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Analysis of Cashew Leaves before and after Extraction

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Abstract: Research for drugs and dietary supplements derived from plants have accelerated in recent years. Ethnopharmacologists, botanists, microbiologists, and natural-products chemists are combing the Earth for phytochemicals and "leads" which could be developed for treatment of infectious diseases. Meanwhile, 25 to 50% of current pharmaceuticals are derived from plants. Plant extracts and the use of plant parts such as leaves, fruits, flowers, stems, barks, buds and roots are known in cosmetic and pharmaceutical applications since ancient times. Traditional healers have long used plants to prevent or cure infectious conditions. Cashew (Anacardium occidental L.) leaves extract (CLE) has high potential and can be a suitable candidate for this reason.

Keywords: Ethnopharmacologists, pharmaceutical, Anacardium occidental, Cashew leaves extract, supplement.

Introduction

Various herbal and plant compositions are already recognized for their antimicrobial benefits by institutions such as the Chemical Abstracts Service (CAS) and European Inventory of Existing Commercial/ Chemical Substances (EINECS). Plant components have been used historically for their health benefits, which provides insight into possible design and sales concepts; plant components also have strong scientific validation supporting their active role as antimicrobials (Kamni and Sysler, 2007). Plants have an almost limitless ability to synthesize aromatic substances, most of which are phenols or their oxygen-substituted derivatives (Geissman, 1963). Most are secondary metabolites, of which at least 12000 have been isolated, a number estimated to be less than 10% of the total. Some, such as terpenoids, give plants their odors; others (quinones and tannins) are responsible for plant pigment (Schultes, 1978). Applications of plants and plant extracts in cosmetics are wide spread and where used for purposes such as moisturizing, whitening, tanning, colour cosmetics, sunscreen, radical-scavenging, antioxidant, immunostimulant, washings, preservatives, thickeners etc. (Blum, Schurch and Zulli, 2007).

Material and Methods

B.1 Protein

B.1.1 Procedure

I. Weight 0.2 – 1 g test portion into digestion flask.
II. Add tablet of catalyst and 15 ml H_2SO_4 into each flask.
III. Include at least 1 flask with refrence material in every subset of 7 samples or fewer.
V. Place the digestion tube in the tube rack and start to diges when the digestor reached 400℃ for 1-2 hour or until a clear and blue-green solution is obtained.
V. Allow content to cool, then catiously, add about 20 ml Deionized water and cool to room temperature. (Note: Add H_2O as soon as possible to reduce amount of caking.)
VI. Prepare receiver Erlenmeyer flask by adding appropriate volume of receiver solution (boric acid solution) to amount of H_2O such that condenser tip will be sufficently immersed to trap all NH_3 envolved (as perin 8.5).
VII. Place the quick clamping device and place the digestion tube into position
VIII. Check the tight fit of the tube against Viton cone.
IX. Close the protection door and switch the instrument on.
X. Let the steam generate for a few minutes.
XI. Press desired key and program number to start the distillation process.
XII. On running a sample the display shows the distillation sequence of chemical additions, distillation time and suction sample.
XIII. Once the program has finished the program remove digestion tube by lowering the quick clamping device.
XIV. Clean the H_3BO_3 distillate outlet tubing with deionized water, then remove the erlenmeyer flask with the distillate and continue the determination.
XV. Correct for blank determination on reagents.
XVI. Titrate Boric acid solution with 0.1M HCl using burette.

