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Studies on physico chemical characteristics and comparative study on extraction yield of Adulasa (*Adhatoda vasica*) leaf

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Abstract

The objective of present investigation is evaluating physico-chemical properties of Adulasa leaves which have many pharmaceutical effects. In the present investigation the physical properties like weight, length, width, shape and size were observed along with the chemical properties like moisture, fat, protein, ash, crude fibre and carbohydrates which found (15.2), (1.75), (6.12), (2.18), (6.5) and (68.5) per cent respectively. The calcium content was found higher and chromium content was lower in adulasa leaves respectively. Comparative study of leaf extraction was carried out to determine the per cent extraction yield by using various solvents in which aqueous have highest extraction yields and petroleum ether have lowest i.e.(30.1) and (5.6) per cent respectively.

Keywords: Adulasa, Extraction yeild, Adulasa dried extract etc.

1. Introduction

Adhatoda vasica Nees is native to India. It is distributed all over the plains of India & in lower Himalayan ranges, ascending to a height of 1,300m. It is a small evergreen, sub-herbaceous bush which grows universally in open plains, especially in the lower Himalayas up to 1300 meters above sea level (Global Herbal Supplies). Spread from the Punjab in the North, and Bengal and Assam in the South-East to the Ceylon, Malaysia and Singapore in the South. It is one of the very important medicinal plants in this area (Rahman *et al.*, 2004)^[8].

Adhatoda zeylanica medic.syn *A. vasica* (Linn) Nees (Vasaka), a popular Indian medicinal plant, has long been used commonly in Ayurvedic system of medicine. The plant has been found to posses' diverse number of pharmacological activities. The present paper gives an account of updated information on its photochemical and pharmacological activities. The review reveals that wide ranges of photochemical constituents have been isolated from the plant and it posses' important activities' like ant tissue, antibacterial, abortifacient, anti-inflammatory and antiulcer. Various other activities like radio modulation, hypoglycaemic, cardiovascular protections, antitubercular, antiviral, hepatoprotective, antimutagenic and antioxidant have also have been reported. These reports are very encouraging and indicate that herb should be studied more extensively for its therapeutic benefits. Clinical trials' using vasaka for variety of combinations in different formulation should also be conducted. (Sayeed *et al.*, 2009)^[10]

The plant has been included in the WHO manual "The Use of Traditional Medicine in Primary Health Care", which aims to profit health workers in South East Asia to keep them informed of the therapeutic utility of their surrounding flora (Singh *et al.*, 2011)^[10].

Materials and methods

The present investigation was carried out in Department of Food Engineering with collaboration of Department of Food Science and Technology and Department of Food Chemistry and Nutrition, College of Food Technology, VNMKV, Parbhani during year 2014-16. Adulasa was obtained from Dept of Botany and Medicinal plants VNMKV, Parbhani.

Preparations of Adulasa (*Adhatoda vasica*) leaf powder

Adulasa leaf powder was prepared as per the method adopted by Gulfaz *et al.*, (2004). After the collection of leaves samples of *Adhatoda vasica* were washed and subjected to sun dried, followed by oven dried. Finally the samples were crushed and converted into powdered form and saved for further analysis.

Physico chemical properties of Adulasa (*Adhatoda vasica*) leaf powder

Moisture, Fat, Protein, Crude fibre, Sugar and Ash content of adulasa leaf powder was

evaluated as per A.O.A.C, (2000) [1]. All the tests were executed in triplicates.

Mineral Estimation of Adulasa (*Adhatoda vasica*) leaf powder

The determination of calcium, magnesium and iron were done as per the method described by Ranganna (1986) [9]. The Atomic Absorption Spectrophotometer was used to determine potassium and chromium content in *Adhatoda vasica* leaf powder as per the method given by kumar *et al.*, (2013) [7].

Comparative study on leaf extraction Adulasa (*Adhatoda vasica*) by using various solvents

Five gm of the *Adhatoda vasica* leaf powder was macerated with 50 ml of ethanol, methanol, hexane and chloroform (1:10, w/v) in a closed flask for 24 hrs. The flask was shaken intermittently during 6 hrs and allowed to stand for 18 hrs. The extract was filtered rapidly, taking precautions against loss of solvent. The filtrate was evaporated to dryness in a porcelain dish and dried at 105°C, to a constant weight. The percentage of methanol-soluble extractive value was calculated with reference to the air dried powder. The extraction yield was estimated as per the method given by Srinivasan and Kumaravel, (2015) [15].

Physico chemical properties of adulasa (*Adhatoda vasica*) dried extract

Moisture, Fat, Protein, Crude fibre, and Ash content of adulasa leaf powder was analyzed as per A.O.A.C, (2000) [1]. Carbohydrates were analyzed by differential method. Mayer reagent test for alkaloids test Kanthale and Panchal, (2015) [6]. Total alkaloids content estimated as per the method given by Harborne, (1973) [5].

