



Talinum portulacifolium: A Comprehensive Review of its Phytochemistry and Pharmacological Potential

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1. ABSTRACT:

Talinum portulacifolium, often known as Fame Flower or Jewels of Opar, has piqued the curiosity of botanical and pharmacological researchers. This review paper attempts to provide a detailed analysis of Talinum portulacifolium's phytochemistry and pharmacological potential.

The review begins by delving into the phytochemical composition of various plant sections, such as leaves, roots, and the entire plant. The discovery and characterisation of bioactive chemicals such as alkaloids, flavonoids, saponins, and triterpenoids that contribute to the therapeutic characteristics of the plant are prioritized.

Talinum portulacifolium's pharmacological actions are then thoroughly investigated. Studies on its antioxidant and anti-inflammatory activities are discussed, offering light on possible applications in oxidative stress and inflammation-related disorders. The article also delves into the plant's traditional applications in many cultures and places, providing insights into its past therapeutic roles.

Recent research on Talinum portulacifolium's possible hypolipidemic activity is highlighted, along with its implications for cardiovascular health.

2. INTRODCUTION:

Talinum portulacifolium, often known as Fame Flower or Jewels of Opar, is an interesting botanical specimen that deserves to be studied in terms of pharmacognosy. This plant, native to North and South America, has long been utilized for medical purposes.

From a pharmacognostic standpoint, the plant has various characteristics that contribute to its medicinal potential. The leaves of Talinum portulacifolium, for example, contain a range of secondary metabolites such as alkaloids, flavonoids, and saponins. These substances are well-known for their pharmacological actions, which range from potential antibacterial characteristics to antioxidant and anti-inflammatory benefits.

The roots of Talinum portulacifolium have also piqued the curiosity of pharmacognosists. They contain bioactive chemicals that may contribute to the plant's folk medicinal usage. Furthermore, research on the chemical composition of this plant has revealed the existence of triterpenoids and steroids, which adds to its medicinal relevance.

Talinum portulacifolium has potential in the development of herbal medications and natural therapies in terms of pharmaceutical uses. The varied array of bioactive substances found in various areas of the plant lays the groundwork for further research into the plant's potential in the treatment of numerous illnesses.

Furthermore, Talinum portulacifolium's pharmacognostic examination goes beyond chemical composition. Morphological properties of the plant, such as its succulent nature and prominent flower clusters, aid in identification and verification in herbal remedies.

2.1 . Biological name:

Portulaca Portulacastrum

2.2 . Heterotypic Synonyms:

Talinum cuneifolium (var. tuberculatum poell.in Rept Spec.Nov.Regni Veg.48: 193(1940))

Talinum indicum (Wight & Arn.in Prodr. Fl.Ind.Orient.1:356 (1834))

2.3 . Homotypic Synonyms

Orygia portulacifolia Forssk. in Fl. Aegypt.-Arab.: 103 (1775)

Claytonia cuneifolia Kuntze in Revis. Gen. Pl. 1: 57 (1891), nom. superfl.

Portulaca cuneifolia Vahl in Symb. Bot. 1: 33 (1790), nom. superfl.

Talinum cuneifolium Willd. in Sp. Pl., ed. 4. 2: 864 (1799), nom. superfl.

2.4 . Common Names:

- Fame Flower
- Jewels of Opar
- Dwarf Pokeweed
- Rock Pink
- Florida Spinach
- Leafy Jewels
- Adam's Needle
- Rose Pink
- Pom Pom Plant
- Red Stemmed Portulaca

2.5 . Geographical Distribution:

1.North America:

United States: Southeastern regions, including Florida and Texas.

2.Central America:

Mexico: *Talinum portulacifolium* is found in various parts of Mexico.

3.South America:

Central and South America: The plant's distribution extends into various countries in Central and South America.

4.Introduced Regions:

Cultivation and Gardens: *Talinum portulacifolium* is cultivated as an ornamental plant and can be found in gardens and landscapes beyond its native range.

2.6 . Growing Conditions:

1.Sunlight:

Talinum portulacifolium prefers direct sunlight. It thrives in direct sunlight, making it ideal for sunny garden spots.

