

# Talinum triangulare (jac.) phytochemical composition



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Title: Study of phytochemical composition of leaves, stems and roots in *Talinum triangulare (jac.) willd.*

## 1. 0 INTRODUCTION

### 1. 1 Background of study

The *Talinum triangulare* have common name as ' Ginseng Jawa' in Java, waterleaf. The waterleaf was derived from family *Portulacaceae* . Some people confused the *Talinum triangulare* with *Talinum fruticosum* . The waterleaf was assumed native to tropical America. The herbs were introduced into Java in 1915 from Surinam by Bogor Botanic Gardens. Otherwise, the Southeast Asia was introduced recently.(Source: Google search, 2008)

The waterleaf was an erect perennial herbs plant with swallow roots, obtuse angular, hairless and succulent stems which can grow until 100cm-300cm tall. The branches on the stems have two laterals and basal buds. The leaves are arranged spirally almost nearly opposite, often crowded at the top of the stem and indistinctly or short petiole. The leaf-blades are usually spoon-shaped, with a size of measure about 3-25cm long and 1-6cm wide, entire and succulent, obtuse to round and occasionally at the apex.

The flowers are bisexual and it is a measure about 0. 5-2. 0cm in diameter. The pedicels measure 10mmx4mm. The stamens are about 20-40, style is 2-3 fid while ovary superior. The yellow fruit is capsular, ellipsoid to globular in shape with a size of measure about 0. 8-1. 2mm long, granulated, smooth and black shining in colour.

Waterleaf also has been founded as possess useful medical potentials such as laxative, purgative, treatment of diarrhea, gastro-intestinal diseases as

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well as in the management of cardiovascular diseases such as: stroke and obesity.

In Southeast Asia, waterleaf is sometimes planted as an ornamental pot plant or an edging plant in gardens. In South America, It has some medicinal applications. The crushed plant is applied as a poultice on contusion, inflammation and tumour. Decoctions are used for painful eyes and to aid recovery from blows and falls. Both of the roots and leaves have medicine properties. Mostly the leaves can use in painful eyes and the roots as internal treatment.

## **1. 2 Research questions**

The traditional medicine from this herbs plant not widely spread or less awareness among the public users. This is because the public user still continuing taking the synthetic medicine without knowing the side effect of the artificial medicine. Most of the phytochemical compound of the plant contain chemotherapeutic agent and can help to secure or prevent the diseases such as antidiabetic and anticancer. Most of the study of this herbs plants focusing on the leaves. So that, I interest to investigate for major part of the herbs plant which are leaves, stems and roots because I believe that different part must have different phytochemicals.

The present of the study was carried out to identify the class of phytochemical from leaves, stems and roots of the *Talinum triangulare*.

## **1. 3 Objectives:**

To extract the biologically active compound from leaves, stem and roots of the *Talinum Triangulare*.

- 1. 3. 2 To analyse the phytochemical present in Talinum Triangulare.
- 1. 2. 3 To investigate the present of chemotherapeutic agent in phytochemical compound of Talinum Triangulare.

#### **1. 4 Hypothesis**

H<sub>o</sub> : the Talinum triangulare contain phytochemical from various solvent

H<sub>a</sub> : the Talinum triangulare does not contain phytochemical from various solvent

#### **1. 5 Scope of study**

The phytochemical analysis of extract, water, methanol, ethanol and chloroform extract. The extracts of this plant was tested using preliminary phytochemical screening. Besides, these researches also identify the presence of chemotherapeutic agents.

## **2. 0 LITERATURE REVIEW**

### **2. 1 Introduction**

According to (R. O. B. Wijesekera., 1991), the world must have concern of medicinal plant industry because it has benefits to industry. He states that the plant-derived medicinal have cheaper rates that imported alternatives medicine. In addition, plant-derived biocides and pest repellents which are inexpensive and biodegradable and also can cause little long-term ecological damage. So that, alternative pesticides product can be derived from the medicinal plants.

The Studies on the Biochemical Effects of *Talinum Triangulare* on Rat state that, (Arit et al, 2007) the plant has nutrition value and there are claimed that the plant have medicinal value. The plant has anti-inflammatory effect and <https://assignbuster.com/talinum-triangulare-jac-phytochemical-composition/>

used as tonic (Oluwole, 2003) and (Udo et al., 1993). In European Journal of medical plant (Eleazu et al., 2003) state that the plant have source of important micro-nutrient such as vitamins, especially pro-vitamin A and  $\beta$ -carotene as well as essential amino acids and mineral elements. Waterleaf is a rich source of minerals (such as calcium, potassium and magnesium) and pectin proteins.

