



## PHYTOCHEMICAL AND ANTIOXIDANT SCREENING OF AQUEOUS EXTRACT OF BASELLA ALBA FOR MEDICINAL APPLICATION

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**Abstract:** *Basella alba* belongs to the family Basellaceae and commonly known as Malabar spinach, Indian spinach, Ceylon spinach and vine spinach. It has been found to be a good source of calcium, iron, vitamin A and vitamin C. the plant has shown immense potential in antiulcer, antioxidant, antibacterial activity and wound healing properties etc. this paper includes the evidence-based overview of phytochemical properties of the *Basella alba*, which maybe helpful to establish a standard natural drug for research. Phytochemicals were extracted from the plant leaves and were characterized using colorimeter to find the functional groups. Phytochemical analysis of *Basella alba* leaf was studied using three solvents (chloroform). Powder of the leaves was employed to obtain the extracts, which was qualitatively and quantitatively analyzed for phytochemical content using standard methods. Phytochemical constituents were abundant in the leave extract. Leaf was found to have various phytochemicals such as alkaloids, glycosides, flavonoids, terpenoids, saponins, phenols etc., which could have lots of medicinal benefits such as reducing headache, treatment of congestive heart failure, prevent oxidative cell damage etc.

**Key Words:** *Antioxidants, colorimeter, Phytochemicals, Basella alba, medicinal, Centrifuge machine, chloroform, Tetraoxosulphate (vi) acid [H<sub>2</sub>SO<sub>4</sub>]*

### 1.0 Introduction

Plants have always played a major role in the treatment of human and animal diseases. Medicinal plants can be used in different forms; as raw materials for extraction of inactive constituents which can be transformed by partial synthesis into active compounds and as such or as extracts or as traditional preparations, (Adhikari *et al.*, 2012.).

Medicinal plants are widely used for the treatment of diseases and infection, over 60% of people in Nigeria rural areas depend on the traditional medicine for the treatment of their ailments. Different plants have been used as a source of inspiration in the development of novel drugs. (Bamidele *et al.*, 2010)

Earlier studies have found that the antioxidant activity of several plants is mainly due to their richness in phenolic compounds, viz. flavonoids, phenolic acids, vitamins C and E, and various carotenoids. These herbal antioxidants are very effective in preventing the destructive physiopathology triggered by oxidative stress due to free radicals' overproduction.

*Basella alba* is an edible perennial vine in the family Basellaceae. It is found in Tropical Asia and Africa where it is widely used as a leaf vegetable. It is native to the Indian subcontinent, Southeast Asia and New Guinea. It is reportedly naturalized in China, Tropical Africa, Brazil, Belize, Colombia, The West Indies, Fiji and French Polynesia. It grows in humid climate where summer temperature exceeds ideal conditions.

*Basella alba* is an extremely heat tolerant; (Grubben and Denton., 2004), fast growing perennial vine which belongs to family Basellaceae; (Rathee *et al.*, 2010). It is commonly known as Malabar spinach, Indian spinach, Ceylon spinach, vine spinach; (Roy *et al.*, 2010), climbing spinach; (Venkatalakshmi *et al.*, 2010), East-Indian spinach, Chinese spinach; (Bamidele *et al.*, 2010) and cyclone spinach; (Nirmala *et al.*, 2011). *Basella* is native

to tropical Southern Asia, probably originated from India or Indonesia; (Saroj et al., 2012). *Basella alba* is particularly abundant in Malaysia, Philippines, tropical Africa, the Caribbean and tropical South America; (Palada and Crossman, 1999), Southeast of Brazil (Echo plant information sheet, 2006). Due to easy adaptation to a variety of soils and climates *Basella alba* is considered one of the best tropical spinach throughout the tropical world (Palada and Crossman, 1999). *Basella alba* is one of the wild leafy vegetables, which is rare in its natural habitat; (Wambugu and Muthamia, 2009) but, nowadays it is an important leafy vegetable grown for its nutritive value; (Varalakshmi and Devaraju, 2010), throughout the temperate regions as an annual and the tropics as a perennial; (Bamidele et al., 2010, Echo plant information sheet, 2006). Almost in every part of India, *Basella* is grown as a pot herb; (Khare, 2007). *Basella alba* is an underutilized plant with great potential (Olgort, 2006). The plant is often grown as an ornamental.

*Basella alba* is a very popular vegetable in many coastal communities of Southern Nigeria and is one of the chief sources of the major ingredients in the Northern and Northeastern foods. (Izonfuo et al., 2006; Pareek et al., 2010). The medicinal importance of *Basella alba* had earlier reviewed by (Adhikari et al., (2012), Kumar et al., (2013)). Some common/vernacular names of *Basella alba* are; Chinese: luluokui, Danish: indiskspinat, Dutch: ceylonspinazie, Filipino: Alugbati, French: baselle, German: indischerspinat, South west region of Nigeria: Amunututu, Telugu: baccali.

