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A Comparative Study of Quality Control Parameters for *Adhatoda vasica* Nees., *Azadirachta indica* (Linn.) A. Juss. and *Calotropis procera* (Aiton) Collected From Eco-friendly and Non Eco-friendly Environment

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Abstract

Now a day's more demand of herbal drugs are common for disease treatment but lack of Knowledge of proper methodology and availability of herbal drug are promoting the practices of adulteration and substitution. The objective of the present study was to evaluate the quality parameter of samples of *Adhatoda vasica* Nees., *Azardirachta indica* (Linn.) A. Juss. and *Calotropis procera* (Aiton) collected from the Eco-friendly and Non eco-friendly environment. This study has been planned to observe quality control parameters like total ash content, acid insoluble ash, alcohol-soluble extractive and water-soluble extractive. The result of alcohol-soluble extractive and water-soluble extractive of Eco-friendly and Non eco-friendly environment has been found with a comparable difference. The Sample of *Adhatoda vasica* Nees., *Azardirachta indica* (Linn.) A. Juss. and *Calotropis procera* (Aiton) collected from eco-friendly environment showed alcohol-soluble extractive values 9.6%, 17.6% & 16% respectively and the sample of *Adhatoda vasica* Nees., *Azardirachta indica* (Linn.) A. Juss. and *Calotropis procera* (Aiton) collected from Non eco-friendly environment showed alcohol-soluble extractive values 8%, 22.4% & 23%. The Sample of *Adhatoda vasica* Nees., *Azardirachta indica* (Linn.) A. Juss. and *Calotropis procera* (Aiton) collected from eco-friendly environment showed water-soluble extractive values 23.2%, 24% & 25.6% respectively and the sample of *Adhatoda vasica* Nees., *Azardirachta indica* (Linn.) A. Juss. and *Calotropis procera* (Aiton) collected from Non eco-friendly zone showed water soluble extractive values 16%, 18.4% & 32%.

Keywords

Adhatoda vasica Nees., *Azardirachta indica* (Linn.) A. Juss. and *Calotropis procera* (Aiton), Quality Control Parameters.

Introduction

The relationship between plants and man has existed since antiquity and the use of plants as medicines is not new to man[1]. *Adhatoda vasica*, also known as Malabar nut tree is part of the Acanthaceae plant family. It is a small evergreen, sub-herbaceous bush which grows commonly in open plains, especially in the lower Himalayas (up to 1300 meters above sea level), India, Sri Lanka, Burma and Malaysia[2]. As per therapeutic property it is a good

expectorant[3], anti-asthmatic and bronchodilator activity[4], aflatoxin-detoxifying compounds[5], anti-tubercular activity, anti- inflammatory activity and abortifacient[6], easy childbirth delivery[7], antibacterial[8], antihistaminic effect, moderate hypotensive activity, thrmobopoietic activity[9], antiulcer[10], antidiabetic activity[11]. *Azadirachta indica* A. Juss. Belonging to the family of Meliaceae is an important medicinal plant used in the Traditional System of Medicine[12]. *Azadirachta indica* A. Juss. tall, evergreen trees, native to India, in no widely distributed throughout the Indo-Malayan region and is also found in tropical Africa[13]. Anti-inflammatory, antipyretic, immunostimulant, hypoglycaemic, and antiulcer properties. It also has pregnancy interceptive, antimalarial, antifungal, antibacterial, antiviral, anticarcinogenic, antihepatotoxic, and antioxidant properties[14&15], analgesic[16]. The plant, *Calotropis procera* (of family *Asclepiadaceae*), commonly known as Aak is used in many ayurvedic formulations like *Arkelavana*[17]. It is a xerophytic erect shrub, growing widely throughout the tropical and sub-tropical regions of Asia and Africa. This plant is popularly known because it produces large quantity of latex[18]. Analgesic, antitumor, antihelmintic[19], proteolytic, antimicrobial, larvicidal, nematocidal, anticancer, anti-inflammatory[20].

