

## Phytochemical Screening of Plant *Pongamia Pinnata* (Linn.)

Savya Singh, Research Scholar, School of Pharmacy, Glocal University Saharanpur (U.P)

Dr. Pawan Prakash (Associate Professor), Research Supervisor, School of Pharmacy, Glocal University Saharanpur (U.P)

### 1. ABSTRACT

The phytoconstituents were identified by chemical test which showed the various phytoconstituents mainly in the following extract Glycoside, Carbohydrate, tannins, , Gum & mucilage Carbohydrate, Glycoside, Proteins & amino acids, Fixed oil & fats, Phenolic compounds & tannins, Phytosterol, Gum & mucilage, Alkaloids, Gum & mucilage, Resin, Flavonoids Carbohydrate, Glycoside, Proteins & amino acids, Saponins, Phenolic compounds & tannins, Phytosterol, Alkaloids, Resin, Flavonoids In the above stated extract Chloroform, Ethanolic, Aquous extract which has the polarity in between was selected for further Pharmacological evaluation. Quantitative chemical tests such as acid value, saponification value etc. are some of the techniques, which are useful in herbal products evaluation. One of the modern chemical standardization techniques that are widely used is the chromatography technique.

**Key Word-: Phytochemical, *Pongamiapinnata*(Linn.), Quantitative chemical, Aquous extract**

### 2. INTRODUCTION

Herbal medicinal products are defined as any medicinal product, exclusively containing as active substances one or more such herbal substances or one or more herbal preparations, or one or more herbal substances in combination with one or more such, Herbal preparations are obtained by subjecting herbal substances to treatment such as extraction, distillation, expression, fractionation, purification concentration or fermentation. These include comminuted or powdered herbal substances, tincture, extracts, essential oils, expressed juices and processed exudates. Originally an Indo-Malaysian species, it is now found in many countries. *Pongamiapinnata*(Linn.) Pierre (Synonyms: *Pongamiaglabra*Vent., *Derrisindica*(Lam.) Bennet, *Cytisuspinnatus*Lam.) is a member of the Fabaceae family (Papilionaceae; Leguminosae). *Pongamiapinnata* is a medium-sized, glabrous, semi-evergreen tree, growing up to 18 meters or more in height, with a short bole, spreading crown, and grayish-green or brown bark.

*Pongamiapinnata*(*Pongamia*)

*pinnata*(synonyms: *Millettia pinnata*, *Cytisuspinnatus*, *Derris indica*, *Pongamiaglabra*; common names: Karanj, Indian Beech Tree, Honge Tree, Pongam Tree) is a perennial oleaginous legume (Leguminosae) with nitrogen-fixing capability and medicinal properties. This plant is native to the Indian subcontinent and grows on marginal land with no direct competition with food crops. It can thrive in areas with annual rainfall ranging from 500 to 2500 mm with the maximum temperature ranging from 27 to 38 °C and the minimum from 1 to 16 °C (Sangwan et al., 2010). Mature trees can withstand waterlogging, slight frost, and high salinity. It is used to control soil erosion and for binding dunes because of its dense network of lateral roots. The long thick taproot makes it drought tolerant. *P. pinnata* can be successfully propagated through seeds and cuttings as well (Kesari et al., 2010).

Hopefully in the not so distant future nitrogen fixing legumes, and in particular tree legumes, will be recognized as important members of the select group of plants that will demonstrate their utility as sustainable feedstock's for large scale production of biofuels. Variety of reasons has been cited for the need for studying medicinal plants. Most of the traditional knowledge about medicinal plants was in the form of oral knowledge that had been lost with persistent invasions and cultural adaptations. There was no uniform or standard procedure for maintaining the inventory of these plants and the knowledge about their medicinal properties. There is a prevalence of using plants and plant based products in various contemporary and traditional systems of medicines, without any written documentation or regulation. Therefore, it is essential that such uses of natural products be documented and studied for systematic regulation and wide-spread application.