In other research, Waterleaf (*Talinum triangulare*) enhances the Cerebral Functions in Swiss Albino Mice (Ofusori, 2008) state that ' the waterleaf increases the antioxidant enzyme catalyse that the antioxidants have been known to enhance the brain functions.

For the micro-propagation research, Application of biotechnology for the improvement of Nigerian indigenous leaf vegetables (Opabode, 2005) state that ' Water leaf (*Talinum triangulare*) is considered a cheap crop and can easily be collected from the wild as vegetable. To date, no research priority has been accorded this crop. Improvement of its nutritional qualities should be the first objective of biotechnological application on *T. triangulare*.

Somaclonal variants could emerge as a result of manipulation of in vitro propagation conditions and medium. This could widen genetic variability of the crop plant.

## **2. 2 Types of phytochemicals in medicinal plants**

The phytochemicals are important in medicine industry. Since the phytochemical constituents promote health in human. The phytochemicals have large classes of identified and characterized. Every single plant food may contain thousands of different phytochemicals but the question is

whether the bioactive compound can give same benefit when the compound was consumed from whole food (Colleen Carkeet, 2013). The classes of the phytochemicals for the medicinal plants include alkaloids, glycosides, flavonoids, phenolics, saponins, tannins, terpenoids, anthraquinones and steroids (Doughari) blom edit lg .

The alkaloids are the largest group of secondary chemical constituents which is made up of the largely of ammonia compound. The compounds have basic properties and alkaline reaction where the red litmus papers turn to blue. The basicity of the compound are depends on the structure of the molecule, presence and location of the functional groups. Since the compound have basic properties, the compound surely bitter in taste (Doughari). Alkaloids can be found in 15-30% of all flowering plants and the most widely containing alkaloids are caffeine and berberine. Alkaloids may be found in roots, rhizomes, leaves, bark, fruit or seeds (Pengelly, 1996).

In generally, the glycosides were defined as sugars form from the condensation process with different varieties of organic hydroxyl compound. Glycosides have neutral in reaction and can be hydrolyzed into its components by ferments and mineral acids. The glycosides can be classified based on type of sugars component, chemical nature of aglycone or pharmacological action. Naturally, the glycosides have bitter taste which prove that the glycoside contain lactone group that may be diterpene lactones or triterpenoids (Doughari). The glycoside can be found in seeds, roots, shoots, flowers and leaves. Most of glycosides are soluble in water and organic solvent but the aglycones have possibility become insoluble in water (Pengelly, 1996).

The flavonoids are important to play role in photosynthesis (Wijesekera, 1991). The flavonoids are the most containing pigments after chlorophyll and carotenoids. The flavonoids are responsible for autumnal leaf colours and have function as protection to plant tissue from UV radiation, as antioxidants, enzyme inhibitors, pigments and light screens (Pengelly, 1996). The compound also involved in photosensitisation and energy transfer, action of plant growth hormones and growth regulators and also to defence the infection (Middleton Jr, 1988).

Phenolics are chemical components as naturally pigment colour that responsible for the colour of fruits. The most important role of phenolics as plant defences against pathogens and herbivore predators so that the phenolics was applied in control of human pathogenic infection. The phenolics can be found in apples, green tea, and red wine (Doughari). The phenolics compound widely distributed from plant flora. The phenolics constituent is important part of glycosides (phenolics glycosides), flavonoids, and tannins. Curcumins are phenolics compound that derived from *Curcuma longa* that contain antioxidant, anti-inflammatory, anti-cancer and hepatoprotective activities (Saroya, 2011).

Saponins are glycosides that can be found in a number of plants. The saponins can be classified into two groups which are steroid saponins and triterpene saponins. The saponins are introduced as high molecular weight compounds which is triterpene and steroid aglycones combine together to form a sugar molecule (Saroya, 2011). The saponin was derived from *Saponaria vaccaria* a plants that contain saponins and recently used as soap.

The saponins have soap-like behaviour in water thus can produce foam (Doughari).

Other than that, the tannins also widely distributed from plant flora. The tannins also have phenolics compounds of high molecular weight. The compounds are soluble in water and alcohol. Most of part plants that can be found are roots, barks, stems, and also outer layers of plant tissues (Doughari). The tannins are the most plant constituents that responsible for astringency. Tannins are non-crystalline compounds which in water can produce a mild acid reaction and the tannins have sour in taste. Most of tannins are classified as hydrolysable tannins and condensed tannins but some plants have both (Pengelly, 1996).

Terpenoid or terpene is one the most important groups of active compounds in plants. Almost all terpenoids structures may divide into isoprene units which is containing five carbons with two unsaturated bonds (Pengelly, 1996). The terpenoids can be found in liquid form which is flammable unsaturated hydrocarbons. The terpenoids can be found in essential oils, resins or oleoresins (Saroya, 2011). Terpenoids can be classified as monoterpenes, diterpenes, triterpenes, and sesquiterpenes. The classified based on the number of isoprene units that involve in the formation of the compounds (Doughari).

