Determination of Mineral Content of Local Species of Elephant Foot Yam

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Abstract*— Amorphophallus paeoniifolius (Dennst.) Nicolson is a tropical tuber crop that Amorphophallus paeoniifolius (Dennst.) Nicolson is a tropical tuber crop that belongs family Areaceae commonly used in Ayurvedic medicines as well as tribal medicines in India. The aim this study is to evaluate the minerals of tubers of locally cultivated species of Amorphophallus paeoniifolius (Elephant Foot Yam). For the determination of calcium and phosphorous precipitation method of titration was employed. Content of calcium and phosphorous in tuber was found to be 26.01mg/100g of and 39.42mg/100g of respectively. It was concluded that the elephant foot yam is good source of minerals and can be used as food or feed. Because minerals have function in the body that include as enzymatic regulation, acid- base processes, bone growth and muscle stimulation.

***Indexed Terms*— Elephant foot yam, Amorphophallus paeoniifolius, mineral content, calcium, phosphorous**

I. INTRODUCTION

Amorphophallus paeoniifolius (Dennst.) Nicolson is a tropical tuber crop that originates from south-east Asia and belongs to the genus *Amorphophallus* and family Areaceae commonly used in Ayurvedic medicines as well as tribal medicines in India. It is an important economic crop because of its high production potential (50–60 t/ha) and popularity as a vegetable. This Plant has great potential as a vegetable crop for its fine character, including low fibre content in the corm and good disease resistance.[1,2] This plant is also potential source of peroxidases which have wide applications in areas including chemical synthesis, medicines, and bioremediations of waste water, biosensing and biotechnology.[3] Also a resistant starch III is prepared from it and compared to the native starch proved that to have better thermal stability with high crystallinity along with the potential to reduce the viscosity, gel forming ability and hardness of gel.[4] Also on boiling of tubers of elephant foot yam reduces oxalate content acridity phenolic content and anti- oxidant activity.[5] The corms are acrid, astringent, thermogenic, irritant, anodyne, anti-inflammatory, anti-haemorrhoidal, haemostatic, expectorant, carminative, digestive, appetizer, stomachic, anthelmintic, liver tonic, aphrodisiac, emmenagogue, rejuvenating and tonic. They are useful in vitiated condition of Vata and Kapha, arthralgia, elephantiasis, tumors, inflammations, haemorrhoids, haemorrhages, vomiting, cough, bronchitis, asthma, anorexia, dyspepsia, flatulence, colic, constipation, helminthiasis hepatopathy, splenopathy, amenorrhoea, dysmenorrhoea, seminal weakness, fatigue, anemia and general debility.[6,7] The aim this study was to evaluate the minerals of tubers of locally cultivated species of *Amorphophallus paeoniifolius* (Elephant Foot Yam).

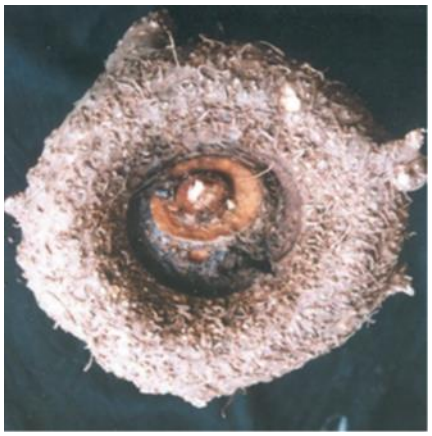

Fig. 1. Tuber and Plant of Elephant Foot Yam

II. MATERIALS AND METHODS

A. Materials

Tubers of Elephant Foot Yam were collected from local house of sakoli Dist. Bhandara, Maharashtra, India. The tubers were cleaned, peeled, chopped and sun dried for two days at 30-32^0 C and milled into powder.

B. Chemicals

The chemicals required for the analysis were procured M. P. Biomedical Navi Mumbai. Following chemicals are used during the analysis of sample.

Hcl, methyl red indicator, ammonium hydroxide, ammonium oxalate, conc. H2SO4, KMnO4, conc. HNO3, ammonium molybdate, KNO3, NaOH, phenolphthalein indicator.

C. Determination of Moisture

2-3 g of the sample was weighed in a silica dish. Dried in the vacuum oven at 60ºC and 20" Hg pressure for a minimum of 2 hours.

