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Initial phytochemical screening of the different parts of *Mansoa alliacea* L. (Garlic Vine)

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Abstract

This study aimed to determine the phytochemicals present in *Mansoa alliacea*. Standard procedures were utilized for the extraction and determination of alkaloids, flavonoids, tannins and phenols, and quinones using the ethanolic extract of the roots, stem, leaves and flowers of *M. alliacea*. The results showed that the leaf and root extract contained the most phytochemical present. Stem extract showed a negative indication of any phytochemical tested. The presence of various phytochemicals in the different parts of the plant can be useful in studying the allocation of different chemical defenses of the organism. The presence of phenolic compounds also implies a possible resource for antioxidant compounds. Further studies are suggested to isolate and characterize phenolic compounds present in this organism.

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Introduction

Mansoa alliacea (garlic vine) belongs to the trumpet-creeper family and a species of tropical liana. It is common to countries in Northern South America (Liogier, Martorell 2000) and has reached in Central America and Brazil (Sheat, Schofield 1995). It is also known as *ajo sacha* which means "forest garlic" or "wild garlic" among the mestizos of the Amazon rainforest. *M. alliacea* grows on solid ground, far from bodies of water, in shaded areas of low vegetation and in small primary forests. It does not thrive in flooded areas or in open fields. It primarily grows in tropical areas with rainfall ranging from 1800-3500mm per year, having a temperature between 20 and 30°C (Revilla 2001).

M. alliacea is widely used by the indigenous Indian tribes of the Amazon for a variety of purposes using almost all parts of the plant. Dried aerial parts are infused which is used to treat fever and rheumatic pains (Hasrat *et al.* 1997). In Peru, dried leaves are used for the treatment of colds and pneumonia (Desmachelier *et al.* 1997) and in malaria as an insecticidal (Arana, 2005; Perez, 2002). Infusion of the leaves is also used in Brazil for the treatment of colds and fevers (Corrêa 1931; Le Cointe 1934; Silva *et al.* 1977), for headaches (Branch, Silva 1983), and as condiments (Pimentel 1934).

The leaves, bark and roots are also used orally in traditional medicine as analgesic, antipyretic and anti-rheumatic (Lorenzi, Matos 2002). Bark of the roots and the patch of the leavers were macerated with alcohol as traditional anti-rheumatic and anti-arthritic treatment (Revilla, 2001). Leaves have been also used against fever and colds through infusion and the aqueous maceration of the roots as a tonic (Revilla 2001). The decoction of the leaves was also used as external wash for muscular fatigue and as pain reliever in the Guianas (Grenand *et al.* 1987). According to Revilla (2001), *M. alliacea* can be commercialized as perfume fixative using the fresh and dried leaves, bark, stem and roots.

Much of what we know about *M. alliacea* comes from a wide spectrum of traditional herbal practices for the treatment of different diseases and illnesses. Only a few studies were about the phytochemicals present in this plant (Rao, Rao 1980; Ganapatay, Beknal 2004). In this study, it aimed for determination phytochemicals present in *M. alliacea* particularly, tannins, phenols, alkaloids, saponins, flavonoids, and quinones.

Materials and methods

Collection and Preparation of Samples

The different parts of *M. alliacea* (leaves, stem, flowers and roots) were collected from a garden in Xavier Heights Subdivision, Cagayan de Oro City (January 2017). The plant material was identified based of morphological characteristics by the first author using available literature. The freshly collected samples were washed thoroughly with distilled water and air-dried under at room temperature for 7 days. The samples were reduced to small piece; material was grounded into fine powder using mortal-pestle. Powdered samples were then stored in air tight plastic containers for future use.

Preparation of Plant Extract

The air dried and powdered plant samples at 2.0 grams each were infused with 20ml of ethanol until boiling. The extracts were filtered through Whatman No.1 filter paper. The supernatants were collected, covered, labelled and used for further screening of various phytochemicals.

Qualitative Tests for Phytochemicals

Qualitative tests for phytochemicals were conducted to determine the presence of alkaloids, tannis, saponins, flavonoids, quinones. The following tests were conducted respectively:

Tests for Alkaloids:

Wagner's Test

2ml of the each plant extract was treated with a few drops of potassium mercuric iodide solution, which is also known as Wagner's reagent. The formation of a whitish yellow or a cream coloured precipitate indicates the presence of alkaloids in the specific part of the plant (Evans 2002).

