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# Phytochemical Analysis of Bugbugayyong (ABRUS PRECATORIUS LINN) Leaves Extract

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## Abstract
Abrus precatorius Linn is one of the important medicinal plants belonging to the family Fabaceae. It is used as the common effective medicinal herb in many countries. The study plant has many therapeutic values like anti-inflammatory, anti-diabetic, antimicrobial and antioxidant activities. This study investigated the phytochemical constituents of leaves extract of Bugbugayyong (Abrus precatorius Linn). Specifically, it aimed to 1: Determine the phytochemical constituents of Bugbugayyong (Abrus precatorius Linn) leaves extract. Preliminary qualitative phytochemical screening was performed on the crude methanolic extract and revealed the presence of alkaloids, carbohydrates, saponins, diterpenes, phytosterols, phenolics, flavonoids and proteins except tannins.

**Keywords:** Leaf Extract, Phytochemical Constituents, Abrus precatorius Linn

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## Introduction
Plant has been an important source of medicine since ancient times. The oldest known record of plant being used for a therapeutic purpose is found in Egyptian medical papyrus written in the fourteen centuries. Since then, preparation of plant materials in the form of decoction, infusion, powder or paste have been used in traditional medicine for prevention and treatment of different diseases and for improving the general well-being.

Moreover, medicinal plant represents a rich source of antimicrobial agents. As such, they were used medicinally in different countries. A wide range of medicinal plant parts and extracts are used as raw drugs due to their varied medicinal properties. Some of these raw drugs are collected in smaller quantities by some healers for local use and some use the extracts of plant parts. The therapeutic efficacy of many indigenous plants for many disorders had been described by practitioners for traditional medicine. The antimicrobial properties of these medicinal plants are also being increasingly reported from the different parts of the world. The World Health Organization (WHO) estimated the plant extracts or their active constituents were used as folk medicine in traditional therapies of 80 % of the world population.

Although hundreds of plant species had been tested for antimicrobial properties, a vast majority of plants have not been adequately valuated. A detailed investigation of antimicrobial properties of plants that were used in local traditions can lead to the development of invaluable plant drugs for many diseases. There is a need therefore to investigate the antimicrobial properties of still more plants as stated in (Asian Journal: Microbial Biotech Encl, 2009)

*Abrus precatorius* is a twining herb with delicate feathery leaves, climbing shrub, with greenish yellow branches. Leaves 5-17 compounds, leaflets obovate or oblong; Flowers are crowded racemes, sub sessile, pale purple to yellowish growing at the end of a stalk. Fruits are short pods containing hard, shiny, scarlet and black seeds. The seeds are slightly smaller than ordinary peas; ovoid scarlet with a black spot round the hilum. The root is woody, tortuous and much branched, with a sweet taste, rather like liquorice. Abrus precatorius is a slender, perennial, much branched, perennial climber that twines around trees, shrubs, deciduous, woody, prickly twinning herbaceous (William charles Evans, 2002)

Bugbugayyong or *Abrus precatorius* Linn. (Family – leguminoseae and subfamily-Papilionaceae) is a native plant of India subcontinent and the East and West Indies, in Hindi, it is known as Ratti or Gumchi. Plant parts such as leaf extracts is used for leukoderma, the seed having abrin is used as a purgative and abortive and the root extract used against coughs in the ayurvedic system of medicine. It has been utilized as medicine from very ancient times not only in this subcontinent but also in China and other prehistoric cultures. In certain tribal regions people chew leaf of *Abrus precatorius* for the relief of the mouth ulcer. It also contains tri-terpenoid saponins and used in the treatment of inflammation, ulcers, wounds, throat scratches and sores as cited by Pokharkar R, et.al., (2011) in their study entitled “GCMS studies of *Abrus precatorius*. Pharmacology online”.

The Philippines has plants and animals, of endemic species which are considered as some of the 17 mega-biodiversity areas of the world that claim two-thirds of the biological diversity on the planet. The nation's abundance in biological diversity has a crucial role in the creation of its own complementary medications especially those made with plant origins (Sia, 2011).

It is for the above-mentioned that RA 8423, also known as the Traditional and Alternative Act of 1997, strengthens the use of alternative medicines from plant sources. With this law, folk or traditional medical practices are once actively practiced to prevent or cure human diseases.

Philippines is known to be a tropical country of diverse fauna and flora. Due to the moderate temperature in the place, there are varied researches and explorations concerning herbal and indigenous plants. One of those plant species is the Abrus precatorius or the Rosary Pea which belongs to the Legume family. Parsad, et al. (2015) stated that the said specie is locally found in the South Pacific Region. Furthermore, Khairullah (2022) also stated that it is found to be growing in tropical and subtropical areas of the world where Philippines is included. It was found to be an important in controlling invasive pests in the farms. Additionally, the said specie is a native or an ancient introduction (Parsad, et al., 2015). Khairullah, et al. (2022) added that in the Philippines, its origin name is Jequirity. It is widely cultured in Nigeria and Southeast Asian countries. It has found to treat rheumatism, alexiteric, sore throat, vomiting and other therapeutic uses. These are the following uses: antimicrobial activity, antihelmintic activity, etc.

