

## Phytochemical contents of a local food plant *Saekan* (*Mollugo oppositifolia* Linn.) in Pandi, Bulacan

Conteúdo fitoquímico de uma planta alimentícia local *Saekan* (*Mollugo oppositifolia* Linn) em Pandi, Bulacan

Contenido fitoquímico de una planta alimenticia local *Saekan* (*Mollugo oppositifolia* Linn) En Pandi, Bulacan

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### ABSTRACT

The present study was undertaken to confirm the phytochemical contents of *Saekan* (*Mollugo oppositifolia* Linn.) The plant sample was first confirmed by the Bureau of Plant Industry with a scientific name *Mollugo oppositifolia* Linn. and a common name *Saekan/Papait/Salsalida* plant under the family *Aizoaceae*. The results from a phytochemical analysis of about 500 grams of dried whole plant sample in the Chemistry Laboratory of the Department of Science and Technology Region III (DOST III) Office confirmed that alkaloidal compounds, a phytochemical with antimicrobial, anthelmintic, and antidiarrheal properties were present due to the formation of turbidity or white precipitate using Meyer Test; a reddish-brown layer that turned to blue/purple showed in the Keller-Killiani Test proved the presence of glycosides which has anti-diarrheal properties; and Saponins were found to be in the plant using Froth Test due to a formation of froth which has anthelmintic, antidiarrheal, and anticancer properties.

**Keywords:** phytochemical. food plant. *Saekan*. *Mollugo oppositifolia* Linn.

### RESUMO

O presente estudo foi realizado para confirmar os conteúdos fitoquímicos de *Saekan* (*Mollugo oppositifolia* Linn.). A amostra da planta foi confirmada pela primeira vez pelo Bureau of Plant Industry com um nome científico *Mollugo oppositifolia* Linn. e uma planta de nome comum *Saekan / Papait / Salsalida* sob a família *Aizoaceae*. Os resultados de uma análise fitoquímica de cerca de 500 gramas de amostra de planta inteira seca no Laboratório de Química do Departamento de Ciência e Tecnologia da Região III (DOST III) Office confirmaram a presença de compostos alcalóides, um fitoquímico com propriedades antimicrobianas, anti-helmínticas e antidiarreicas devido à formação de turbidez ou precipitado branco usando o Teste de Meyer; uma camada marrom avermelhada que mudou para azul / púrpura mostrada no Teste de Keller-Killiani comprovou a presença de glicosídeos com propriedades antidiarreicas; e Saponinas foram encontradas na planta usando o Teste de Espuma devido a uma formação de espuma que tem propriedades anti-helmínticas, antidiarreicas e anticâncer.

**Palavras-chave:** fitoquímico. planta alimentar. *Saekan*. *Mollugo oppositifolia* Linn.

### RESUMEN

El presente estudio se llevó a cabo para confirmar el contenido fitoquímico de *Saekan* (*Mollugo oppositifolia* Linn.) La muestra de la planta fue confirmada por primera vez por la Oficina de Industria Vegetal con el nombre científico *Mollugo oppositifolia* Linn. y un nombre común planta *Saekan / Papait / Salsalida* bajo la familia *Aizoaceae*. Los resultados de un análisis fitoquímico de aproximadamente 500 gramos de muestra de planta entera seca en la Oficina del Laboratorio de Química del Departamento de Ciencia y Tecnología de la Región III (DOST III) confirmaron la presencia de compuestos alcaloides, un fitoquímico con propiedades antimicrobianas, antihelmínticas y antidiarreicas. debido a la formación de turbidez o precipitado blanco usando la prueba de Meyer; una capa de color marrón rojizo que se volvió azul / púrpura mostrada en la prueba de Keller-Killiani demostró la presencia de glucósidos que tienen

propiedades antidiarreicas; y se encontró que las saponinas estaban en la planta usando la prueba de espuma debido a la formación de espuma que tiene propiedades antihelmínticas, antidiarreicas y anticancerígenas.