### 3. MATERIALS AND METHODS

#### Phytochemical screening

Chemical evaluation comprises of different chemical tests and chemical assays, the isolation, purification and identification of active constituents. Quantitative chemical tests such as acid value, saponification value etc. are some of the techniques, which are useful in herbal products evaluation. One of the modern chemical standardisation techniques that are widely used is the chromatography technique. General screening of various extracts of the plant material was carried out for qualitative determination of the groups. Basset, Jet al., (1985)

#### Test for carbohydrates and glycosides

A small quantity of the extract was dissolved separately in 4 ml of distilled water and filtered. The filtrate was subjected to the following tests to detect the presence of Carbohydrate and glycosides.

##### (a) Molisch's test

The filtrate was treated with 2-3 drops of 1% alcoholic  $\alpha$ -naphthol solution and 2 ml of concentrated  $H_2SO_4$  was added along the sides of the test tube. Appearance of brown ring at the junction of two liquids shows the presence of carbohydrates.

##### (b) Fehling's test

The filtrate was treated with 1 ml of Fehling's solution A and B and heated on the water bath. A reddish precipitate was obtained shows the presence of carbohydrate.

#### Test for fixed oils and fates

##### (a) Spot test

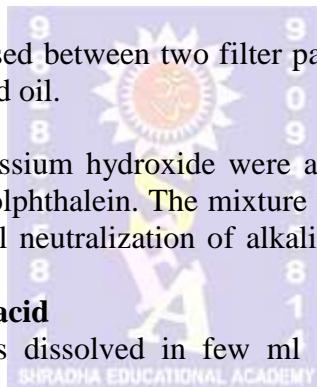
Small quantity of extract was pressed between two filter papers. Appearance of oil stain on the paper indicates the presence of fixed oil.

##### (b) Saponification test

Few drops of 0.5% alcoholic potassium hydroxide were added to a small quantity of various extracts along with a drop of phenolphthalein. The mixture was heated on the water bath for 1-2 hours. Formation of soap or partial neutralization of alkali indicates the presence of fixed oils and fats.

#### Test for proteins and free amino acid

Small quantity of the extract was dissolved in few ml of distilled water and treated with following reagents.



(a) **Millon's test** – Appearance of red color shows the presence of proteins and free amino acids.

(b) **Ninhydrin reagent** – Appearance of purple color shows the presence of proteins and free amino acids.

(c) **Biuret test** – Equal volumes of 5% sodium hydroxide solution and 1% copper sulphate solution were added, appearance of pink or purple color shows the presence of proteins and free amino acids.

#### Test for saponins

**Foam test** – The extract was diluted with 20 ml of distilled water and it was agitated in a graduated cylinder for 15 minutes. The formation of 1 cm layer of foam shows the presence of saponins.

#### Test for phenolic compounds and tannins

Small quantity of the extract was taken in distilled water and test for the presence of phenolic compounds and tannins was carried out with the following reagents.

(a) **Dilute ferric chloride solution (5% w/v)** - Violet color.

(b) **10% lead acetate solution** - White precipitate.

#### Test for phytosterols

Small quantity of the extract was dissolved in 5 ml of chloroform separately. Then this chloroform solution was subjected to the following tests to detect the presence of phytosterols.

##### (a) Libermann-Burchard's test

The above prepared chloroform solution was treated with few drops of concentrated sulphuric acid followed by few drops of diluted acetic acid, 3 ml of acetic anhydride. A bluish green color appeared indicates the presence of phytosterols.

#### (b) Salkowski reaction

To 1 ml of the above prepared chloroform solution, few drops of concentrated sulphuric acid was added. Brown color produced shows the presence of phytosterols.

#### Test for Alkaloids

Small quantity of the extract was treated with few drops of diluted hydrochloric acid and filtered. The filtrate was used for the following tests.

(a) Mayer's reagent – cream precipitate

(b) Dragendroff's reagent – Orange brown precipitate

(c) Hager's test – yellow precipitate

#### Test for flavonoids

##### (a) With aqueous NaOH solution

Small quantity of the extract was dissolved in aqueous sodium hydroxide. Appearance of yellow colour indicates the presence of flavonoids.

##### (b) With conc. sulphuric acid

To a small portion of extract, concentrated sulphuric acid was added. Yellow orange color was obtained shows the presence of flavonoids.