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B.2 Nitrogen

Table 3.2 Percentage of protein and nitrogen in cashew leaves

Sample No.	Volume/ Wheight of sample, g	Volume of titrant used, ml	Total N, %	Protein, %	%RPD Protein	Average Protein	Remarks
1	0.5103	4.63	1.24	7.76	0.1288	7.765	Before Extraction
2	0.5068	4.60	1.24	7.77			
3	0.5060	5.53	1.50	9.39	3.3568	9.235	After Extraction
4	0.5787	6.10	1.45	9.08			

1) $N\% = \frac{(TVsample - TVblank) X N_{HCl} X\ 14.007 X 100}{\text{Test portion weight,mg}}$

Where,

TVsample = Titration volume of sample , ml

N_{HCl} = Normality acid (HCl)

TVblank = Titration volume for blank , ml

F = Conversion factor for Protein

2) Protein % = N% X F Where F = Factor

3) Recovery % = (Observed value / True value) X 100

4) M_{NaOH} = (KHP,g X 1000) / (TV , ml X 204.23)

The Relative Percent Difference (RPD) shall be within $\pm$ 5%

$\%RPD = \frac{(A-B) X\ 100}{(A+B)/2}$

Where :

A= First replicate B= Second replicate

B.3 Fat

B.3.1 PROCEDUR

I. Weight 2-5 g samples and make the nutrial (free of Acid and alkaline).
II. Put the samples with filter papers in thimbles of the soxhlet.
III. Run the soxhlet for 8 hours with the temperature No.4.
IV. Solvent is petroleum ether (40 – 60℃ Boiling Point).
V. Put the samples with filter papers in oven for 2 hours with temperature of 130℃.
VI. 30 minutes in desiccator and then weigh.

Table 3.3 Percentage of Fat in cashew leaves

Sample No.	Sample Weight,g	Empty Flask,g	Flask+Oil,g (After drying)	Fat Content%	%RPD	Average	Remarks
1	3.4692	96.5034	96.5500	1.3452	1.9309	1.3807	Before Extraction
2	3.4458	110.2502	110.2990	1.4162			
3	3.2551	123.2567	123.2991	0.1044	1.4739	0.0890	After Extraction
4	3.2556	100.4171	100.4205	0.0737			

Fat Content % = $\frac{[(Flask+Oil) - Empty\ Flask] X\ 100}{\text{Sample weight,g}}$

The Relative Percent Difference (RPD) shall be within $\pm$5%

$\%RPD = \frac{(X_1 - X_2)\ X\ 100}{(X_1 + X_2)/2}$

Where :

X_1 = first replicate X_2 = Second replicate

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B.4 Crude Fiber

B.4.1 PROCEDURE

I. Weight 2- 5 g sample. Transfer the sample to 1 L beaker, and add 200 ml 1.25% H_2 SO_4. Heat the flask untilthe contents starts to boil and then boil for exactly 30 min. Check the flask periodically to keep solids from adhering to sides.

II. Filter the contents of the flask through pleated gauze placed in the filter funnel. Thoroughly rinse the flask with hot water, transferring the rinsing and finally wash the residue on the gauze until the washings are acid-free as indicated by the litmus paper. Allow the gauze to drain well.

III. Return the residue to the beaker and add 200 ml 1.25% NaOH. Heat the flask until the contents start to boil and then boil exactly for 30 min.Check the flask periodically to keep solids from adhering to sides.

IV. Filter the contents of the flask through wetted pre-weighted ashless filter paper (B_1) placed in the filter funnel. Thoroughly rinse the flask with hot water, transferring the rinsing and finally rinse the residue properly until the washings are acid-free as indicated by the litmus paper.

V. Transfer residue and the ashless filter paper to ashing dish, and dry for 5 h at 95 – 100℃ or for 2h at 130℃. cool in desiccator and weigh (W_2). Ignite at 600℃ ±15℃. cool in desiccator and reweigh (W_3).

VI. Analyzed blank same as samples cool in desiccator and weigh (B_2). Ignite at 600℃ ± 15℃. Cool in desiccator and reweigh (B_3).