**Palavras-chave:** fitoquímico. planta alimentícia. *Saekan*. *Mollugo oppositifolia* Linn.

## 1. INTRODUCTION

*Saekan* (*Mollugo oppositifolia* Linn.) or *papait* is a small green food plant eaten as a vegetable. It is an annual plant known to other countries as *Gima shak* in Bangladesh, Bitter Leaf in England, *Jima* in India, and *Thora Poondu* (Sri Lanka). In Pandi, Bulacan, it is commonly known as *Saekan* or *Papait* plant. The researcher pursued this study because the utilization of *Saekan* was not evident much more in the Province of Bulacan, Town of Pandi, and the food plant was considered underutilized which has the potential as an alternative food source. The general problem of the study was “How may the phytochemical contents of *Saekan* (*Mollugo oppositifolia* Linn.) be confirmed? The researcher used a specific species from the family *Aizoaceae* which was *Saekan* (*Mollugo oppositifolia* Linn.). The test was done in the Analytical Services Laboratory in the same building at DOST III Maimpis City, Pampanga. The sample was sundried for three-days and weighed less than 500 grams which is a requirement before the test. The samples were then delivered to the testing area and received by an attending secretary. After 30 working days, the results were released and received via electronic mail confirming the presence of alkaloidal compounds, glycosides, and saponins. The researcher found this study significant to the community where *Saekan* was abundant and can be propagated. This study tried to unleash the potentials of this food plant and promoted the beneficial effects of consuming the plant. The results of this study were deemed to have tremendous implications to the Rural Health Unit, Municipal Agriculture Office of Pandi, farmers, teachers, students, and other future researchers.

## 2 THEORETICAL FOUNDATION

The present study was conceptualized based on the theories, related literature and relevant studies briefly explained below. These helped the researcher strengthen the knowledge about the study and gave useful information that was used to validate the point of the researcher.

**2.1 The Doctrine of Signatures.** Bhome (1621) stated in the theory that plants are given by God to humans with their “signature” or characteristic that identifies what is its use. The plants were from God and should be used by human beings for food and medicine for their illness. The idea of the theory started with Galen and imposed that herbalists can use plants to treat various diseases of the ailing body.

It is also mentioned in the theory that some examples of characteristics depend on the human body part which can be used. For example, a heart-shaped leaf of a plant can be used to treat ailments of the heart. Another example is that a red-colored plant treats blood while a yellow one can be used to treat certain matters in bile and digestion. White-colored plants and some bitter are used to cleanse the liver. A mushroom, based on its shape, can cure certain diseases on the male organ. Mentioned in the theory that bitter taste plants are believed to cleanse the liver. The plant being studied possesses bitterness and some countries like India (Khare, 2007) and Bangladesh (Hoque, 2011) used the decoction of the plant as stomachic and cure liver disorders. This theory enhances the concept of the usefulness of the *Saekan* as an effective herbal medicine locally available in the community of Pandi.

Suratos (2017) used to study *Saekan* together with all other plants and considered as one of the so-called Indigenous Food Plant (IFP) and was underutilized by the locals. Likewise, it is termed as “food for the poor” but its micro and macronutrients are indeed helpful to the human system. Underutilization of this plant is due to its low economic value because of small leaves and its unavailability the whole year-round. This study helped the researcher in maximizing the idea of the plant in terms of community awareness, beliefs, practices, plant uses, and characteristics.

*Saekan* is also included in the list of plants on the book of Indian Medicinal Plants which is an illustrated dictionary by Khare (2007) and gave some information about the plant including its family *Aizoaceae*, *Mollugonaceae*, habitat in some parts of India, Ayurvedic and folk names, and its action when taken by the body as a stomachic, antibacterial, and bitter tonic in some liver disorders. This work (Khare,

2007) solidifies the usefulness of the plant in terms of its usefulness as a consumable plant and effective herbal medicine for certain illnesses. It was hoped in this study that after careful analysis and study of the phytochemical content, a confirmatory test of the effectiveness of the plant to cure/remedy some illness will be provided to serve the Pandieños.

*Saekan* juice can be applied to some skin diseases and itch and can cure earache when combined with a little amount of castor oil as written in the book of Vardhana (2008) and should be warmed in the application. It is also described as a growth in prostate direction, branched, annual herb that grows every March to August.

