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# Proximate Composition Analysis of *Argyreia Zeylanica (Gaertn.) Voigt*- Fruit

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**A B S T R A C T**

Argyreia zeylanica (=Argyreia pomacea) is a perennial, woody climber belonging to the family Convolvulaceae. This plant is regarded as a wild medicinal plant. Various parts of this plant are used in the treatment of cardiovascular diseases, jaundice, diabetes mellitus, peptic ulcers, and wounds. The raw and ripe fruits are edible and have the potential to cure ulcers. Proximate analysis of A. zeylanica fruits was conducted using food chemistry analytical methods. The proximate composition analysis showed the presence of significant quantities of total carbohydrates (11.26 ± 0.24 g/100 g), total proteins (6.18 ± 0.12 g/100 g), total free amino acids (5.39 ± 0.17 g/100 g), starch (4.26 ± 0.09 g/100 g), and vitamin C (9.28 ± 0.36 mg/100g), along with minor quantities of fats (0.07 ± 0.0 g/100g), ash (1.28 ± 0.12%), with 72.23 ± 0.14% moisture. Hence, the fruits were found to be good sources of carbohydrates, proteins, amino acids, and vitamin C.

Keywords: *Argyreia zeylanica, Argyreia pomacea,* proximate analysis, vitamin C, fruit.

## 1. Introduction

*Argyreia zeylanica (=Argyreia pomacea)* is an endemic, perennial, woody climber (Fig. 1a & 1b) belonging to the family Convolvulaceae, found in dry and deciduous forests of South India (Tamil Nadu, Kerala, and Karnataka) and Sri Lanka (Biju, 1997). Ethnobotanically, various parts of *A. zeylanica* are used to cure cardiovascular diseases, jaundice, diabetes mellitus, peptic ulcers, and wounds (Balasubramanian *et al.*, 1997; Vidya Dharshini *et al.*, 2016). The plant comprises green to yellowish brown, glabrous, pulpy, ovoid, berry fruits (Fig. 1c).

Wild edible plants play a major role in providing nourishment to the ethnic people. Wild edible foods are obtained from leaves, flowers, fruits, and seeds. Of these, edible fruits are important because of their rich nutritional value. (Tomar *et al.*, 2015). The raw and ripe fruits of *A. zeylanica* are consumed as food by ethnic communities of the Western Ghats in Coimbatore, India. The fruits have the potential to cure ulcers (Paulsamy, 2011). The nutritive value of this fruit has not been reported so far. Hence, in the present study, we have focused on finding the proximate composition of *A. zeylanica* fruits.


**Fig. 1 - *A. zeylanica* habit (a); A part of the shoot with flowers (b); Fruits (c).**

## 2. Materials and methods

### *2.1 Plant collection and identification*

The plant *A. zeylanica*, with flowers and fruits, was collected from the Coimbatore district, Tamil Nadu, in December 2019. The plant specimen was identified as *Argyreia zeylanica* (Gaertn.) Voigt (=*Argyreia pomacea* Sweet), by the Botanical Survey of India, Southern Regional Centre, Coimbatore (Certificate No: BSI/SRC/5/23/2019/Tech/393, Dated 16 December 2019).

### *2.2 Preparation of the fruit sample*

The fresh *A. zeylanica* fruits were collected from the plant, washed under tap water to remove debris, and then air-dried. The fleshy edible portion of the fruit was separated out from the seeds, dried in the shade for a week, and then pulverized into powder form. The powdered fruit sample was stored in a sterile, air-tight glass container for further studies.

### *2.3 Proximate composition analysis of A. zeylanica fruit*

Total carbohydrates, total proteins, total free amino acids, starch, fat, vitamin C, ash, and moisture content of *A. zeylanica* fruits were analysed by the following standard procedures.