2.Soil:

Talinum portulacifolium requires well-drained soil to thrive. It may grow in a variety of soil types, including sandy and rocky soils. Organic matter added to the soil can improve its fertility.

3.Watering:

While *Talinum portulacifolium* is drought-tolerant once established, it is important to water it on a regular basis, especially during dry months. It is, nevertheless, critical to prevent soggy situations.

4.Temperature:

Talinum portulacifolium is noted for its resilience to a wide range of temperatures. It can withstand both hot and cold temperatures, making it appropriate for cultivation in tropical and subtropical climates.

5.Propagation:

Seeds can be used to propagate the plant. Seeds can be planted immediately in the garden or started indoors and transplanted later. Furthermore, *Talinum portulacifolium* can self-seed, allowing it to naturalize in favourable conditions.

2.7 . Chemical Constituents:

- Flavonoids
- alkaloids
- Steroids
- Triterpenoids
- Saponins

3. TRADITIONAL USES OF TALINUM PORTULACIFOLIUM :

Talinum portulacifolium is a perennial herbaceous plant found primarily in India and Africa. Talinum portulacifolium is a plant that is utilized as a decorative plant, medicinal herb, and vegetable in several traditional civilizations. It also has various medicinal properties, including as anti-ulcerogenic, anti-diabetic, antibacterial, and antioxidant properties..

In some traditional cultures it is usually used as fodder for cattle and goat. In Ethiopia leaves of talinum used for treating eye diseases and its roots against cough and gonorrhoea. In Tanzania it is used for Aphrodisiac properties and its leaf decoction remedy for constipation and also its leafy stem parts are often cooked with other leaves or mixed with coconut milk or groundnuts. T.portulacifoliumalso enhances the body's immunity towards stress conditions.

While scientific study on its traditional uses is sparse, anecdotal evidence and traditional knowledge suggest various applications Such as:

A) Wound Healing: Talinum portulacifolium preparations have traditionally been administered topically to wounds to enhance healing. This traditional use may be influenced by the plant's putative anti-inflammatory qualities.

B) Respiratory Ailments: In some traditional medical practices, portions of Talinum portulacifolium are used to treat respiratory difficulties. Coughs, bronchitis, and asthma are examples of such disorders.

C) Anti-Diabetic Properties: Fame Flower has been utilized to treat diabetes in some traditional medical systems. Some believe the herb has characteristics that aid with blood sugar regulation.

D) Aphrodisiac: Talinum portulacifolium has long been used as an aphrodisiac in several cultures. Certain components of the plant can be used to make tonics or infusions that are said to boost libido.

E) Digestive Aid: The plant has long been used to treat digestive disorders. It can be drunk as an infusion or used in traditional treatments for indigestion or stomach pain.

F) Anti-inflammatory Uses: Traditional healers may employ Talinum portulacifolium to treat inflammation-related disorders. Arthritis and other inflammatory diseases are examples of this.

G) Postpartum Recovery: In some traditional methods, portions of the Fame Flower plant are used to help women recuperate from childbirth. It can be ingested in a variety of forms to help with the recuperation process.

The following table lists the traditional applications of plants based on their parts;

Plant Part	Uses	Reference
Leaves	Used as fodder for cattle, Used for treating eye diseases, Leaf decoction used to treat constipation, also used as vegetable	Talinum portulacifolium (Forssk.) Asch. ex Schweinf.
Roots	Roots used against cough and gonorrhoea	Talinum portulacifolium (Forssk.) Asch. ex Schweinf.
Young stem parts	Leaves along with stem parts cooked with others leaves or coconut milk used	Talinum portulacifolium (Forssk.) Asch. ex Schweinf.