Deb, Jamir, and Ozukum (2013) stated in their research that due to the increasing number of the world's population and other consumers, the utilization of some underutilized crops should be given importance for it will help to feed and be a new source of food. This problem is prevalent in the town of Pandi. Due to the sudden increase in population because of relocations, the municipality of Pandi is finding a new way of sustaining food security to the citizens. This study will be helpful to Pandieños especially those new citizens living in relocation sites because they will be given awareness of utilizing *Saekan* locally available to their place. The Municipality may help them also to propagate the said food plant for them to provide food and a small-time income for those cultivating the soil.

On the medicinal aspect of the plant-based on Hoque (2011), *Saekan* has analgesic and anti-inflammatory properties. In the place of the study conducted in Bangladesh, the said plant is utilized as a folkloric medicine to joint pains, fever, inflammation, and others. The proponent proved the consent by using two different types of the test; analgesic test and edema test. The results showed that the herb's methanolic extract has analgesic and anti-inflammatory activities. The study then proved and validated that the usage of the herb is scientifically approved and effective.

A work by Gonipathan and Nija (2014) found out that *Saekan* has great potential in dealing with ulcers and as an agent for gastroprotection. He tested the extract of the said plant on some ulcerated rats. His experiment showed that there was a significant decrease in the ulcer-causing bacteria and has an observable white blood cells count increase. He also used a known drug for ulcers and compared the results from the herb and drug. His experiment revealed that *Saekan* is better in treating peptic ulcers than the administered drug commercially available to the pharmacy.

Other researchers, in the name of Dongarwar, Uma Thakur, and Wadekar (2012) experimented on the plant's extract and found out that it is essential in toning the body's muscles, stomachic, relieves the discomfort of gas in the digestive tract, and is widely used in some districts of India. Their findings come up through the result of their phytochemical screening of the plant samples in a different solvent like chloroform, water, petroleum, ethanol, and methanol. They found out that there is a presence of secondary metabolites like alkaloids, carbohydrates, proteins, phenols, saponins, tannins, and steroids.

On pharmacognosy and preliminary phytochemical investigation of *Saekan* made by Nagannawar and Jayaraj (2018), the leaves, stem, and roots of the herb undergone different types of testing. The sample was taken from the Karnatak University campus in India and washed, sundried and powdered. Then, the solvent used was ethanol, acetone, petroleum, water, chloroform, and ether. After some series of tests, the results showed that using Molisch's test, carbohydrates compounds were present. Alkaloids were present using Mayer's test while glycosides were found using the Anthrone test. The foam test was used to see traces of saponins while  $\text{FeCl}_3$  test was used to show components of tannins.

### 3 METHODS

A sample was brought to the Bureau of Plant Industry in Manila and confirmed that the plant being studied was *Saekan*. It was assured by the researcher that there are no other plants or animals that are being harmed on the gathering of the samples. A certificate was issued to the researcher confirming the authenticity of the plant sample. Phytochemical extraction is done to separate the active medicinal components of plants using different standard procedures (Tiwari et. al, 2011). Different solvents were used depending on their effectivity to show results like water for flavonoids (anthocyanin), alcohol (tannin and saponins), methanol

(high cytotoxicity can destroy some compounds), ethanol (better to use than methanol, and more increased polarity when mixed with (30%)water), acetone, chloroform (terpenoids) and ether.

Tiwari et. al (2011) also said that the following phytochemicals can be identified through the following tests like Mayer's test for alkaloids where the filtrate sample was treated with a reagent which was Potassium mercuric iodide where the formation of a white to yellowish precipitate indicates its presence.


Borntrager test was used to identify the presence of anthranol glycosides which happens when there is a formation of a pink-red colored layer formation. Froth test was used to show saponins components and their presence results in the formation of froth. FeCl<sub>3</sub> is used to show components of tannins and can be observed through the formation of a blue-black color or brownish to a green color formation.

## 4 RESULTS AND DISCUSSION

### 4.1 Confirmation of the Plant Sample by Bureau of Plant Industry

This part presents and explains the research findings on the confirmation of the plant sample made by the Bureau of Plant Industry.