The different parts of *Abrus precatorius* could be used and they have different sources of chemical constituents which have different medicinal effects on the body. Such as root, leaf and the seed of the fruit of the Abrus plant have different types of chemical constituents which help to explore the different biological effects for the treatment of different diseases (Bapat SP, Sane RT, 2012). Also, it has anti-suppurative properties. They are grinded with lime and poured on acne, sore and abscess. Decoction of leaves are taken orally for cough and flu. The roots are useful for the treatment of jaundice and bile haemoglobinuric. Its root paste is administered for the curation abdominal pains, recovery from tumors and also for inhibiting abortion and grinded powder of roots were taken with pure clarified butter thrice a day for four days to cure cough according to Chadha YR (2010).

Root can be used as a remedy from snake bite by chewing. However, for using as an anti-malarial and anti-convulsant the extract of fresh root in hot water can be administered orally (Nadkarni, K. M. (2011), on the other hand as cited by Anant S, Maitreyi Z. Pharmacognosy, phytochemistry and pharmacology of *Abrus precatorius* leaf (2012) liquid broth of dried root is taken orally for the treatment of bronchitis and hepatitis.

Paste of leaves and seeds are applicable on the head for graying of hair. Dried seeds of *Abrus precatorius* are ground to powder and administered orally one teaspoonful once a day to cure the worm infestation for two days.the In veterinary section of medicine, dried seed powder of Abrus is used for the treatment of fractures (Chopra RN, Nayar SL, Chopra IC, 2009).

Phytochemical analysis showed the presence of moisture, ash, crude protein and crude fiber. Carbohydrate and organic matter were calculated. Phytochemical screening also showed alkaloids, flavonoids, tannins, saponins, and reducing sugars in both ethanolic and aqueous extracts. There were more than 166 chemical constitutes that have been preliminarily isolated or identified from *Abrus precatorius*, which affiliates with distinct categories of compounds, including flavonoids, phenolics, terpenoids, steroids, alkaloids, organic acids, esters, proteins, polysaccharides, and other compounds according to Tion, M. T., Fotina, H., & Saganuwan, S. A. (2018).

**Objective of the Study**

This study aimed to investigate the phytochemical analysis of Bugbugayyong (*Abrus precatorius* Linn) leaves extract.
Specifically, it aimed to determine the phytochemical constituents of Bugbugayyong (*Abrus precatorius* Linn) leaves extract.

## METHODOLOGY

This portion presents the research design, materials and procedures, preparation and formulation of treatments and phytochemical test.

**Research Design**

This study utilized the Complete Randomized Experimental Design to test cause-and-effect relationships between variables. According to Blake, true experiment is a special observation made to confirm or disprove doubtful conditions. It is an act or operation undertaken in order to discover some unknown principle or effect or to test some suggested or known truth.

There were two distinct activities in the study: Activity 1 was the leaves extraction of Bugbugayyong (*Abrus precatorius* Linn); Activity 2 was the conduct of phytochemical test.

### Materials and Procedures

**Collection of Leaves**

The bugbugayyong leaves were collected from Paypayad, Candon City, Ilocos Sur. After collection, the leaves were washed thoroughly with running water the air dried in a shaded area for one month at ambient temperature.

**Preparation and Formulation of Treatments**

The dried Bugbugayyong leaves were powdered with blender. About 500 grams of powdered samples were extracted with 1000 ml of 95 % methanol for 48 hours. The extract was filtered with Whatman No. 1 filter paper and then evaporated to dryness at a temperature of 40 $^0$C using a rotary evaporator (Okugon, 2000).

The extract of Bugbugayyong leaves was made and stored. The 100 % leaves extract was prepared by transferring 100 grams of powdered sample into a beaker into which 95 % methanol was added up to 100ml calibration mark.

**Phytochemical Test**

Samples measuring 500 grams of powdered bugbugayyong leaves were brought to Lorma College, Carlatan, San Fernando City, La Union for the phytochemical tests. The tests were done to determine the presence of tannins, alkaloids, anthraquinone, glycosides, saponin, flavonoids, carbohydrates, diterpenes, phenolics, phytosterols, triterpenes, unsaturated lactones, reducing sugars, and test for proteins (Sofowara, 1993).

## RESULTS AND DISCUSSION

**Phytochemical Constituents of Bugbugayyong (*Abrus precatorius* Linn) Leaves Extracts**

The phytochemical components of the leaf extracts of Bugbugayyong (*Abrus precatorius* Linn) are revealed in Table 1. As shown, it contained alkaloids, carbohydrates, saponins, diterpenes, phytosterols, phenolics, flavonoids and proteins. However, tannins were notably not detected, along with reducing sugars, glycosides, lactones, and triterpenes. Tannins are the major phytochemicals found in many higher plants. The sugar and other secondary metabolites that arise from them, deposit these constituents in different parts of the plant body. Sugars in the form of carbohydrates would be the primary metabolite produced in leaves by photosynthesis (Ketziset.et.al, 2006).