#### 4. RESULT & DISCUSSION

Plant derived natural product such as flavonoids, Phenolic compound have received considerable attention in recent years

#### Phytochemical evaluation

The phytoconstituents were identified by chemical test which showed the various phytoconstituents (**Table No.2**) mainly in the following extract

#### Hexane extract

Glycoside, Carbohydrate, tannins, , Gum & mucilage

#### Chloroform extract:

Carbohydrate, Glycoside, Proteins & amino acids, Fixed oil & fats, Phenolic compounds& tannins, Phytosterol, Gum & mucilage, Alkaloids, Gum & mucilage, Resin,

Flavonoids

#### Ethanol extract:

Carbohydrate, Glycoside, Proteins & amino acids, Fixed oil & fats, Phenolic compounds& tannins, Alkaloids, Phytosterol, Resin, Flavonoids

#### Aqueous:

Carbohydrate, Glycoside, Proteins & amino acids, Saponins, Phenolic compounds& tannins, Phytosterol, Alkaloids, Resin, Flavonoids

In the above stated extract Chloroform, Ethanol, Aqueous extract which has the polarity in Between was selected for further Pharmacological evaluation.

**Table:2 Phytochemical screening of different extract of dried seed of *Pongamia pinnata* Linn.:-**

S.No.	Constituents	Tests	Hexane	Chloroform	50% Ethanolic	Aqu.
1.	Carbohydrate	Molish"stest	+	+	+	+
		Anthronet test	+	+	+	-
		Fehling"stest	-	-	+	+
2.	Glycoside	Legal"stest	+	+	+	-
		Kellerkillanistest	-	-	+	+
3.	Fixed oil&fats	Spottest	-	+	-	+
		Saponificationtest	-	-	-	-
4.	Proteins&amino acids	Million"stest	-	-	-	-

		Ninhydrin test	—	+	+	—
		Biuret test	—	+	—	—
5.	<b>Saponins</b>	Foam test	—	—	+	+
6.	<b>Phenolic compounds &amp; tannins</b>	FeCl <sub>3</sub> test	+	—	+	+
		Lead acetate test	+	+	+	—
7.	<b>Phytosterol</b>	Salkowski test	—	+	+	+
		Libermann-Burchard test	—	—	—	+
8.	<b>Alkaloids</b>	Dragendorff's test	—	—	+	—
		Mayer's test	—	+	+	+
		Hager's test	—	—	—	—
9.	<b>Gum &amp; mucilage</b>	Swelling test	+	—	—	—
10.	<b>Resin</b>	Resin	—	+	+	+
11.	<b>Flavonoids</b>	Aq. NaOH test	—	—	+	—
		Shinoda's test	—	+	+	—

Where:-(+)=Presence,(-)=Absence

**Table No: 3 Quantitative analysis of dried seeds of *Pongamia pinnata* Linn.:**

Parameters	Range(%)	Mean $\pm$ SD(%)
Totalsugar	0.560 - 0.571	0.565 $\pm$ 0.007
Total starch	1.237 - 1.242	1.24 $\pm$ 0.003
Total phenolics	0.189-0.186	0.187 $\pm$ 0.002
Total alkaloid	0.33 - 0.28	0.305 $\pm$ 0.035

## 5. CONCLUSION

In spite of overwhelming influence of modern medicine and tremendous advances made in the production of synthetic drugs, traditional medicaments referred to now-a-days as herbal drugs in different places in the literature, have retained their place in therapy. Their effectiveness, low cost and comparative freedom from serious toxic effects make these medicaments not only popular but also an accepted mode of treating disease even in developed countries. Plant derived natural product such as flavonoids, Phenolic compound have received considerable attention in recent years.

## 6. BIBLIOGRAPHY

Agaie, B.M., Onyejili, P.A., 2017. Anthelmintic activity of crude aqueous leaf of *Anogeissus leiocarpus* in sheep. *African J. of Biotechnology*. 6, 1511-1515. ISSN 1684-5315

Ahmad, M.; Feza, S.K.; Saxena, R.R. Sharma and S.K. Singh.(2004). Effect of *Azotobacter chroococcum* nutrient uptake in Amrapali mango under high density planting. *Indian J. Hort.*, 61(4); 348.

