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Extraction and characterization of oil from *Bauhinia Vahli* (Adda) Seeds

Janaki P, Rajeswari M, Tirumala Devi Y and Sandeep BV Department of Food, Nutrition and Dietetics, College of Science & Technology, Andhra University, Visakhapatnam

Abstract *:Bauhinia Vahli seed oil was extracted from the seeds. The yield of the oil by Soxhlet extraction method was 49% which is very high. The following properties of the extracted oil were determined: specific gravity, boiling point, saponification value, acid value , iodine value and peroxide value. The extracted oil has a very low acid value and peroxide value which makes it edible. The high saponification value of seed oil indicates strong cleansing ability. The low Iodine value obtained also suggests that the Bauhinia Vahli seed oil will be less susceptible to oxidative deterioration. The oil seed residue was found to be rich source of proteins and minerals. The recipes developed using the oil was found to be highly acceptable by the panel members. Thus, Adda seed has the potential to become a new cheaper source of edible oil and its full potential should be exploited*

Key words: *human consumption, physico-chemical, extracted oil*

Introduction

The nutritive and calorific values of seeds make them good sources of edible oils and fats in the diet. Seed oils have extensive demands both for human consumption and for industrial applications. They have also been rated as the second most valuable commodity in the world trade today .The majority of India's tribal population relies on forest products for subsistence uses. Exploitation of non timber forest products, particularly seeds, can be a sustainable and more economically rewarding use of forests than timber extraction.

Bauhinia vahlii Wight &Arn .is a very large, usually evergreen, climber and is distributed in deciduous forests of India from Gujarat southwards to Maharastra and Northern Andhra Pradesh, commonly on hillsides and in forest valleys . The seeds of this legume are a rich source of crude protein (24.59%), crude lipid (23.26%), crude fibre (6.21%), carbohydrates (41.72%), minerals and essential amino acids. The ripe seed when eaten raw or fried tastes like cashew-nuts . The cooked and roasted mature seeds of *B. vahlii* are eaten by the tribes, Kondakapulu and Baagethalu of Araku valley, Visakhapatnam, AndhraPradesh, and Mundari group of tribes in India . The seeds are considered aphrodisiac and tonic. A paste of the seed is applied to boils and given to children suffering from indigestion.

Attention has not been focused on under-utilized forest foods such as Bauhinia vahli which is widely consumed by tribal population. The seed of Bauhinia vahli is a possible source of oil for domestic and industrial uses. Research works in the area of extraction of oils from Bauhinia vahli plants are scarce in the literature . This research work focuses on the extraction of oil from the seed of Bauhinia vahli plant

popularly called as Adda seeds and subsequent physico-chemical analysis of the extracted oil and assess the fitness for consumption. If the technology is exploited, it can be a boon for the tribal people not only in terms of consumption but also income generating.

Materials and Methods

Procurement & Pre preparation of Sample: The fresh seeds were collected from Lambasingi, a tribal village in Visakhapatnam agency area. The seeds were dried at 45ºC for 3 days. The drying process stimulated the opening of outer husk and release of seeds embedded inside. The seeds were separated from the chaffs and other impurities. The cleaned seeds were homogenized into a fine powder for the extraction of oil.

Extraction of oil from the seed sample: Two different methods were used for extraction of oil from Adda seeds which include

a. Extraction of oil using milling machine : Oil was extracted from the seed sample from a commercial oil milling machine

a. Soxhlet extraction method : According to standard method ISO 659 finely ground dried *Bauhinia* seed sample (about 5g of particle size 2 mm), was used to obtain oil by Soxhlet extraction using petroleum ether for 8 hours.

The yield of oil was calculated from both the methods and compared to assess the best yielding method for extraction of oil from Adda seeds by using the formuls-

Yield of oil = (Weight of oil × 100)/Initial weight of sample

Study of physico - chemical properties of extracted oil:

Lovibond Tintometer with a 1″ in. cell was used to measure the intensity of the color of oil. Standard procedures of Americal oil chemist Society were used for lipid indices values as outlined by AOAC(1997). The lipid indices estimated were Acid Value, Saponification value, Iodine value, Peroxide value, Refractive Index and Specific gravity.

Analysis of oil seed residue from Adda seeds for Nutrient content:

Moisture, carbohydrates,Proteins, Ash, Minerals Iron, Calcium and Phosphorus were analysed by the methods of Ranganna, 1986 and Raghuramulu et al. (2003)

Assessment of efficacy of oil for cooking purpose: In order to assess the cooking quality of crude oil extracted from Adda seeds in the present investigation. A total of five commonly consumed recipes Pakkoda, Chekodi, Vegetable Upma, Potato fry and Vegetable curry were prepared using the oil. Sensory evaluation was done by selected panel members (10 No.s) for various parameters such as colour, texture, flavor, taste and overall acceptability. Scores are given for each parameter of the recipe based on the 4 point scale rating system. 1- Poor, 2-Average, 3-Good, 4- Excellent.