**Table 1. Phytochemical Constituents of Bugbugayyong (*Abrus precatorius* Linn) Leaves Extracts**

| Detection Test | Constituent | Leaves |
|---|---|---|
| Mayers' Test | Alkaloids | - |
| Dragendorff's Test | Alkaloids | + |
| Hagers' Test | Alkaloids | + |
| Wagners' Test | Alkaloids | + |
| Molisch's Test | Carbohydrates | + |
| Fehlings' Test | Reducing Sugars<br>Anthraquinone | - |
| Modified Borntragers' Test | Glycosides | - |
| Kedde Test | Unsaturated Lactones | - |
| Froth Test | Saponins | + |
| Foam Test | Saponins | - |
| Cupric Acetate Test | Diterpines | + |
| Salkowakis' Test | Triterpines | - |
| Libermann Burchards' Test | Phytosterols | + |
| Ferric Chloride Test | Phenolics | + |
| Gelatin Test | Tannins | - |
| Alkaline Reagent Test | Flavonoids | + |
| Lead Acetate Test | Flavonoids | - |
| Xanthroproteic Test | Proteins | + |

**Legend: (Results) + Presence of phytochemicals**
**- Absence of phytochemicals**

Alkaloids are found primarily in plants and are especially common in certain families of flowering plants. Many alkaloids possess local anesthetic properties, though clinically they are seldom used for this purpose. Alkaloids are synthesized by plants and are found in the leaf, bark, seed or other parts usually constituting the active principle of the crude drug.

However, carbohydrates is one of the three macronutrients, a compound made up of carbon, hydrogen, and oxygen that is derived from plants and provides energy. It performs numerous roles in living organisms and serves for the storage of energy

(https://books.google.com.ph).

On the other hand, Saponins are glycosylated plant secondary metabolites found in many major food crops because saponins are widespread throughout the plant kingdom, this group of secondary metabolites may have general significance as antimicrobial Phyto protectants (K. R., Johnson and Fenwick, G.R., 2007). Saponins have many health benefits. Studies have illustrated the beneficial effects of the chemical on blood cholesterol levels, cancer, bone health and stimulation of the immune system. Studies had shown that saponins have antitumor and anti-mutagenic activities and can lower the risk of human cancers, by preventing cancer cells from growing (www.phytochemicals.info/phytochemicals/saponins.php).

Moreover, Diterpenes are a class of chemical compounds composed of two terpene units with the molecular formula $C_{20}H_{32}$. They are biosynthesized by plants, animals and fungi via the HMG-CoA reductase pathway. Diterpenes form the basis for biologically important compounds such as retinol, retinal and phytol. They are known to be antimicrobial and anti-inflammatory (www.phytochemicals.info/phytochemicals/Diterpenes.php).

Also, Phytosterols are compounds found in plants that resemble cholesterol. These are plant sterols and have anti-inflammation effect (http://clinicaltrials.gov).

Furthermore, Phenolics are broadly distributed in the plant kingdom and are the most abundant secondary metabolites of plants. These compounds showed a wide range of antioxidant activities in vitro and are thought to exert protective effects against major diseases such as cancer and cardiovascular diseases. Boligon (2013) affirmed in his study published in the Journal of Applied Biomedicine that *Abrus precatorius* Linn contained phenolic compounds including steroids and terpenoids which are responsible for its antimicrobial and anti-herpetic activities.

Likewise, flavonoid compounds have the ability to respond to a wide array of microbial organisms. The activity is probably due to their ability to form a complex with extra cellular and soluble proteins, which then binds to bacterial cell wall. More lipophilic flavonoids likely disrupt microbial membranes. Some flavonoids support health by strengthening capillaries and other connective tissues and some function as anti-inflammatory, antihistimatic, and ant-viral agents. As anti-oxidants, some flavonoids protect low density lipoprotein (LDL) cholesterol from oxidative damage (https://www.gnc.com/healthnotes/Supp/Flavonoids.htm.2002).

Lastly, Proteins are large molecules composed of one or more chains of amino acids in a specific order determined by the base sequence of nucleotides in the DNA coding for the protein. It is required for the structure, function, and regulation of the body's cells, tissues, and organs. Proteins are essential components of muscles, skin, bones and the body as a whole (http://www.medicinet.com).

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusion

Based on the findings obtained, the following conclusions were derived:

1. *Abrus precatorius Linn* leaves can be used as an antioxidant as it contains flavonoids and a moderate amount of phenolics-induced antioxidant activities and also find its application in medicine.
2. Bugbugayyong (*Abrus precatorius* Linn) leaf extracts contained phytochemical constituents that possess antibacterial activity.

### Recommendations

In light of the findings and conclusions, the researchers offer the following recommendations:

1. The phytochemicals present in Bugbugayyong (*Abrus precatorius* Linn) must be isolated, purified and concentrated obtain better results.
2. Further studies should be made on Bugbugayyong leaves extraction using other organic solvents like Hexane, Petroleum ether, Chloroform, Ethanol, and Aqueous will be used to obtain the extract. These extracts will be subjected for physicochemical and qualitative phytochemical analysis by using the standard procedures and the extracts will be tested on fungi and protozoa.
3. Toxicological investigations of the plant extracts should carry out with a view to developing novel drug for human use.

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