4. IMAGE OF PART OF TALINUM PORTULACIFOLIUM:



STEM



PLANT



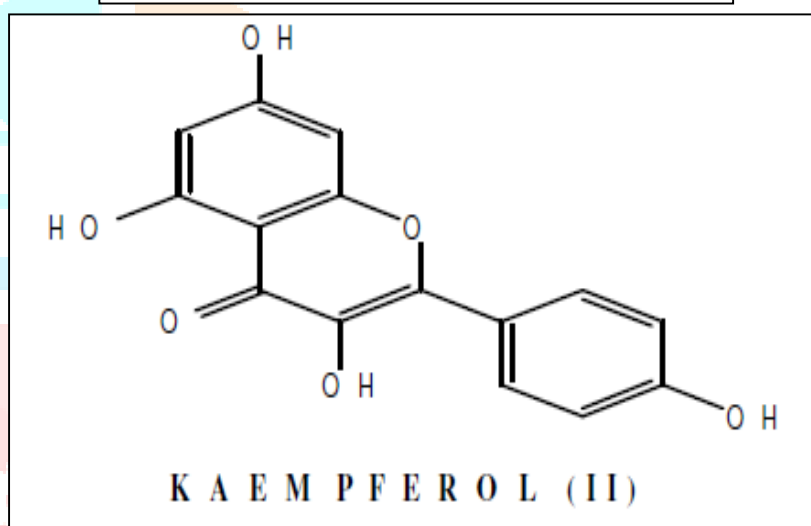
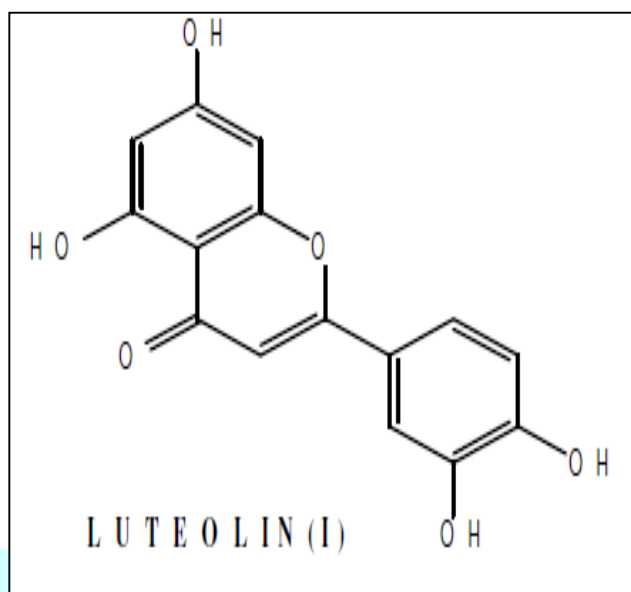
FRUIT



LEAVES

5. PHYTOCHEMICAL ANALYSIS:

Alkaloids, gums and mucilage, flavonoids, saponins, tannins and triterpenoids, and steroids are among the chemical compounds isolated from *Talinum portulacifolium*. And it contains luteolin, also known as 2-(3,4-Dihydroxyphenyl)-5,7-dihydroxy-4-chromenone), and kaempferol, also known as 3,5,7-trihydroxy-2-(4-hydroxyphenyl)-4H-1-benzopyran-4-one.



The following methods were used to conduct phytochemical screenings of *Talinum portulacifolium* leaf extracts in petroleum ether, chloroform, methanol, ethanol, and aqueous solvents.

5.1. Extract preparation for tests:

The extract is prepared by the process of maceration, where 360ml of Ethanol is taken with 240ml of distilled water which provides a 3:2 ratio mixture. The drug is left for 4 days at a temperature of 30°C to 32°C.

5.2. Test for Alkaloids:

For detection of alkaloids around 2grams of grounded sample is added to a mortar, then 0.2g of sample is boiled along with 2ml of 5% Hydrochloric acid over a steam bath for 5 minutes. Then, the mixture was allowed to cool which is followed by subsequent filtration and addition of 2 drops of Dragendroff's reagent. This results in the formation of a red precipitate. By addition of Mayer's reagent, a creamy white color precipitate is observed. These tests confirm the presence of Alkaloids as one of the chemical constituents.