6. Data analysis: The mean values (means ±SD) were calculated from replicates of each experiment

RESULTS & DISCUSSION

Adda seed oil was extracted from Adda seeds by two methods comprising of milling machine and Soxhlet extraction method. The % yield of oil by soxhlet extraction method is greater (Table.1) when compared to commercial oil milling method, indicating soxhlet as the best method suitable for oil extraction

Table.1. % Yield of Adda seed oil obtained from two different methods of extraction

S.No	Method Employed for extraction of oil	% yield of oil from Adda seeds
1	Oil Milling Machine	18.6
2	Soxhlet Oil extraction method	49

The Physico-chemical properties studied include colour, Specific Graviry, Refractive Index, Boiling point, Smoke point, Acid value, Saponification value, Iodine value and Peroxide value .The colour of the oil was yellow based on colour tintometer readings. The specific gravity of Adda seed oil was found to be 0.92± 0.01 which is similar to Soya bean, Sunflower seed, Safflower seed and grape seed oils . The Refractive index of oil was 1.45763±0.04, which is similar to Palm oil and Grape seed oil. The Boiling point was 122 ºC± 0.23, which is on a lower side when compared to other unconventional oils. The smoke point was 248 ºC± 0.46, which is lower than the standard Flash values of 250ºC for edible oils indicating its fitness for cooking and deep frying and more stability to oxidation (Table.2)

The Free fatty acid value of adda seed oil 3.15± 0.07 mg of KOH/g of oil which is similar to the values of Ground nut oil and palm oil. The Saponification value was found to be very high, proving its potential for industrial soap making with high cleansing ability. High sap value also may indicate high percent of short chain fatty acids which can contribute to therapeutic potential of these oils. The Iodine value of the oil was 81.9 which is similar to ground nut oil, sunflower seed oil and safflower seed oil. The seed oils are non drying due to their low iodine values, however, it may also suggest that they have fewer unsaturated bonds and

therefore have lower susceptibility (Table. 2)

Table- 2 . Physico-Chemical Properties of the extracted Adda seed oil

Property	Value
Specific Gravity	0.92± 0.01
Boiling Point	122 ºC± 0.23
Smoking Point ºC	248 ºC± 0.46
Acid Value (mg of KOH/g)	3.15± 0.07
Saponification Value(mg/g)	398.31± 11.9
Iodine Value (mg/g)	81.9± 1.9
Color index	30y , 2r
Refractive index	1.45763±0.04, 40 ºC
Peroxide Value (meq of O_2/Kg	6.4±0.01

The Adda seeds and deoiled seed cake were found to have good amounts of proteins and minerals (Table. 3).When the acceptability of the products made with Adda seed oil was tested, it was found that the products were highly acceptable and comparable to any other commonly consumed recipes. But the colour was slightly darker because of the crude oil. There was no abnormal flavor or unacceptable taste in the product (Table.4)

Table- 3. Proximate composition of Adda seed and Deoiled Seed Residue

Nutrient (%)	Adda Seeds	Deoiled Adda Seed Residue
Moisture %	3.6	1.13
Carbohydrates	35.6± 3.23	22.6± 1.23
Proteins	18.23± 1.46	12.6± 0.21
Ash	3.15± 0.08	9.8± 1.52
Iron	3.98± 1.9	3.6± 1.03
Calcium	108.2± 10.7	120.6± 1.73
Phosphorus	398± 11.9	156± 10.8

Table 4 . Sensory evaluation of 5 products prepared by *Bauhinia vahlii* seed oil

Sensory Characteristics	Pakoda	Chegodi	Potato Fry	Vegetable Upma	Vegetable Curry
Taste	4.6± 0.41	4.6± 0.43	5.0± 0.41	4.8± 0.42	4.8± 0.41
Colour	3.8± 0.43	4.6± 0.39	4.8± 0.33	4.0± 0.43	4.4± 0.32
Flavour	4.6± 0.38	4.0± 0.35	4.8± 0.39	4.8± 0.35	4.8± 0.35
Texture	4.8± 0.23	4.8± 0.20	5.0± 0.23	4.6± 0.21	4.4± 0.24
Overall acceptance	4.6± 0.52	4.6± 0.54	5.0± 0.60	4.8± 0.67	4.6± 0.61

Conclusion

Based on the results obtained from the extraction and characterization of Adda seed oil, it can be concluded that the oil is found to be edible. The percent yield of the oil is comparable to commonly consumed oils and more than the other unconventional oils. Out of the 10 physico chemical properties tested, six of the properties were similar to groundnut oil, safflower seed and grape seed oils. High Saponification value might indicate presence of short chain fatty acids in higher levels which can be used for therapeutic applications such as tube feeds. . The low Iodine value obtained also suggests that the seed oil will be less susceptible to oxidative deterioration. Thus, Adda seed has the potential to become a new source of oil and its full potential should be exploited. Adda seed is a popular seed which is roasted and consumed by all the tribal population of Visakhapatnam agency areas. The seed is consumed for its nutty almond like flavor. This study is the first of its kind to extract oil from the seeds in order to benefit the tribal population. The production of useful oil from the seeds could be of economic importance of benefit to the areas where the tree is cultivated. If the technology is exploited, it can be a boon for the tribal people not only interms of consumption but also for income generation.

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