Dragendroff's Test

2ml of the each plant extract was treated with potassium bismuth iodide solution, which is also known as Dragendroff's reagent. Formation of red orange precipitate indicates the presence of alkaloids in the specific part of the plant.

Test for Saponins:

Foam test

2mL of each plant extract was shaken with 2ml of water or acetone. The presence of foam after 10 minutes of shaking indicates the presence of saponins (Tiwari *et al.* 2011).

Tests for Flavonoids:

Ferric Chloride Test

2mL of each plant extract was treated with a few drops of ferric chloride solution. The presence of an intense green color indicates the presence of flavonoids (Kumar Bhandary *et al.* 2012).

Lead Acetate Test

2ml of each plant extract was treated with a few drops of lead acetate solution. The production of a yellow precipitate indicates the presence of flavonoids (Kumar Bhandary *et al.* 2012).

Test for Tannins and Phenols:

Ferric Chloride Reagent Test

2mL of each plant extract was mixed with 10ml of distilled water and was filtered. Ferric chloride reagent was then added to it and the formation of a blue-black, green, or blue-green precipitate indicates the presence of tannins (Evans 2002).

Test for Quinone:

Alcoholic KOH Test

Few drops of alcoholic KOH was added to each plant extract. A red to blue color in the solution indicates presence of quinones (Patel *et al.* 2013).

Results and discussion

In this study, initial screening was conducted for various parts of *M. alliacea*. Standard procedures were conducted to determine various phytochemicals present in *M. alliacea*. Summary of the results of the qualitative phytochemical analysis are shown in Table 1. Much of the results in this study are similar to the results found in the study conducted by Patel *et al.* (2013). As shown in the results, various phytochemicals tested positive in the leaves part of the plant while no presence of phytochemicals where noted in the leaves. This result may indicate that the leaves require a good amount of defense mechanism since it is the major photosynthetic organ of the plant. Plant organs with high fitness value will be highly defended and would contain more chemical defenses (Barto, Cipollini 2005). Flavonoids were noted be only present in the flowers since these metabolites are commonly found in colorful petals of several plants. Flavonoids are considered as the major flower pigments, particularly anthocyanidin glycosides (Martin, Gerats 1993). *M. alliacea* flowers' color range from purple to violet which can be attributed to the different flavonoids present in it. The presence of alkaloids, flavonoids, tannins, phenols, and quinones in the roots of *M. alliacea* may suggest the need for defense mechanism of the plant against various pathogenic diseases present in the soil. The bitter taste of alkaloids would protect the plant from potential herbivores. No phytochemicals were observed present in the ethanolic extract of the stem. This can be attributed to costly nature of defense systems as a response to natural selection. The allocation of defense mechanism within the plant depends on the parts most vulnerable to predation (Rhoades 1979). The presence of flavonoids, tannins and phenols in the leaves and roots can imply presence potential source of antioxidants. Flavonoids and tannins are known to act as primary antioxidants or free radical scavengers (Ayoola *et al.* 2008).

Table 1. Phytochemicals present in the different parts of *M. alliacea*

Phytochemicals	Tests	Leaves	Stems	Roots	Flowers
Alkaloids	Wagner	-	-	-	-
	Dragendroff	+	-	+	-
Flavonoids	Lead acetate	-	-	+	+
	Ferric chloride	+	-	-	-
Saponins	Foam Test	-	-	-	-
Tannins and Phenols	Ferric chloride	+	-	+	-
Quinone	Alcoholic KOH Test	+	-	+	-

Conclusion

The phytochemicals in *M. alliacea* were determined using various standard qualitative procedures. Phytochemicals under studied were alkaloids, flavonoids, saponins, tannins and phenols, and quinones. Several phytochemicals were found to be present in the leaves and roots which could be related to their demand for chemical defense. These plant organs require a good allocation of chemical defenses due to their vulnerability against predators and diseases. The presence of flavonoids and phenolic compounds in the roots and leaves may suggest a potential source of antioxidants. Further studies are required to isolate and characterize these phenolic compounds for antioxidant activities.

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