*Basella alba* is a good source of vitamins A, vitamins C and vitamins B9, thiamine, riboflavin, niacin, minerals like calcium, magnesium and iron, and several antioxidants. It also contains essential amino acids such as arginine, isoleucine, leucine, lysine, threonine, and tryptophan and a low percentage of soluble oxalates. Different drying methods and storage resulted in a considerable reduction in calcium, magnesium, sodium, iron, manganese, and zinc. Saponins, peptide, and phenolic compounds were shown to be present in *Basella alba*. The leaves contain carotenoids, organic acids, water soluble polysaccharides, bioflavonoid and betacyanin. The morbidity rate within the fast growing population precipitate the need for research on natural products, hence the determination of the phytochemicals and antioxidants composition of aqueous extract from *Basella alba* for medicinal purposes.

### 1.1 Statement of the problem

Using laboratory technologists as a matter of case study, the mechanism of *Basella alba* chemo preventive spice remains a matter of conflict among researchers. While some school of thought observed that *Basella alba* is effective in controlling the extent of colorectal gastric, liver, skin, breast and prostate cancers. In order to put an end to all these agitations.

### 1.2 Justification for the study

In order to put research record straight, and settled long prevailing research argument, the medicinal potential analysis of *Basella alba* was carried out on both the leaves, stem and the mixture of both. This will go a long to provide natural alternative medicinal at low cost and risk, hence reduction in both morbidity and mortality rate.

## 2.0 Materials and Methods

### 2.1 Materials

#### 2.1.1 Plant sample

The plant under the study is *Basella Alba* which was obtained by basket survey

#### 2.1.2 Sample treatment

*Basella alba* plant was gotten from The Federal Polytechnic Ede environments. The leaves was air dried in the laboratory and allowed to dry completely, the dried leaves were grinding into fine powder using electric blender.

#### 2.1.2 Reagents

Hydrochloric acid, Ferric chloride, Distilled water, Olive oil, Aluminum chloride, Tetraoxosulphate(vi) acid [H<sub>2</sub>SO<sub>4</sub>], Acetic anhydride, Chloroform, Glacial acetic acid, Potassium iodide, Iodine, Benzene, ammonium hydroxide, Amyl alcohol.

#### 2.1.3 Apparatus

Weighing balance, Aluminum foil, Colorimeter, Centrifuge machine, Water bath, Mechanical shaker, Beakers, Test tubes, Test tube racks, Measuring cylinder, Conical flask, Micro pipette,

## 2.2 Methods

### 2.2.1 Method of Extraction

Below were the extraction processes

### 2.2.2 Preparation of Extract

5g of air dried fine powder of each *Basella alba* was weighed using an analytical weighing balance and it was poured into a beaker. 100ml of distilled water was measured using measuring cylinder and was added to each sample. It was stirred carefully and poured into correctly labeled sample bottles. It was placed on a mechanical shaker to shake vigorously for 24hours. Handkerchief was placed on the beakers and the samples were shakes and then poured in each beaker respectively to separate the filtrate and the residue. The filtrate of the samples was poured into test tube tubes and labeled correctly and it was placed in the centrifuge machine for 20mins at the speed of 3500rpm to be separated into upper layer which is the extract and lower layer which is the particles which was later discarded.

### 2.2.3 Phytochemicals screening

The following phytochemicals were determined:

- Tannins
- Phlobatannins
- Saponins
- Flavonoids
- Steroids
- Terpenoids (Salkowski test)
- Cardiac Glycosides and Cardenolides (Keller – Killani test)
- Alkaloids
- Anthraquinone
- Chalcones
- Phenol

### 2.2.4 Antioxidant Screening

While the following Antioxidants were tested for:

- Total Phenolic (TP)
- Total Ferric Reducing Antioxidant Properties (TFRAP)
- Total Flavonoid (TF)
- Total 1,1-diphenyl 2-picrylhydroxyl (DPPH)
- Total 2,2-azino-bis(3-ethylbenzathiazoline-6-sulphonic acid) ABTS

## 3.0 Results and Discussions

### 3.1 Results

#### 3.1.1 Below were results of phytochemical screening

**Table 1:** shows the phytochemical screening of *Basella alba*

Constituents	Basella Leaf	Basella stem
Tannins	-	-
Saponins	+	+
Steroids	-	-
Terpenoids	-	+
Cardiac Glycosides	+	-
Phenolic Compounds	-	-
Flavonoids	+	-
Chalcones	-	-