5.3. Test for Amino acids:

2ml of extract is taken to which Ninhydrin reagent was added and the mixture was boiled for a few minutes, formation of blue color was observed which indicates the presence of amino acids

5.4. Test for Fatty acids:

0.5ml of extract was taken to which ether of 5ml was added, this was then allowed to dry on a filter paper. The presence of a transparent filter paper indicates the presence of fatty acids

5.5. Test for Flavonoids:

1ml of sample was taken and it was treated with a mixture of concentrated HCL and magnesium chloride which result in the formation of pink tomato color which indicates presence of Flavonoids

5.6. Test for Saponins:

The detection for presence of Saponins is done by performing a test where the sample is boiled for 5 minutes in 5ml of distilled water. This mixture is then filtered while it is still hot, and the filtrate is then used to carry the following tests.

1ml of filtrate is taken to which 2 drops of olive oil is added, this mixture is then shaken and observed for formation of an emulsion. 1ml of filtrate is taken and it is diluted with 4ml of distilled water. The mixture is then shaken vigorously and upon standing it produces a stable froth.

These tests confirm the presence of Saponins.

5.7. Test for Anthraquinones:

5ml of extract is taken and is hydrolyzed with dilute H₂SO₄, to it 1ml of Ammonia and 1ml of Benzene was added resulting in the formation of rose-pink color which indicate the presence of Anthraquinones

5.8. Test for Tannins:

To 5ml of 45% ethanol the sample was added and boiled for 5 minutes. The mixture was then left to cool and was subsequently filtered.

1ml of above filtrate is taken and 3 drops of lead sub acetate solution is added to it. This results in the formation of a gelatinous precipitate which indicates the presence of Tannins.

0.5ml of bromine water was taken and added to 1ml of filtrate. This results in the formation of a pale brown precipitate which also indicates the presence of tannins.

5.9. Test for Glycosides:

The test sample was prepared by mixing 30ml of distilled water with sample and heating it for 5 minutes on a water bath, which is then filtered and collected.

5ml of filtrate was added to A and B of Fehling's solution until the solution turns to alkaline pH which is then heated over a water bath for 2 minutes, this results in the formation of a lightish blue color precipitate than brick red color which indicate the absence of glycosides.

- **Test for cardiac glycosides:** 1ml of extract was taken and a mixture of concentrated H₂SO₄ and ferric chloride solution and 0.4ml of glacial acetic acid was added which result in formation of brown color, this indicates the presence of cardiac glycosides

5.10. Test for Coumarin:

2ml of extract was taken to which 10% NaOH was added, and the solution was shaken thoroughly for 5minutes, and yellow color was observed which indicate presence of coumarin

5.11. Test for Phenols:

1ml of extract was taken and to it 0.5ml of 20% H₂SO₄ solution was added with subsequent addition of few drops of aqueous NaOH solution, resulting in formation of blue color which indicate presence of Phenols

5.12. Test for Steroids:

1ml of sample was taken and concentrated 10% H₂SO₄ was added, resulting in formation of green color which indicate presence of Steroids

5.13. Test for Terpenoids:

1ml of sample was taken and to it concentrated H₂SO₄ and 2ml of chloroform was added, which result in the formation of reddish-brown ring color, indicating presence of terpenoids

5.14. Test for Carbohydrates:

100g of extract was dissolved in 5ml of distilled water and was filtered and the filtrate is used for the following tests

i. Molisch's Test:

2ml filtrate is added to 2 drops of alcoholic naphthol solution which was shaken and concentrated sulphuric acid is added slowly to the walls of container and was allowed to stand for some time. A violet ring is formed between 2 liquids indicating presence of Carbohydrates

5.15. Test for Quinones:

1ml of sample was taken to which a solution of aqueous ammonia was added with continuous shaking and a color change of aqueous layer was observed (red, violet or pink) which indicate the presence of quinones

PLANT PART	CHEMICAL CONSTITUENT	FUNCTION
LEAF	<ul style="list-style-type: none"> • Flavonoids • Alkaloids • Saponins 	<ul style="list-style-type: none"> • Antioxidant properties • Analgesic, Cardiovascular effects and Anti Microbial Properties • Antioxidant and Anti Inflammatory Properties
ROOT	<ul style="list-style-type: none"> • Triterpenoids • Steroids 	<ul style="list-style-type: none"> • Anti Inflammatory Properties • Wound healing and Anti Inflammatory Properties

6. PHARMACOLOGICAL ACTIVITIES:

While research on the pharmacological effects of *Talinum portulacifolium* is ongoing, it is crucial to remember that the scientific literature on this plant may not be as rich as that on other frequently studied medicinal herbs.

