit.
- 3) Nagarajan, S. S., Periyannan, M., & Ramalingam, R. (2016). Pharmacognostical and Phytochemical Studies of *Delonix regia*. *Research Journal of Pharmacognosy and Phytochemistry*, 8(2), 70.
- 4) Padma, R., Parvathy, N. G., Renjith, V., Kalpana, P. R., & Rahate, P. (2013). Quantitative estimation of tannins, phenols, and antioxidant activity of methanolic extract of *Imperata cylindrica*. *Int J Res Pharm Sci*, 4(1), 73-7.
- 5) Panchal, P. M. (2012). Pharmacognostical and Phytopharmacological Investigation of *Peltophorum pterocarpum* (DC) Backer ex. Heyne. *International Journal of Ayurvedic Medicine*, 3(4), 196-217.
- 6) Sharma S. and Arora S. (2015). Phytochemicals and pharmaceutical potential of *Delonix regia* (Bojer ex hook) Raf a Review, *Int J Pharm Pharm Sci* Vol, 7, 17-29.
- 7) Shanmukha, I., Patel, H., & Patel, J. (2011). Riyazunnisa. Quantification of total phenol and flavonoid content of *Delonix regia* flowers. *Int. J. Chem. Tech. Res*, 3, 280-283.
- 8) Singh, S., & Kumar, S. N. (2014). A review: introduction to genus *Delonix*. *World J Pharm Pharm Sci*, 3(6), 2042-55.
- 9) Wang, L. S., Lee, C. T., Su, W. L., Huang, S. C., & Wang, S. C. (2016). *Delonix regia* Leaf Extract (DRLE): A Potential Therapeutic Agent for Cardioprotection. *PloS one*, 11(12), e0167768.