Anthraquinones	-	-
Alkaloids	-	-
Phlobatanins	-	-

Key:  
+Present  
-Absent

### 3.1.2 Antioxidant Screening

**Table 2:** Shows Antioxidant Contents of *Basella Alba* at 25µl

Samples (25µl)	T P	T F	TDPPH	TFRAP	ABTS
BS	0.450±0.021	0.190±0.014	0.440±0.014	0.340±0.014	1.370±0.014
BL	0.660±0.014	0.260±0.014	0.560±0.014	0.620±0.014	1.365±0.007
STD	1.370±0.014	0.050±0.014	0.680±0.014	0.160±0.000	1.180±0.014

**Table 3:** Shows Antioxidant Content of *Basella Alba* at 50µl

Samples (50µl)	T P	T F	TDPPH	TFRAP	ABTS
BS	0.830±0.014	0.320±0.014	0.350±0.014	0.385±0.007	1.355±0.007
BL	1.290±0.014	0.530±0.014	0.310±0.014	0.575±0.007	1.310±0.014
SDT	1.860±0.014	0.050±0.014	0.680±0.014	0.160±0.000	1,335±0.007

## 3.2 Discussions

### 3.2.1 Phytochemicals Contents

From table 1; it was observed that the leaves of *Basella Alba* was rich in saponins, flavonoid, cardiac glycosides while the stem was rich in saponins and terpenoids only, (Adhikari *et al.*, 2012) thereby inferred the medicinal values of the plant. But the medicinal values of the leaves and stems of the plant lie in some chemical substances that have a definite physiological action on the human body. Different phytochemical have been found to possess a wide range activities which help in protection against body diseases (Angustia *et al.*, 2015).

### 3.2.2 Antioxidants Contents

The antioxidant analysis result obtained (Table 2) revealed that the Total Ferric reducing antioxidant properties (FRAP), Total phenolic compound (TPC) and Total flavonoid content (TFC) in the leaves and stems extracts were considerable, while that of Total flavonoid content (TFC) is lower than that of Ferric reducing antioxidant properties and higher compared to that of Total phenolic content, in accordance with the works of Jovale *et al.*, 2015, It was also observed that the high level of Ferric reducing antioxidant properties contents of *Basella Alba* leaves and stems might account for strong activity observed against Total flavonoid and Total phenolic in Table 3 also shares the same pattern even at high volume of the extracts. Table 2 and 3 showed significant difference

between different volumes of the extracts and the plant parts. This is also in accordance with works of Bamidele *et al.*, 2010, and Kumar *et al.*, 2013. When compare all the results with the standards it was observed that Basella Alba will be a good of natural medicinal products for human consumption, because of the close range. This can also from the graphical presentations (Fig. 1&2) above.

#### 4.0 Conclusion and Recommendations

##### 4.1 Conclusion

Medicinal plants are widely used for the treatment of diseases and infections, majority of people in Africa depend largely on the traditional medicine for the treatment of their ailments. *Basella Alba* is considered one of the best tropical spinach throughout the tropical world; it is one of the wild leafy vegetables, which is rare in its natural habitat. It's phytochemical and antioxidant composition proves beyond reasonable doubt, the medicinal values of the plant.

Phytochemical extracts of *Basella alba* based on the findings revealed a coexistence of phenols, flavonoids, tannins, saponins, anthraquinone, terpenoids and steroids, all these are useful for treatment of various diseases among mankind. Moreover, investigation on the plant shows the presence of antioxidant; DPPH, ABTS, FRAP, total flavonoid content and the total phenolic content is useful for human disease for pharmacological studies. The evidence of the presence of phytochemicals and the antioxidant in *Basella alba* make it widely acceptable as a food and as an agent of treatment to human generally. Which in turn reduce morbidity and mortality rates among the population of the developing countries.

##### 4.2 Recommendations

The followings are recommended:

###### Consumers

- That Basella alba should be serve as food supplements for human.
- Should be consumed as medicine with the advantage of help in reducing heart diseases.
- The leaves can also be recommended as herbal medicine for treating some illness such as boils, body pain, dysentery, bleeding, and also serve as an antidote for some other illness.

###### Future Prospects

- More researches are still expected to be carried out on the Basella alba to give more benefits that can be attached to it medically.
- Basella alba plant needs to be improve on its consumption based on it antioxidant property and its benefit in reducing body diseases.
- Multi-disciplinary attentions have to be given to Basella alba breeding and exploitation of its potential for better productivity through considerable evaluation under different agro-ecology of the country.

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