Here is a general review of the pharmacological activity linked with different components of *Talinum portulacifolium*:

PLANT PART: WHOLE PLANT		
PHARMACOLOGICAL ACTIVITY	RESULT	REFERENCES
Anti-ulcerogenic	Treatment with the <i>T. portulacifolium</i> plant extract significantly protected the ulceration induced by the three models. The gastric volume, pH of gastric juice, total acidity, free acidity and ulcer index were the parameters estimated and did show significant results. 800 mg/kg extracts of <i>T. portulacifolium</i> did show high significant results as that of standard drug. Percentage protection of 800 mg/kg was 79.9% and the standard drug-treated group did show 84%. So was with total acidity (38.1 + 1.45) and free acidity (16.5 + 0.76).	Exploiting the phenomenal anti-ulcerogenic potential of <i>Talinum portulacifolium</i> ethanolic extract whole plant on Albino Rats: The therapeutic potential of Chinese Herb-mǎ chǐ xiàn kē (Portulacaceae) <u>Rohit Gundamaraju, Kotla Maheedhar, and Kim Kah Hwi¹</u> https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4080503/
Hepatoprotective Activity	The current study looked on the role of alcoholic extract of <i>Talinum portulacifolium</i> forsk. It significantly reduced the increase in serum Aspartate amino transferase (AST), Alanine amino transferase (ALT), alkaline phosphatase (ALP), and total serum bilirubin (SB) caused by Paracetamol, and it increased the activities of lipid peroxidation (LPO) and glutathione (GSH) in the liver. Histopathological examination of the liver was previously performed to supplement the information from the biochemical analysis. The discovery that <i>Talinum portulacifolium</i> forsk has a substantial protective effect against acute hepatotoxicity induced by Paracetamol	Thalapaneni, Nageswara Rao, Chidambaram, Kumar Appan, Ellappan, Thilagam, Sabapathi, Mohana Lakshmi and Mandal, Subhash C. "Inhibition of Carbohydrate Digestive Enzymes by <i>Talinum portulacifolium</i> (Forssk) Leaf Extract" <i>Journal of Complementary and Integrative Medicine</i> , vol. 5, no. 1, 2008. https://doi.org/10.2202/1553-3840.1120
Anti Diabetic Activity	The ethanolic extract of <i>Talinum portulacifolium</i> lowered the glucose level in diabetic mice given STZ and a high fat diet. Streptozotocin has been demonstrated to cause tissue damage and free radical generation. The pancreas is particularly vulnerable to the effects of STZ-induced free radical damage. The current study found that an ethanolic extract of <i>Talinum portulacifolium</i> has strong anti-diabetic activity and lowers serum cholesterol levels. The antihyperglycemic action of the ethanolic extract may be attributable to increased insulin secretion from pancreatic beta cells or increased tissue uptake of glucose via insulin sensitivity.	R. Hima Bindu*, S. Mohana Lakshmi, N. Himaja, K. Nirosha, M. Pooja: Formulation, Characterisation and Anti Diabetic Evaluation of <i>Talinum Portulacifolium</i> (Forssk.) Loaded Solid Lipid Nanoparticles in Streptozotocin & High Fat Diet induced Diabetic Rats 5(4): 2108-2114. (2014)