Materials

Chemicals

Hydrochloric acid, methanol, and distilled water used in study were of analytical grade.

Plant samples

Samples of leaves of *A. vasica*, *A. indica* and *C. procera* were collected in early morning during month of April from medicinal plant garden, Dev Sanskriti Vishwavidyalaya Gayatrikunj – Shantikunj, Haridwar, U.K., India. The leaves of same sample were collected from Non Eco-friendly Zone of Haridwar, U.K., India. All the samples were identified and authorised under the supervision of Department of Applied Medicinal Plants' Sciences, Dev Sanskriti Vishwavidyalaya. The samples *A. vasica*, *A. indica* and *C. procera* were named as AV/1, AI/1 & CP/1 for eco-friendly zone and AV/2, AI/2 & CP/2 for non-eco-friendly zone respectively.

Methods

Macroscopic evaluation

The macroscopic evaluation was studied by the method of Trease and Evans[21].

Physiochemical evaluation

The Physiochemical parameters of ash analysis, acid-insoluble ash and extractive values were determined as per standard Ayurvedic pharmacopoeial procedures[22&23].

Ash Analysis

2 gm. of powder was taken into silica crucible previously heated and weighed. The powder was evenly scattered in fine layer on bottom of the crucible. Then the crucible was heated in furnace at a temperature not exceed-ing 450^0 C until free from carbon, cooled and weighed. The percentage of total carbon free ash was calculated with reference to air-dried powder.

$$\text{Total ash} = \frac{\text{Ash obtained after calcinations}}{\text{Plant material taken (gm)}} \times 100$$

Acid Insoluble Ash

Carbon free ash was boiled with 25 ml of 2 M hydro-chloric acid for 5 min, filtered through ash less filter paper, was washed with hot water, and then the filter paper was dried in oven, ignited in crucible previously weighed, cooled and weighed. The percentage of the acid insoluble ash was calculated with reference to the air-dried powder.

$$\text{Acid Insoluble ash} = \frac{\text{Acid insoluble Material}}{\text{Plant material taken (gm)}} \text{ X } 100$$

Determination of Percentage Extractives

About 5 gm. of air-dried powder was macerated with 100 ml of desired solvent such as water and alcohol specified strength, in closed flask of for 24 h. The mixture was vigorously shaken at intervals during 6h. After 24 h the solution was rapidly filtered without any loss of solvent. Them from the filtrate about 25ml of the solution was evaporated of dryness in a flat bottomed shallow porcelain dish, dried at 100^0C and weighed. Then the percentage of solvent was calculated with reference to the air-dried drug.

$$\text{Soluble extractive (\%)} = \frac{\text{Dry extract}}{\text{Plant material taken (gm)}} \text{ X } 100$$

Result and Discussion

Macroscopic evaluation

According to World Health Organization, the macroscopic description of a medicinal plant is the first step towards establishing its identity and should be carried out before any other tests are undertaken[24].

Table 1.1 Macroscopic evaluations of AV/1 and AV/2.

Features	AV/1	AV/2
Colour	Dark green to green	Green to yellowish green
Odour	Characteristic	Characteristic
Taste	Bitter	Bitter
Size	9-28cm length and 4-10cm width	12-30 cm length and width 4-10 cm
Shape	Lanceolate	Lanceolate
Margin	Entire	Entire
Apex	Acuminate	Acuminate
Texture	Leathery	Leathery
Venation	Pinnate	Pinnate
Type	Simple	Simple

Physiochemical Evaluation

The leaves of AV/1 & AV/ 2, AI/1 & AI/ 2 and CP/1 & CP/ 2 were tested for total ash, acid insoluble ash and extractive values, the result of those were presented in Table 4,5 & 6 respectively. The Physiochemical evaluation of the leaves of AV/1 & AV/ 2 revealed that the leaves had acid-insoluble ash content is more in AV/ 2 as compared to standard values and results are comparable with the study of Singh and coworkers[2] and water-soluble extractive content is less in AV/2 as compared to standard values.