Results and Discussion

Physico chemical properties of Adulasa (*Adhatoda vasica*)

Physical properties of Adulasa (*Adhatoda vasica*):

Physical analysis of Adulasa such as average weight, length, width, shape, color etc. were determined. The results pertaining to the physical properties of Adulasa are depicted in the table 1.

Table 1: Physical properties of Adulasa leaves

Physical parameters	Results
Average Weight (gm)	1.66
Length (cm)	17.58
Width(cm)	7.59
Shape	Oval
Color	Light green

*Each value is average of three determinations

It was observed from table 1 that the average weight of Adulasa leaves was 1.66 gm. Length and width of adulasa leaves was measured by using vernier calliper which gives idea about the wholesomeness of the leaves and the length and width was found to be 17.58cm and 7.59cm respectively. The shape and color was observed visually and the shape of leaves was found to be oval and color was Light green. Similar result found in (Shah *et al.*, 2014) [11]

Chemical properties of Adulasa (*Adhatoda vasica*):

The data on chemical properties of Adulasa viz. moisture, fat, protein, carbohydrates, ash and fibre was carried out and the results obtained were tabulated in table 2.

Table 2: Chemical properties of Adulasa leaf

Chemical parameters	Results (%)
Moisture	15.2
Fat	1.75
Protein	6.12
Carbohydrate	68.25
Ash	2.18
Crude fiber	6.5

*Each value is average of three determinations

It was evident from Table 6 that moisture content in adulasa leaves was found to be 15.2% and fat content was low in concentration 1.75%. Leaves contain higher amount of carbohydrate content than other parameters 68.25% and ash content of adulasa leaves was found to be 2.18% and crude fibre content was 6.5% respectively. These all chemical parameters were found more or less similar with result found by Gulfranz *et al.*, (2005) [4] and Singh *et al.*, (2011) [12].

Mineral composition of Adulasa (*Adhatoda vasica*):

The data pertaining to the essential minerals content of Adulasa fruit was recorded in the Table 3 with respect to important minerals i.e. calcium, magnesium, potassium and iron.

Table 3: Mineral composition of adulasa leaf

Mineral composition	Results (mg/100gm)
Calcium (Ca)	6808
Magnesium (Mg)	482
Potassium (K)	3110
Iron (Fe)	70
Chromium	4

*Each value is average of three determinations

The various minerals like Ca, Mg, K Fe and Cr were analyzed from adulasa leaf, the concentration of these minerals were 6808, 482, 3110, 70 and 4 (mg/100gm) respectively. It can be seen from above table that the highest amount of calcium content 6808 mg/100gm whereas lowest in chromium content 4mg/100gm. These values are similar with the result reported by kumar *et al.*, (2013). The concentration of Mg and Ca was found much higher than the other inorganic minerals. Chromium was found very low as compared to other minerals tabulated in the Table 3.

Comparative study on leaf extraction of Adulasa (*Adhatoda vasica*)

The data obtained from the leaf extraction by using different solvent is given in Table. 4

Table 4: Comparative study on leaf extraction yield of Adulasa

Solvent	Extraction yield (%)
Methanol	19
Ethanol	16.8
Hexane	8
Chloroform	10.2
Petroleum ether	5.6
Aqueous	30.1

*Each value is average of three determinations

It was observed from Table 4 that the extraction yield of adulasa leaf extraction by using methanol, ethanol, hexane,

chloroform, petroleum ether and aqueous solvents was (19%),(16.8%), (8%), (10.2%), (5.6%) and (30.1%) respectively. In which the highest extraction yield was recorded for aqueous and lowest was found by petroleum

ether respectively. This results were found less or more similar with Srinivasan and Kumaravel (2015) [15] and Vinothapooshan *et al.*, (2010).