PLANT PART: LEAF

PHARMACOLOGICAL ACTIVITY	RESULT	REFERENCES
Anthelmintic activity	The <i>in vitro</i> anthelmintic activity of crude methanolic extracts of the leaves <i>Talinum portulacifolium</i> (Forssk.) Asch. Ex Schweinf on the Indian adult earthworms <i>Pheritima posthuma</i> was investigated. The time the earthworms took to become paralyzed and die was calculated from the test results using the standard medicine albendazole suspension.	Shaik Sonia Nazmi. Anthelmintic activity of methanolic extract of <i>talinum portulacifolium</i> (forssk.) asch.ex schweinf. J Pharmacogn Phytochem 2023;12(2):128-130. DOI: 10.22271/phyto.2023.v12.i2b.14638
Anti Hyperglycemic and Anti Oxidant Activity	Hexane, ethanolic and aqueous extracts of <i>Talinum portulacifolium</i> leaves were prepared and given individually at different doses to normal and streptozotocin (STZ) induced diabetic rats after an overnight fast. The blood glucose levels were measured at 0,1,2,3,4,5 and 6 h after the treatment. The hexane extract at a dosage of 0.5g/kg b.w has shown maximal blood glucose lowering effect (64.7%) in diabetes rats. The same dosage did not produce any hypoglycemic activity in normal rats	Babu RK, Vinay K, Sameena SK, Prasad SV, Swapna S, Rao ACh. Antihyperglycemic and antioxidant effects of <i>Talinum portulacifolium</i> leaf extracts in streptozotocin diabetic rats: A dose-dependent study. Pharmacognosy Magazine [Internet]. 2009;5(19s):1-10. http://www.phcog.com/text.asp?2009/5/19/1/59773
Hypolipidemic Activity	The present study demonstrated new properties of concoction as a potent antihyperlipidemic and antioxidant agent. The histopathological results of concoction have shown slightly prevented thrombus formation. These results suggest that the plant extracts may be beneficial in preventing atherosclerotic cardiovascular diseases scientific evaluation is needed to derive its molecular level mode of action	K. Prasanthi, Y. Indira Muzib, M. Venkateswarlu. Assessment of Hypolipidemic and Antioxidant Activity of Herbal concoction against Triton WR-1339 induced Hyperlipidemia in Experimental animals. Research J. Pharm. and Tech 2019; 12(2):615-620. doi: 10.5958/0974-360X.2019.00109.4
Anti Asthmatic Activity	In histamine and Ach-induced bronchospasm studies acetone extracts of the plant have significantly increased PCT 10.69 and 10.52 (**P < 0.01), one-way analysis of variance (ANOVA) Tukey's test compared with control. Histamine and Ach-induced ileum contraction studies also showed that the acetone extracts exhibited response 2.6 with 47% and 2.2 with 40% inhibition (*P < 0.05). The results were expressed by one-way ANOVA, Dunnett's test.	Asian Journal of Pharmaceutics • Apr-Jun 2017 (Suppl) • 11 (2) S289 In Vitro, In Vivo Antiasthmatic Studies of <i>Talinum portulacifolium</i> F.Mamillapalli Vani ^{1,2} , S. K. Abdul Rahaman ³ , Avula Prameela Rani ⁴

7. CONCLUSION:

At last, the evaluation of *Talinum portulacifolium* emphasizes its importance as a botanical entity with a complex phytochemical composition and therapeutic potential. The plant, also known as Fame Flower and Jewels of Opar, has piqued the curiosity of botanical and pharmacognostic researchers. The phytochemical examination reveals the presence of several bioactive components throughout the plant, including flavonoids, alkaloids, saponins, triterpenoids, and steroids. These chemicals contribute to the diverse pharmacological effects of *Talinum portulacifolium*.

The plant has significant antioxidant and anti-inflammatory capabilities, indicating its potential for treating oxidative stress and inflammation-related disorders. Furthermore, the found bioactive ingredients support *Talinum portulacifolium*'s traditional usage in wound healing, diabetic treatment, and respiratory disorders. While the review emphasizes the positive elements of *Talinum portulacifolium*, it also emphasizes the need for additional research to fully understand its medicinal potential. Although previous research has laid the groundwork, there are still gaps in our understanding of specific pathways, dosage considerations, and potential adverse effects.

In the end, *Talinum portulacifolium* is a botanical treasure, with its complex chemistry and pharmacological adaptability paving the road for its use into modern herbal medicine. It has the promise of delivering vital insights to the ever-expanding area of natural therapies as research efforts continue.

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