Table 1.2 Macroscopic evaluation of AI/1 and AI/2.

Features	AI/1	AI/2
Colour	Green	Green
Odour	Indistinct	Indistinct
Taste	Bitter	Bitter
Size	4.8-5.2cm in length and 1.1-1.5cm in wide	4-5.2cm in length and 1-1.5cm in wide
Shape	Lanceolate	Lanceolate
Margin	Crenate	Crenate
Apex	Acute	Acute
Texture	Thin Papery	Thin Papery
Venation	Reticulate	Reticulate
Type	Compound	Compound

Table 1.3 Macroscopic evaluation of CP/1 and CP/2.

Features	CP/1	CP/2
Colour	Green	Green
Odour	Characteristic	Characteristic
Taste	Bitter	Bitter
Size	6-14.5cm length and 4-10cm width	5-12cm length and 4.5-8cm width
Shape	Ovate	Ovate
Margin	Entire	Entire
Apex	Acuminate	Acuminate
Texture	Rough	Rough
Venation	Reticulate	Reticulate
Type	Simple	Simple

The Physiochemical evaluation of the leaves of AI/1 & AI/2 revealed that the leaves had total ash content is more in AI/2 as compared to standard values and water-soluble extractive content is less in AI/2 as compared to standard values.

The Physiochemical evaluation of the leaves of CP/1 & CP/2 revealed that the leaves had total ash content is more in CP/2 as compared to standard values and acid-insoluble ash content is more in CP/2 as compared to standard values.

Table 1.4 Quality parameters of AV/1 and AV/2

S. No.	Physicochemical Parameter Values	Observed Value AV/1(%)	Observed Value AV/2(%)	Standard Values (%)
1.	Total ash	13%	13.5%	Not More Than 21%
2.	Acid-insoluble ash	0.5%	1.5%	Not More Than 1%
3.	Alcohol-soluble extractive	9.6%	8%	Not Less Than 3%
4.	Water-soluble extractive	23.2%	16%	Not Less Than 22%

Table 1.5 Quality parameters of AI/1 and AI/2

S. No.	Physicochemical Parameter Values	Observed Values AI/1(%)	Observed Values AI/2(%)	Standard Values (%)
1.	Total Ash	9.5%	10.5%	Not more than 10%
2.	Acid-insoluble ash	0.5%	1%	Not more than 1%
3.	Alcohol-soluble extractive	17.6%	22.4%	Not less than 13%
4.	Water-soluble extractive	24%	18.4%	Not less than 19%

Table 1.6 Quality parameters of CP/1 and CP/2

S. No.	Physicochemical Parameter Values	Observed Values CP/1 (%)	Observed Values CP/2 (%)	Standard Values (%)
1.	Total Ash	14.5%	21.5%	Not more than 21%
2.	Acid-insoluble ash	1.5%	2.5%	Not more than 5%
3.	Alcohol-soluble extractive	16%	23%	Not less than 5%
4.	Water-soluble extractive	25.6%	32%	Not less than 24%