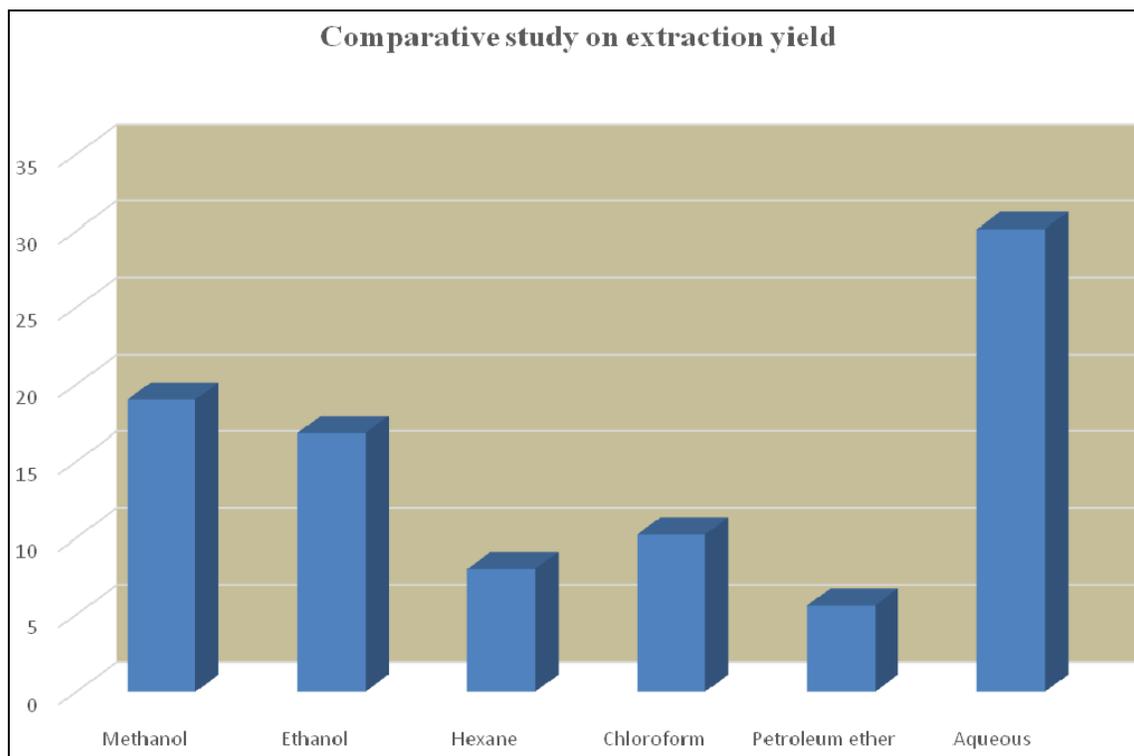


Fig 1: Comparative study on extraction yield of Adulasa (*Adhatoda vasica*) dried extract

Visual Characteristics of *Adhatoda vasica* (Adulasa) leaf extract

The general characteristic of selected adulasa leaf extract and dried extract was carried out and their results are predicted in following Table 5.

Table 5: Visual characteristics of adulasa leaf extract

Parameter	Aqueous Extract	Dried extract
Color	Light brown	Dark brown
Taste	Bitter	Bitter
Odour	No specific	No specific
Touch	Soft	Soft

The results indicated in Table 5 with respect to general characteristics of extract revealed that the colour and odour of adulasa leaf dried was dark brown and no specific smell was found. Similar results were recorded by Srinivasan and Kumaravel (2015) [15].

Extract had a light brown in colour and there was no any specific odour. Extract was bitter in taste while dried extract had also bitter in taste. Both extract and dried were smooth in touch. Constantly colour of dried extract was dark brown which might be due to the presence of coloured alkaloids. The bitter taste of adulasa leaf extract and dried extract was attributed to presence of alkaloids as most of the alkaloids were bitter in taste.

Physico chemical properties of *Adhatoda vasica* (Adulasa) extract

Physicochemical properties of extract and dried were evaluated for retained percentage of its active compound. The results obtained were presented in Table 6.

Table 6: Physicochemical properties of adulasa leaf extract and dried extract

Properties	Extract	Dried extract
pH	5.21	5.30
Moisture (per cent)	71	13.40
Crude fat (per cent)	NA	1.85
Protein (per cent)	NA	4.36
Carbohydrate (per cent)	NA	73.11
Crude fiber (per cent)	NA	4.10
Ash (per cent)	2.13	3.18
Alkaloids test	Positive	Positive
Alkaloids (per cent)	0.30	30.0

*Each value is average of three determinations NA- Not Analyzed

Results obtained were with respect to physicochemical properties of extract revealed that the P^H of extract and dried was 5.21 and 5.30 respectively. Moisture content of fresh extract and dried was found to be 71 per cent and 13.40 per cent respectively. Crude fat, protein, carbohydrate and crude fat of dried extract were analysed and result reported that 1.85, 4.36, 73.11 and 4.10 percent respectively. The total ash content of extract was (2.13 per cent w/w) and the ash content of dried was (3.18per cent w/w). The results found are in support with Sree and Daniel (2015).

The alkaloid content of dried extract was found higher (30per cent) compared to of alkaloid content of aqueous extract. The percent alkaloid content of dried extract had showed highest percent and this might be due to the concentration aqueous extract. Biological alkaloids were present in adulasa leaf were vacicine, vascinol and vascinone. The alkaloid present in extract was 0.3per cent. Similar results were reported by Soni *et al.*, (2008).

The alkaloid content of dried extract was found to be higher than extract. It might be due to dried of extract in rotatory evaporator under reduced pressure at 60°C which dissolve more alkaloids in dried. The phytoconstituent alkaloid can withstand at higher temperature as observed by Doughari, (2006).

Conclusion

It can be concluded that physiochemical properties of adulasa leaf and dried extract were studied. The extraction was carried out by using different solvents in which aqueous extraction was found much better than other solvents. The extraction yield of aqueous solvent was 30.1 percent. The adulasa leaves having many medicinal health benefits, therefore the leaves are recommended for the exploration and utilization in value added food product.

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