D. Ashing and Extraction

Accurately 3 g of the material was weighed into a silica dish. Chared carefully and continued the ashing in a muffle furnace at a temperature not above 450ºC until the ash was white or almost so. Cool the ash, moistened with a few millilitres of distilled water and 3 to 5 ml of concentrated hydrochloric acid was added drop by drop. Mixture was evaporated to dryness on a water-bath and continued heating on the water bath for one hour to rendered silica insoluble. The residue was moistened with 20 ml distilled water and about 2 to 3 ml of concentrated hydrochloric acid was added. Heated on a water bath for a few minutes and filtered through medium filter paper into a 250 ml volumetric flask. The filter paper washed thoroughly with hot water, filtrate was cooled and made it up to volume, shaken thoroughly.

E. Determination of Calcium – Precipitation Method

25 ml aliquot of the solution prepared as in (D) was transferred to a 400 ml beaker and diluted to about 100 ml with water and was added with two drops of methyl red indicator solution. Ammonium hydroxide solution was added drop wise till a brownish – orange color is obtained (pH 5.6). Two drops of hydrochloric acid was added so that the color of solution was pink (pH 2.5 to 3.0). It was diluted to about 150 ml and boiled. With constant stirring 10 ml of hot ammonium oxalate solution was added. Red color of the solution changed to orange, hydrochloric acid added drop wise until the color again changed to pink. It was left overnight and allowed the precipitate to settle. Filtered the supernatant liquid through ash-less filter paper and the precipitate was washed thoroughly with dilute ammonium hydroxide solution. Paper with the precipitate was placed in the beaker in which precipitation was carried out and added a mixture of 125 ml of water and 5 ml of concentrated sulphuric acid, heat to 70 to 90ºC and titrated with the standard potassium permanganate solution until the first slight pink color is obtained.

F. Determination of Phosphorus – Precipitation Method

Precipitation

10 ml aliquot of the prepared solution (As in ashing and extraction of calcium) in a 150 ml beaker was taken. In a dry beaker, 10 ml of the ammonium molybdate stock solution and 10 ml of concentrated nitric acid was added, whirled the beaker during addition. Poured this freshly prepared clear liquid quickly into the beaker containing the aliquot and stirred.

Filtration and Washing

Allowed the precipitate to stand overnight and then filtered through a disc of Whatman filter paper No. 42 in a gooch crucible by suction or through a 9 cm Whatman filter paper No. 42 over an ordinary funnel. As far as possible only the supernatant liquid is passed through the filter paper, retaining the precipitate in the

beaker. When the supernatant liquid is decanted off, the precipitate is washed twice with dilute nitric acid and then with potassium nitrate solution until the washings is free from acid. If ordinary funnel and filter paper are used, freedom from acidity may be tested by collecting sufficient filtrate in test tube to which a few drops of phenolphthalein indicator solution and one drop of the standard sodium hydroxide solution are added. If the pink color appears with one drop of the standard alkali, the precipitate is free from acid.

Titration

Precipitate with the filter paper back was transferred into the beaker in which precipitation was carried out. When gooch crucible is used for filtration, transfer the whole crucible along with the filter paper to the beaker in which precipitation was carried out. Sufficient quantity of the standard sodium hydroxide solution from a burette just sufficient to dissolve the precipitate was added and then 5ml of excessNaOH was added. See that no yellow precipitate sticks to the filter paper. Volume of the standard sodium hydroxide solution added was noted down. About 10 drops of phenolphthalein indicator solution was added and titrated the excess of alkali with the standard nitric acid.[8]

III. RESULT AND DISCUSSION

The elephant foot yam is cultivated species which is used for analysis and the tubers of this plant were analyzed for minerals such as calcium and phosphorous. It was found that tubers contain 26.01mg/100g of calcium and 39.42mg/100g of phosphorous. Paul et. al[2]. reported elephant foot yam is rich in minerals but poor in proteins. The content of phosphorous and calcium vary in some extent as reported by the Chattopadhyay et. al[6]. The elephant foot yam is good source of minerals that can supply a large portion of the daily requirements of minerals in food or feed. Calcium and phosphorous are the major minerals that the body requires in large quantities. Minerals have function in the body that include as enzymatic regulation, acid- base processes, bone growth and muscle stimulation.

		VALUES

SR. NO.	COMPONENTS OF ANALYSIS	
1	Ash Value	6.64%
2	Moisture Content	3.98%
3	Calcium	26.01mg/100g
4	Phosphorous	39.42mg/100g

CONCLUSION

According to the described results, the elephant foot yam is good source of minerals and can be used as food or feed. Because minerals have function in the body that include as enzymatic regulation, acid- base processes, bone growth and muscle stimulation. But before consumption it should be processed due to some anti nutritional factors.

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