Ahmed, S.M., Vrushabendra, S.B.M., Gopkumar, P., Dhanapal, R., Chandrashekara, V.M.(2005). Anti-Diabetic activity of *Terminalia catappa* Linn. Leaf extracts in alloxan-induced diabetic rats. *Iranian Journal of Pharmacology and Therapeutics* 4, 36–39. ISSN 1735-2657

Altschul S.R.! Kerr ME, Bender CM, Monti EJ smbridge, MA Drugs and foods from little known plants. Harbard University Press, Journal of Agricultural and Food Chemistry 52 (9), 2541-2545. Altschul ISBN 9780674729209

Amrane ,A.(2003). Seed culture and its effect on the growth and lactic acid production of *Lactobacillus helveticus*. *J Gen Appl Microbiol* 49(1):21-7. an Indian herbal drug, *Food and Chemical Toxicology* 40, 527–534.

Anjana J., Monika B., Sangeeta S. (2007). Protective effect of *Terminalia bellerica* Roxb. and gallic acid against carbon tetrachloride induced damage in albino rats. *Journal of Ethnopharmacology* 109, 214-218. ISSN 0975-1491

Annarita,L.(2019). Morphologic evaluation of olive plants *in vitro* culture through axillary budsa

International Advance Journal of Engineering, Science and Management (IAJESM)  
ISSN -2393-8048, January-June 2020, Submitted in March 2020, [iajesm2014@gmail.com](mailto:iajesm2014@gmail.com)  
nd somatic embryogenesis methods. *Afr J Plant Sci* 3(3):037–43. ISSN1996-0824

Anonymous the Indian pharmacopoeia. Ministry of health and family wellfairvolI,,pp 120-128, (1996)

Anonymous,. Medicinal plants of India. Indian Council of Medical Research, New Pp87-89(1976)

Ardhapuri. *The Asian J. Hort.*, 04(01):126-130.ISSN1991-637X

Arif-

ullah Khan, Anwarul Hassan Gilani, (2008). Pharmacodynamic Evaluation of *Terminalia bellerica* for Its Antihypertensive Effect. *Journal of Food and Drug Analysis* 16(3), 6-14.ISSN2349-8234

Asthana, M, Kumar, A, Sharma S.(2011). Cytogenetical Effects of *Terminalia bellerica*, Roxb.on Root Meristem of *Vicia faba*. *Adv. Biorev.* 2(1):174-77.ISSN 2271-4136

Aswar, M., Aswar, U., Watkar, B., Vyas, M., Wagh, A., Gujar, K.N., 2008. Anthelmintic activity of *Ficus benghalensis*. *Int. J. of Green Pharmacy*. 170-172.

Axena, S, Bopana, N.(2009). *In-vitro* clonal propagation of *Asparagus racemosus*, a high value medicinal plant. *Methods Mol Biol* 547:179–89.

Ayoob, FA, Awad, H.M, El-Kousy, S.M, Rashed, K.N, Al-Sayed, N.H.(2014). Phytochemical and biological investigations of *Terminalia bellerica* Roxb. leaves. *J Pharm Res.* 8(4):500-10.

Ayoob, FA, Awad, H.M, El-Kousy, S.M, Rashed, K.N, Al-Sayed, N.H.(2014). Phytochemical and biological investigations of *Terminalia bellerica* Roxb. leaves. *J Pharm Res.* 8(4):500-10.ISSN 0974-6943

Babu, Naresh.(2003). Effect of organic inputs and potassium on growth and yield of, Co 5" papaya/ *Carica papaya*. *Indian J. of Agrt Set*, 73 (4): 212-214.ISSN0021-3721

Badam, L, Bedekar, S, Sonawane, K.B, Joshi, S.P. (2002) In vitro antiviral activity of bael(*Aegle marmelos* Corr) upon human coxsackieviruses B1-B6. *J Commun Dis.* 34(2):88-99.ISSN2278-4136

Bajpai, M., Pande, A., Tewari S.K., Prakash, D. ( 2005). Phenolic contents and antioxidant activity of some food and medicinal plants. *International Journal of Food Sciences & Nutrition* 56, 287-29.ISSN-7486

Balchandran, S.; Deotale, R.D.; Hatmode, C.D.; Thakre, K.G. and Archana Thorat.(2006).Effect of biofertilizers (Pressmud, Rhizobium and PSB) and nutrients (NPK)

on chemical and biochemical parameters of green gram. *Journal of Soils and Crops*, 16(1):176-179.ISSN0975-1491

Balkrishnan, S.M.; Selvarajan and Siddeswar, K. (2001).Effect of Biofertilizers in custardapple. *South Indian Hort.*, 49:185-186.