Anthraquinones was derived from phenolics and glycosidic compounds (Doughari). The compounds have yellow-brown pigments which are become dyes for textile and the composition of glycosides and anthraquinones can determines the effectiveness as laxatives (Pengelly, 1996). Besides, the



steroids also known as steroid glycosides which are refer to ' cardiac glycosides'. They can be found naturally in plants phytoconstituents that have benefits as therapeutic applications especially as arrow poisons and cardiac drugs (Doughari).

### **2. 3 Mechanism of Phytochemicals**

Every action of phytochemicals has different mechanism. Some can be used as chemotherapeutics or chemo preventive agents. The chemo preventive agents is refers to as agents can help inhibition, reverse, or retard the tumorigenesis. The chemo preventive phytochemicals also can help in cancer therapy (D'Incalci *et al.*, 2005; Sarkar & Li, 2006).

The antioxidants that derived from phytochemicals of plants can help to protect the cells against the damaging effects of reaction oxygen that known as free radicals such as singlets oxygens, super oxide, peroxy radicals, and peroxynite (Mattson & Cheng, 2006). The naturally antioxidants play main role in health maintenance and prevention of any chronic and degenerative diseases (Uddin *et al.*, 2008; Jayasri *et al.*, 2009).

Some of phytochemicals can be anticacinogenesis otherwise as inhibition of carcinogenesis (Liu, 2004). The various vegetables sources such as broccoli, cabbage, cauliflower and Brussel sprouts that contain glucosinolates have potential to against the colon cancer. Other than that, some phytochemical constituents can helps to protects from pathogenic insects, bacteria, fungi or other protozoa that have been found as application in human medicine (Nascimento *et al.*, 2000).

Other phytochemical constituents also can be analgesics morphine and codeine especially for alkaloids and the most important alkaloids as addictive stimulants caffeine, nicotine, codeine, atropine, morphine, ergotamine, cocaine, and ephedrine. Some compounds also can help to prevent heart ailments and sometimes as anti-inflammatory agents (Kar, 2007).

### **3. 0 Materials and methodology**

#### **3. 1 Preparation of sample**

The waterleaf (*Talinum Triangulare*) was grown and collected at Agro Park of Universiti Malaysia Kelantan Jeli Campus and was confirmed from (Dr. Syamsul, personal talk). The plant part involve in the research are leaves, stem and the roots. All those part was collected as specimen.

#### **3. 2 Preparation of extraction**

The plant was dried for some days or hours. Then, plants were pulverized using a sterile laboratory mortar and pestle to make the powder. Next, the plant powder was stored in air tight container. 100g of the powder was added in 1 L distilled water. The mixture then poured into conical flask. The mixture was shaken gently for 5 minute and kept for 12 hours under room temperature. The mixture was filtered and evaporated to dryness at room temperature. The resultant powder was stored in refrigerator for study about 4 °C. The procedure was repeated for methanol, ethanol, and chloroform.

#### **3. 3 Phytochemical Screening**

The phytochemical screening of waterleaf powder and its methanol, ethanol, chloroform and water extracts is qualitative. Oloyed (2005) was introduces the procedure and the procedure were adopted. This analysis was conducted

to determine the biologically active compounds that presence in the waterleaf.

Test for alkaloids:

Add about 0. 2g of each sample and stirred in 5ml of 2% of Hydrochloride (HCl) solution on a steam bath for about 5 minutes. Then, the mixtures were allowed to cool and filtered. Next, the filtered mixture was divided into 3 test tube by equally proportion and labelled with A, B and C. The portion with 1ml was treated with 2 drops of Dragendroff's. The test indicates that as positive test when red precipitate was shown. 2ml of the filtrate was treated with Mayer's reagent for about 2 drops. If a creamy white precipitation formed, indicate that as a positive test of alkaloids.

Tests for flavonoids:

About 0. 5g of each sample was added into 10ml of ethyl acetate solution and was heated in boiling water only 1 minute. Then, filtered mixture was used for the following test. In this test, about 5ml of the mixture was shaken with 1ml of 1% of ammonia chloride solution and let kept. The yellow precipitate are formed indicate the positive test of flavonoids.

Tests for tannins:

Add about 2g of each sample into 5ml of 45% ethanol and boil for about 5 minutes and let the mixture cool down. Then, filter the mixture . The filtered mixture then was taken about 1ml and was added into the lead sub acetate solution. If the gelatinous precipitates were formed, indicates that as presence of tannins. In other hand, add 1ml of bromine water into the 2ml of <https://assignbuster.com/talinum-triangulare-jac-phytochemical-composition/>

the mixture. If the pale brown precipitate was formed indicate as evidence for presence of tannins.