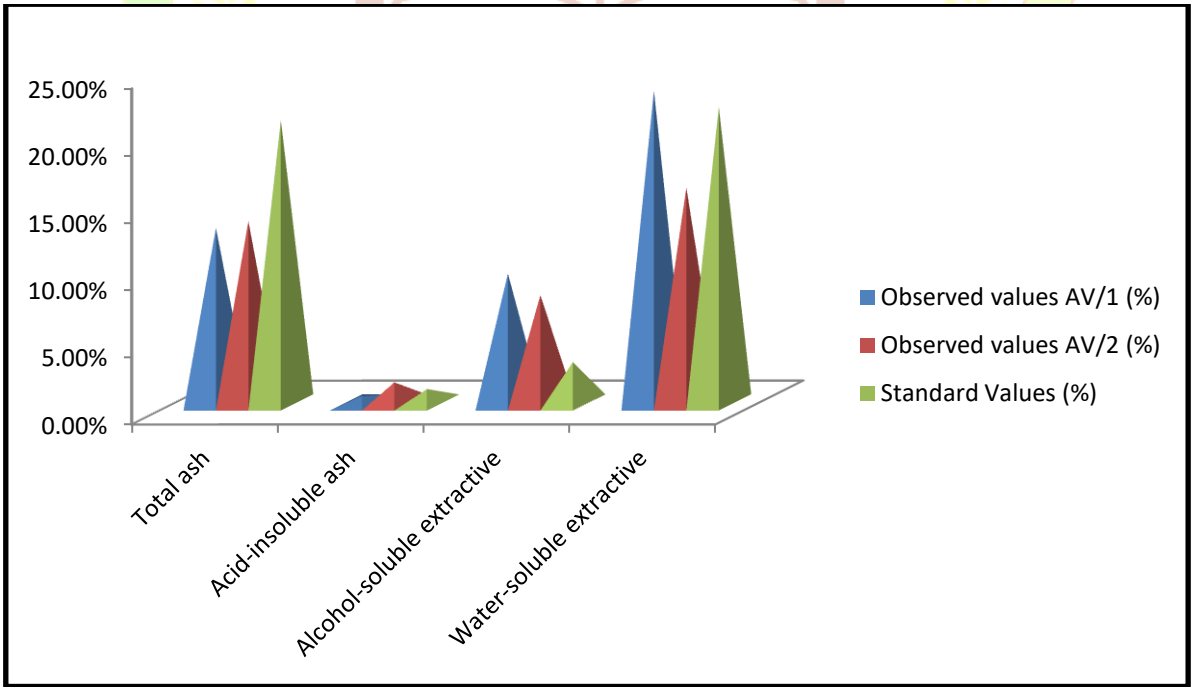

Fig. 1.1 Comparison of Standard & Observed value of the Quality parameters of AV/1 & AV/2