Bandyopadhyay, D, Chattopadhyay, A, Ghosh, G, Datta, A.G.(2004). Oxidative stress-induced ischemic heart disease: protection by antioxidants. *Curr Med Chem.* 11:369-387.ISBN0929867043456016

Barar, S.K., Essential of pharmacotherapeutics, S. Chand and company LTD.Gutteridge JMC, Mitchell J. Redox imbalance in the critically ill. *Br Med Bull* 1999;55(1):49-75(2000)ISBN 8121903149

Barz, W. and Ellis, E.. Potential of plant cell cultures for Pharmaceutical production. In Natural products as medicinal agent. (eds) Beal, J.L and reinhard, E. suppl to palntamedica ,HippokratesVerlage , Stuttgart pp 417-508. (1981).

Basset, J.Denny., J, and Mendhan J., Vogels test book of quantitative inorganic analysis 4<sup>th</sup> edition ELBS Londmal, Essex.UK,1985,

Bhalla, S, Verma, M. and Rawal, S. (2012). Invitro Antioxidant Activity of the Methanolic Extract of *Aegle Marmelos* Leaf, *International Journal of Natural Product*

Bole, Propan-2-ol was used as an acyl acceptor for immobilized lipase-catalyzed preparation of biodiesel. PathakVP ,Saini TR ,Khanna RN Journal of Ethnopharmacology 91 (1), 109-113(2003)ISSN1735-2657

Bolo.Kerr ME, Bender CM, Antihyperglycemic and antilipidperoxidative effects of Pongamia pinnata (Linn.) Pierre flowers in alloxan induced diabetic rats *Journal of Ethnopharmacology*, 105 (1-2), pp. 39-46. (2006) ISSN1727-3048

Boulton,A.J.,Vinik,A.I.,Arezzo,J.C.,Bril,V.,Feldman,E.L.,Freeman,R.,&Ziegler, Chakravarty, S, Mohanty,A, Sudha ,T.N, Upadhyay, A.K, Konar, J.(2010). Removal of Pb(II) ions from aqueous solution by adsorption using bael leaves (*Aegle marmelos*). *J Haz Mat*.173:502-509.ISSN2582-8185

Chandrashekhar,C.H.,Latha,K.P.,Vagdevi,H.M.,Vaidya,V.P.,2008.Anthelminticactivityof thecrudeextractsof *Ficus racemosa*. *Int.J. of Green Pharmacy*.103.

Chaouki,W,Leger,D.Y,Liagre,B,Beneytout,J.L,Hmamouchi,M.(2009).

Checha ,Morihara, N., Itakura, Y., Nakata,Studies on the effect of leaf extract of *Pongamia glabra* (Vent.) (Fabaceae) on histological changes of accessory reproductive glands in the adult male *Periplaneta americana* (Linn.) (Orthoptera: Blattidae) *Journal of Environmental Biology*, 18 (4), pp. 365-370. (1997) ISBN0144876502

Choudhary,G.P.(2012)Anti-ulceractivityoftheethanolicextractof *Terminalia bellerica*

ChristonNaranjon P, S., Biswas, T.K., Rokeya, B., Ali Farmacologia Y medicinal tradicional, R. University centralquito Toxicity studies of purified *P. pinnata* oil with ground nut oil in rats Escaleras,. Bangladesh Medical Research Council Bulletin 20 (1), 24-26(2002)

Cimen,A,Ozgee,C.(2009).Micropropagationof *Anthurium andraeanum*fromleafexplants.

*PakJBot* 41(3):1155-61.

CitralinhibitscellproliferationandinducesapoptosisandcellcyclearrestinMCF-7cells.

D.(2005).Diabetic neuropathies: a statement by the American Diabetes Association. *Diabetes care*, 28(4), 956-962.