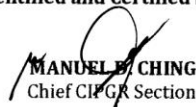
**Table 1A. Plant Identification/Confirmation of Saekan (*Mollugo oppositifolia* Linn.)**

	Republic of the Philippines Department of Agriculture <b>BUREAU OF PLANT INDUSTRY</b> Manila
692 San Andres Street Malate, Manila Philippines e-mail: buplant@yahoo.com	Tel. No. 525- 525- 525- Fax No. 521-
PLT-ID-CRPSD-2317-18 October 12, 2018	

#### PLANT IDENTIFICATION/CERTIFICATION

1. Local/Common Name:	Papait, Salsalida
2. Family / Scientific Name:	Aizoaceae / <i>Mollugo oppositifolia</i> Linn.
3. Collector's Name & Address:	Mark Anthony N. Tingson Bulacan State University Malolos, Bulacan
4. Collection Site/Source:	Pandi, Bulacan
5. Date of Collection:	September 24, 2018
6. Types of Sample:	( x ) Whole plant    ( ) Leaves ( ) Stem            ( ) Roots ( ) Flowers        ( ) Fruits ( ) Seeds           ( ) others
7. Status of Sample:	Fresh
8. Description/Remarks:	See attached sheet
9. References:	See attached sheet

Identified and Certified by:

  
MANUEL E. CHING  
Chief CIPGR Section

Noted by:

  
MARY ANN B. GUERRERO  
OIC - Chief, CRPSD



**Common Name** : Papait, Salsalida  
**Scientific Name** : *Mollugo oppositifolia* Linn.

**Descriptions:**

Papait a very common weed is a slender spreading or ascending, smooth, branched annual herb, with branches 10 to 40 cm in length. The leaves are opposite or whorled, spatulate, oblanceolate, to oblong obovate. The flowers are white and fasciated with slender stalks. The sepals are 3 to 3.5 mm long. The capsule is ellipsoid and a little shorter than the sepals. The seeds are numerous and covered with raised tubular points.

**Uses:**

The whole plant without the roots is eaten as vegetable. It is very bitter when not properly cooked. It is considered as appetizer. This plant is exceptionally rich in iron and a good source of calcium. It is also used as a cooked cataplasm in dyspepsia in children. The plant is considered as stomachic, aperient and antiseptic. The juice is applied to itches and other skin diseases.

**Reference:**

Quisumbing, E. PhD. 1978. Medicinal Plants of the Philippines. Katha Publishing Co. Inc. pp. 279.



10-12-18

The species used in this study is *Saekan* (*Mollugo oppositifolia* Linn.) under the family *Aizoaceae*.

It is dwelling on moist grounds mostly on rice fields and commonly on a fish pond drying up due to summer heat. It bears small white flowers with five petals. The plant has a small primary root and is easy to uproot from the ground. The stem is green to brownish in color and herbaceous in type. The phyllotaxy of the leaves is whorled. The leaf is net-veined and oblong and closely obovate. The whole plant was utilized in the confirmatory analysis of the phytochemical contents. Beliefs on the plant include stomach pain reducer and lower blood glucose level.

#### 4.2 Phytochemical Contents of *Saekan* (*Mollugo oppositifolia* Linn.)

Phytochemical analysis of the *Saekan* in the Department of Science and Technology Regional (DOST III) office in Maimpis City of San Fernando, Pampanga. The phytochemical test is a qualitative test to determine the presence of tannins, saponins, terpenoids, flavonoids, cardiac glycosides, phenolic compounds, and alkaloids in the plant sample. The screening tests used were Mayer/Meyer test for alkaloids, Borntrager Test for anthraquinones, the Keller-Killiani test for glycosides, Bate-Smith and Metcalf test for flavonoids, FeCl<sub>3</sub> test for tannins, and froth test for saponins. The researcher was assured by the DOST Office that the results were kept confidential and were sent via email.

To know the phytochemical contents of the *Saekan*, the researcher set up an appointment for a test in the Department of Science and Technology last January 4, 2019. A research assistant gave instructions in bringing the sample to be analyzed. The test was done in the Analytical Services Laboratory in the same building at DOST III Maimpis City, Pampanga. The sample was sundried for three-days and weighed less than 500 grams which is a requirement before the test. The samples were then delivered to the testing area and received by an attending secretary. After 30 working days, the results were released and received via electronic mail. The results were shown below.