#### *2.3.1 Determination of total carbohydrates*

Total carbohydrates analysis was carried out according to Krishnaveni *et al* (1984). Dried *A. zeylanica* fruit powder (100 mg) was placed in a boiling tube and hydrolyzed in a boiling water bath for three hours with 5 ml of 2.5 N HCl. The mixture was then cooled to room temperature. Solid sodium carbonate was added to neutralize the acid hydrolysate until the effervescence ceases, and the volume was made up to 100 ml with distilled water. The contents were centrifuged (Remi-C 24) at 5000 rpm for 10 min. The supernatant was collected, and 0.1 ml of the sample solution was taken in two separate test tubes, and the volume was made up in each tube to 1 ml with distilled water. Standard (glucose, 100 mg/100 ml) was prepared with five different concentrations (200 µl, 400 µl, 600 µl, 800 µl and 1ml) of the working standard into a series of test tubes and added 1 ml of phenol solution to each test tube and also 5 ml of 96 % sulphuric acid to each tube and shaken well. After 10 min. of shaking, the content in the tubes was placed in a water bath at 25-30$^{o}$C for 20 min. and read the OD at 490 nm in a Spectrophotometer (Thermoscientific, Genesys). The blank contains 1 ml of water instead of the sample. The amount of total carbohydrates present in the leaf sample was calculated using the formula described by Sadasivam and Manickam (2008).

#### *2.3.2 Determination of total proteins*

The protein was estimated as described by Lowry *et al*. (1951) using Bovine Serum Albumin (BSA) as a standard. 100 mg of *A. zeylanica* fruit powder was ground with 10 mL of phosphate buffer in a mortar and pestle. Then the filtrate was centrifuged at 3000 rpm for 10 minutes. The supernatant was used for further analysis.

***Reagent preparation:***

Reagent A: 2% Sodium carbonate in 0.1 N sodium hydroxide solutions.

Reagent B: 1% Sodium potassium tartarate with 0.5 g of CuSO4.

Reagent C: 100 mL of reagent A was mixed with 2 mL of reagent B before use.

Reagent D: Folin-Ciocalteau's reagent

Bovine Serum Albumin was used as a standard (0.01 g of BSA in 10 ml of distilled water). 0.5 to 1 ml of diluted supernatant (10-1) was made up to 100 ml with distilled water. Then, 5 ml of reagent C was added. To this, 0.5 ml of reagent D was added, was allowed to incubated in the dark for 30 minutes, and the absorbance was determined at 660 nm using a spectrophotometer.

#### *2.3.3 Determination of total free amino acids*

Total free amino acids were determined by Sadasivam and Balasubramanian (1987) method. 500 mg of *A. zeylanica* fruit powder was ground in a mortar and pestle with a small quantity of acid-washed sand. To this homogenate, 5-10 ml of 80 % ethanol was added and centrifuged (Remi-C 24) at 3000 rpm for 10 min. After centrifugation, the supernatant was saved. Extraction was repeated twice with the residue, and all the supernatants were pooled together. Residue in a required volume was kept for the quantitative estimation of total free amino acids. Since the tissue was rough, boiling 80 % ethanol was used for extraction. Thereafter, 0.1 ml of the leaf extract was taken in a test tube, added with 1 ml of ninhydrin solution, and the volume was made up to 2 ml with distilled water. The solution was heated in a boiling water bath for 20 min. After heating, 5 ml of the diluent was added, and the content was mixed well. After 15 min., the intensity of the purple colour was read against a reagent blank in a Spectrophotometer (Thermoscientific, Genesys) at 570 nm. The colour was stable for 1 h, and the reagent blank was prepared by adding 0.1 ml of 80 % ethanol instead of the extract.

#### *2.3.4 Estimation of starch*

The starch was estimated as described by Sadasivam and Manickam (2008) using Glucose as a standard. 100 mg of *A. zeylanica* fruit powder was ground with 80% ethanol, then centrifuged at 3000 rpm for 10 min. to remove sugars. The residue was retained, and the supernatant was discarded. Again, residue was washed two times with ethanol to remove all simple sugars. Then the residue was dried well by keeping over a boiling water bath, and then mixed

with 5 ml water and 6.5 ml of 52% perchloric acid, and starch was extracted by keeping the tube at 0°C in a refrigerator for 20 min, and the tube was centrifuged at 3000 rpm for 10 min. The supernatant was collected, and the starch extraction was repeated twice by adding fresh perchloric acid. The supernatant was pooled and made up to 100 ml of distilled water and used for estimation. Glucose was used as a standard. 10 mg of glucose was dissolved in 100 ml of distilled water. 0.5 to 1ml of diluted supernatant ($10^{-1}$) was taken in the test tubes. It was made up to 1ml with distilled water, and then 4 ml of Anthrone reagent was added. The tubes were treated over a boiling water bath for 8 min. and then cooled down to room temperature. The absorbance of a green solution was measured at 630 nm using a spectrophotometer and compared to a standard curve prepared with known amounts of glucose. The amount of total starch present in each sample was calculated, and the results were tabulated.