Tests for carbohydrates:

Add about 0.5g of each sample into the 5ml of iodine solution. The presence of purple colouration at the interphase prove that the presence of carbohydrates.

To test terpenoids, methods from Harborne (1973), Sofowora (1973) and Trease and Evans (1989) was used.

Tests for terpenoids:

About 2ml of each sample was dissolved in 2ml of chloroform and allowed to evaporate for dryness. Then, 2ml of the concentrated sulphuric acid was added and continuing with heated for about 2 minutes. The presence of the greyish colour in mixture indicates that as positive test for terpenoids.

### **3. 4 Detection of Chemotherapeutic Agent**

The phytochemicals that results from the tests will analysis for detection of chemotherapeutic agents by comparing with other research that have done about chemotherapeutic agent that derived from other plants.

## **4. 0 Expected Results**

The expected results are the plant part leaves, stems and roots were successful extracted and phytochemical analysis will successful by using methods from Oloyed (2005), Harborne (1973), Sofowora (1973) and Trease

and Evans (1989). The chemotherapeutic agents will be detected by comparing with other research such as from (Doughari *et al.*, 2009).

## 4. 1 Experimental Design

### 4. 1. 1 Phytochemical analysis for Leaves

Extracts

	Distilled	Methan	Ethano	Chloroform
Phytochemicals	water	ol	l	m

Alkaloids

Flavonoids

Tannins

Carbohydrates

Terpenoids

Table 1. 1 phytochemical analyses for leaves corresponding to various solvent (Sources: Tiwari *et al.*, 2011)

### 4. 1. 2 Phytochemical analysis for Stems

Extracts

	Distilled	Methan	Ethano	Chloroform
Phytochemicals	water	ol	l	m

Alkaloids

Flavonoids

Tannins

Carbohydrat

es

Terpenoids

Table 1. 2: phytochemical analyses for stem corresponding to various solvent  
(Sources: Tiwari *et al.*, 2011)

#### 4. 1. 3 Phytochemical analysis for Roots

Extracts

	Distilled	Methan	Ethano	Chlorofo
Phytochemic	water	ol	l	m
als				

Alkaloids

Flavonoids

Tannins

Carbohydrat

es

Terpenoids

Table 1. 3: phytochemical analyses for root corresponding to various solution  
(Sources: Tiwari *et al.*, 2011)

## 5. 0 References

Doughari, J. H.; Human, I. S, Bennade, S. & Ndakidemi, P. A. (2009).

*Phytochemicals as chemotherapeutic agents and antioxidants* : Possible solution to the control of antibiotic resistant verocytotoxin producing bacteria. *Journal of Medicinal Plants Research* . 3(11): 839-848.

Harboune, J. B., 1973. *Phytochemical Method of Analysis* . Chapman And Hall Publications, New York.

Jayasri, M. A.; Mathew, L. & Radha, A. (2009). *A Report On The Antioxidant Activities Of Leaves And Rhizomes Of Costus Pictus D. Don* . International Journal of Integretive Biology. 5(1): 20-26.

Kar, A. (2007). *Pharmaocgnosy and Pharmacobiotechnology (Revised-Expanded Second Edition)* . New Age International Limited Publishers New Delhi. pp 332-600.

Liu, R. H. (2004). *Potential Synergy Of Phytochemicals In Cancer Prevention: Mechanism Of Action* . Journal of Nutrition. 134(12 Suppl): 3479S-3485S.

Nascimento, G. G. F.; Locatelli, J., Freitas, P. C. & Silva<sup>1</sup>, G. L. (2000).

*Antibacterial Activity Of Plant Extracts And Phytochemicals On Antibioticresistant Bacteria* . Brazilian Journal of Microbiology. 31: 247-256

Oloyed, O. I., 2005. *Chemical Profile Of Unripe Pulp Of Carica Pagaya*. Pak. J. Nutr., 4: 379-381.

Sofowora A (1993). *Medicinal Plants and Traditional Medicine in Africa*. Spectrum Books Ltd., Ibadan, Nigeria, pp. 191-289.

Trease, GE, Evans WC (1989). *Pharmacognosy*, 11th ed., Bailliere Tindall, London pp. 45-50.

Prashant Tiwari, Bimlesh Kumar, Mandeep Kaur, Gurpreet Kaur, Harleen Kaur (2011). *Phytochemical screening and Extraction: A Review*. Internationale Pharmaceutica Scientia. Issues 1(vol. 1).

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