**Table 2A. Phytochemical Analysis Results of *Saekan* (*Mollugo oppositifolia* Linn.) for Detected Contents**



Phytochemical	Method	Result
<b>Phytochemical Screening A2</b>	TM-221	
	With Reference to a Guidebook to plant Screening: Phytochemical and Biological. UST, 2005	
<b>Alkaloids</b>	Mayer/Meyer Test Formation of turbidity or white precipitate	Detected Alkaloidal compounds were present
<b>Cardenolides and Bufadienolides</b>	Keller-Killiani Test Reddish Brown layer then turns to blue or purple	Detected Glycosides compounds were present
<b>Saponins</b>	Froth Test Formation of Froth	Detected Saponins were present

Based on the results using the Mayer/Meyer test following the standard operating procedures from Guidebook to plant Screening: Phytochemical and Biological. UST, 2005 it is found out that when the filtrate is treated with the Meyer reagent (Potassium Mercuric Iodide) a formation of turbidity or white precipitate was formed indicating the presence of the alkaloidal compounds. These compounds were heterocyclic nitrogen compounds with antimicrobial, anthelmintic, and antidiarrheal properties (Tiwari et. al, 2011).

In terms of Glycosides, where cardenolides and bufadienolides were used as test parameters through the Keller-Killiani Test, a reddish-brown layer that turned to blue or purple was formed indicating the presence of glycosides which has a structure of sugar plus non-carbohydrate moiety.

The present glycosides have an antidiarrheal property (Tiwari, et. al 2011) Froth Test was used to show the presence of saponins where the formation of froth from the test is an indication. The presence of saponins indicates anticancer, anthelmintic, and antidiarrheal properties from the plant (Tiwari et. al. (2011). Based on the results showed, it can be said that *Saekan* is a good source of phytochemicals that were helpful for the body.

Due to the presence of alkaloidal compounds, glycosides, and saponins, it is true according to Khare (2007), Hoque (2011), Gonipanthan, and Nija (2014), Dongarwar, and Uma Thakur and Wadekar (2012) that it has antibacterial properties. Also, it proved the findings of Nagannawar and Jayaraj (2018) that the plant contains the presence of alkaloids using the same Meyer's Test done in this study and glycosides using the Anthrone Test.

It is indeed helpful that the following phytochemicals were confirmed present to the plant. The results have a tremendous impact and contribution to the awareness program prepared by the researcher because it was used as a basis for the conducted awareness program to promote the potential of the plant as an alternative food source and utilization of the indigenous food plant.

Besides the detected contents, Table 1B shows the phytochemical analysis results of *Saekan* for undetected contents.

**Table 2B. Phytochemical Analysis Results of *Saekan* (*Mollugo oppositifolia* Linn.) for Undetected Contents**

Test Parameter	Method	Result
<b>Anthraquinones</b>	Borntrager Test	Not Detected
	Formation of red color	Anthraquinone compounds were not present
<b>Flavonoids</b>	Bate-Smith and Metcalf Test	Not Detected
	Development of a strong red or violet color	Anthocyanins were not present
		Leucoanthocyanins were not present
<b>Tannins and polyphenolic compounds</b>	Ferric chloride Test	Not Detected
	Blue-Black color	Hydrolyzable tannins were not present
	Brownish-green color	Not detected
		Condensed tannins were not present

The phytochemicals mentioned in Table 2 such as Anthraquinone, Anthocyanins, Leucoanthocyanins, Hydrolyzed tannins, and Condensed tannins were not detected on the samples submitted but it does not weaken the food values and benefits. The results on undetected phytochemicals may be caused by the volume of the sample tested and the sensitivity to the tests done by the DOST-Region III Chemistry Laboratory. Hence, increasing the volume of the sample also increases the probability that the 3 undetectable chemicals may be detected. It is indeed better to have all phytochemicals found on the plant but it is observed those same properties were also found from the present phytochemicals in the food plant.

## 5 CONCLUSIONS

Based on the significant findings of the study, the researcher set forth the following conclusions that the phytochemical contents based on the results that the local food plant *Saekan* (*Mollugo oppositifolia* Linn.) is beneficial to the body, and utilization of the said plant should be improved. Alkaloidal compounds, glycosides, and saponins were present which have antimicrobial, anthelmintic, antidiarrheal, and anticancer properties. Because of these findings, other researchers may find it interesting to do other studies about the plant in terms of its propagation and awareness program about its uses and utilization.

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