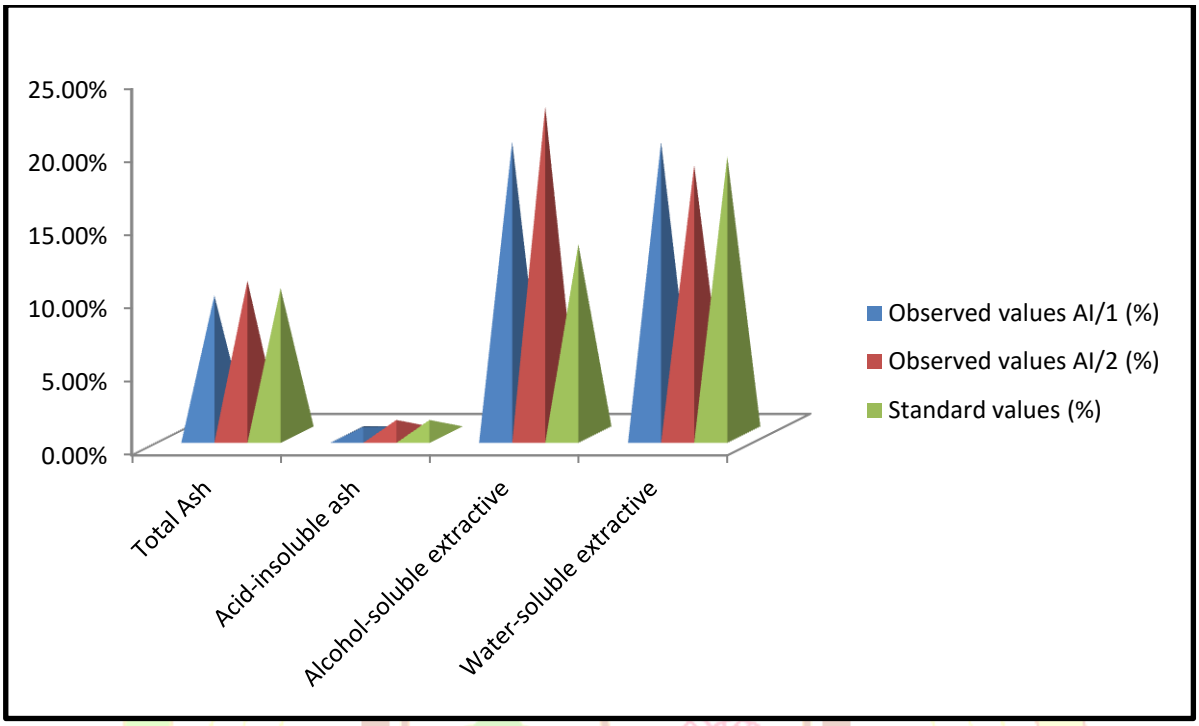

Fig. 1.2 Comparison of Standard & Observed value of the Quality parameters of AI/1 & AI/2

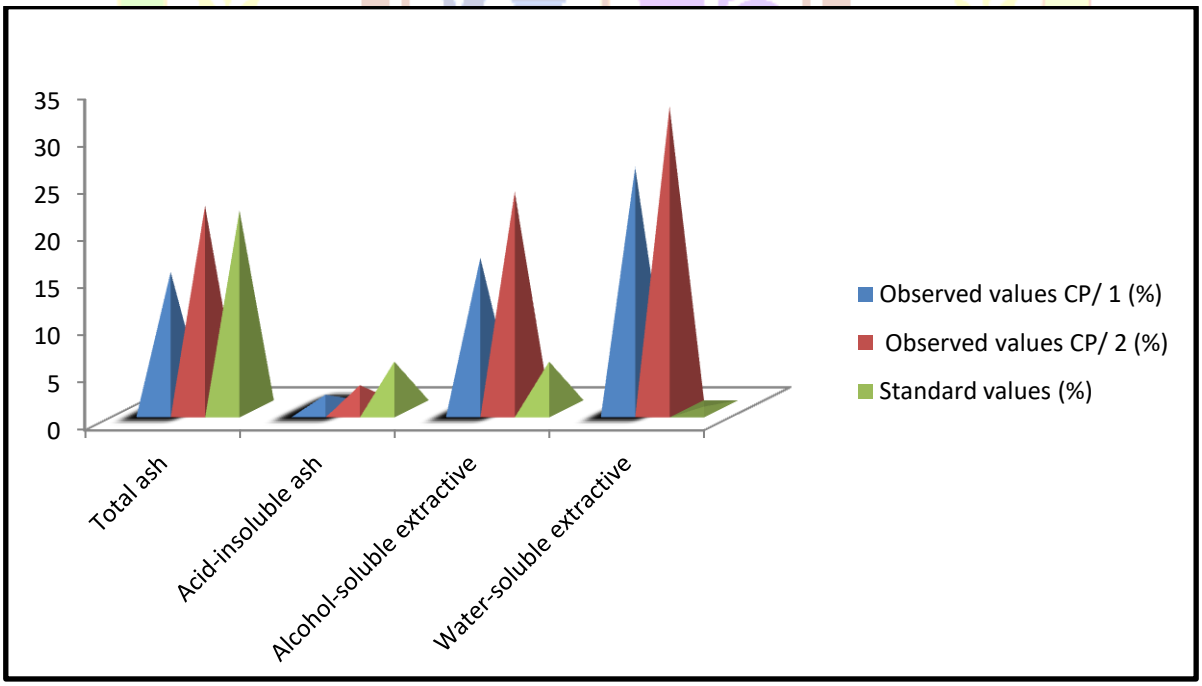

Fig. 1.3 Comparison of Standard & Observed value of the Quality parameters of CP/1 & CP/2

Conclusion

The Present study may be useful to supplement information with its standardization and in carrying out further research and revalidation of its use in the Indian System of Medicine; Ayurveda, Siddha, Unani and Homeopathy.

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