#### *2.3.5 Estimation of crude fat*

2 gram of air-dried *A. zeylanica* fruit powder was extracted with petroleum ether (60- 80 °C) in a Soxhlet apparatus for 6 - 8 h according to the method of the Association of Official Analytical Chemists (AOAC, 1990). After boiling with petroleum ether, the solution was filtered with Whatman No. 40 filter paper, and the filtrate was evaporated in a pre-weighed beaker, and the residue was weighed. The average value of triplicate experiments was expressed as a percentage of ether extract or crude fat content on a dry weight basis.

#### *2.3.6 Estimation of vitamin C*

Ascorbic acid (Vitamin C) in the fruit sample was quantified using the method of Sadasivam and Balasubramanian (1987). 500 mg of *A. zeylanica* fruit powder was ground with 25 ml of 4% oxalic acid in a mortar and pestle, and the contents were centrifuged at 8000 rpm for 10 min. The supernatant was collected, and 5 ml of the aliquot was transferred into a conical flask and 10 ml of 4 % oxalic acid and titrated against the dye (V2 ml). Working standard solution (5 ml) was taken into a 100 ml conical flask and added with 10 ml of 4 % oxalic acid and titrated against the dye (V1 ml). End point was the appearance of pink colour, which persisted for a few minutes. The amount of the dye consumed is equivalent to the amount of ascorbic acid. 0.5 mg × V2 × 100 ml × 100 Amount of ascorbic acid (mg /100 g sample) = V1 ml 5 ml Wt. of the sample.

#### *2.3.7 Determination of ash value*

Ash value was measured as specified by the WHO (1998). Weigh accurately about 5 g of *A. zeylanica* fruit powder in a tared silica/platinum dish. Char the material carefully on a burner and transfer the dish to a muffle furnace and ash at a temperature of 550 ±10°C until the ash is free of Carbon. Heat the dish again at 550 ± 10°C for 30 min. Cool in a desiccator and weigh. Repeat this process of heating for 30 minutes, cooling in a desiccator, and weighing until the difference between two successive weights is less than 1 mg. Record the lowest weight.

$$\text{Total ash (\% on dry weight)} = \frac{(W_2 - W) \times 100 \times 100}{(W_1 - W) \times (100 - M)}$$

W1 = Weight in grams of Silica dish. + sample

W2 = Weight in grams of Silica dish + ash

W = Weight in grams of empty Silica dish.

M = Moisture% of the sample.

Note – Preserve the dish containing this ash for the determination of acid-insoluble ash.

#### *2..3.8 Determination of moisture content*

The moisture content of the fruit was determined by the loss on drying (L.O.D) method as specified by the WHO (1998). 10 g of *A. zeylanica* fruit powder was weighed and placed in a moisture content apparatus. The temperature was adjusted to $10^0$-$110^0$ c till the weight became constant, and then collected in desiccators and weighed. The loss of weight was regarded as a measure of moisture content.

## 3. Results

Total carbohydrates, total proteins, total free amino acids, starch, fat, vitamin C, ash, and moisture were analysed. The proximate composition results of *A. zeylanica* fruit are presented in Table 1.

**Table 1. Proximate composition of *A. zeylanica* fruit**

| Component | Values |
|---|---|
| Total carbohydrate (g/100 g) | 11.26 ± 0.24 |
| Total protein (g/100 g) | 6.18 ± 0.12 |
| Total free amino acids (g/100 g) | 5.39 ± 0.17 |
| Starch (g/100 g) | 4.26 ± 0.09 |
| Fat (g/100g) | 0.07 ± 0.0 |
| Vitamin C (mg/100g) | 9.28 ± 0.36 |
| Ash (%) | 1.28 ± 0.12 |
| Moisture of fresh fruit (%) | 72.23 ± 0.14 |

Values are the mean of triplicate determination (n=3) ± standard deviation

## 4. Conclusion

The proximate composition analysis of *A. zeylanica* fruits showed the presence of significant quantities of total carbohydrates, total proteins, total free amino acids, starch, and vitamin C, along with minor quantities of fats and ash. These components contribute to the nutritional value of *A. zeylanica* fruits. Further research should be carried out on *A. zeylanica* fruits for comprehensive nutritional studies, characterizing the fruit components, and elucidating the structure of the active components present in it.

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