Table 3.4 Percentage of Crude Fiber in cashew leaves

Sample No.	Sample weight, g W_1	Filter paper, g (After drying)B_1	Crucible+ sample,g (After drying)	Crucible+ sample,g (After ashing)	Crude fiber content, %	Average	%RPD
Before Extraction	3.2627	0.9947	38.5786	36.5918	30.3522	33.5231	1.8915
	3.3943	1.0647	38.9820	36.6700	36.6939		
After Extraction	3.2154	1.0297	39.2526	36.6554	48.6938	46.2616	1.0515
	3.2412	1.0346	40.1981	37.7411	43.8294		
SRM	B_3	17.2483	B_2	17.2465	Ash filter paper	0.0018	

$$\text{Crude fiber content \%} = \frac{(W_2 - W_3) - B_1 - (B_3 - B2)\ X\ (100)}{W_1}$$

Where :

W_1 = Weight test portion, g

W_2 = Weight of sample + crucible + filter paper (after drying, g)

W_3 = Weight of sample + crucible + filter paper (after ignition, g)

B_1 = Weight of filter paper after drying, g

B_2 = Weight of container g (blank)

B_3 = Weight of cont & filter paper after ignition, g (blank)

$$\%RPD = \frac{(X_1 - X_2)\ X\ 100}{(X_1 + X_2)/2}$$

Where :

X_1 = first replicate

X_2 = Second replicate

B.5 Moisture

B.5.1 PROCEDURE

I. Heat empty dish at 95 - 100℃.

II. Cool and weight dish before use.

III. Weight 2- 5 g well mixed test portion into the dish.

IV. Uncover test portion. Dry the dish, cover and contents for 3 - 5 hour in oven provided with opening for ventilation and Maintained at 95 – 100 ℃ Note: Drying period begins when oven temperature reaches 100 ℃

V. Cover dish while still in oven, transfer to desiccator and weight soon after reaching room temperature.

VI. Report residue as total solids and loss in weight as moisture.

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Sample No.	Sample Weight,g/ SampleVolume, ml(W1)	Weight of Empty Container, g(W2)	Weight of Container+Sample,g(After Drying)(W3)	Result	Average	%RPD	Remarks
1	2.0343	37.5685	39.4580	7.1179	7.1626	1.2482	Before Extraction
2	2.0285	35.0194	36.9017	7.2073			
3	2.0815	34.5088	36.3951	9.3778	9.1975	3.9206	After Extraction
4	2.0117	35.5413	37.3716	9.0172			

Table 3.5 Percentage of Moisture in cashew leaves

Moisture % = $\frac{W1-(W3-W2)}{W1}$ x 100

Where,W1 = weight of sample, g

W2= weight of empty crucible, g

W3= weight of crucible + sample after drying, g

Total Solids, % = 100 – Moisture(%)

*The Relative Percent Difference (RPD) shall be within ±5%

%RPD = $\frac{(A-B)X100}{(A+B)/2}$

Where, A = First replicate

B = Second replicate

B.6 Ash

B.6.1 PROCEDURE

I. Ignited crucible.
II. Cool and weight crucible before use, W2
III. weight 3 -5 gwell mixed test portion into the dish, W1.
IV. Char the sample on hot plate until it has cease smoking. This is to prevent the sample from sprinkling.
V. Ignite in furnace at 550℃ (dull red) until light gray ash residue or to constant weight.
VI. Cool in desiccators and weight soon after reaching room Temperature, W3.

Table 3.6 Percentage of Ash in cashew leaves

Sample No.	Sample Weight, g/Sample Volume, ml(W1)	Weight of Empty Container, g (W2)	Weight of Container+Sample,g(Ashing) (W3)	Result	Average	%RPD	Remarks
1	2.0343	37.5685	37.6171	2.3890	2.4122	1.9194	Before Extraction
2	2.0285	35.0194	35.688	2.4353			
3	2.0815	34.5088	34.5690	2.8921	2.9348	2.9133	After Extraction
4	2.0117	35.5413	35.6012	2.9776			

Ash% = $\frac{W3-W2}{W1}$ x 100

Where, W1=weight of sample, g

W2= weight of empty crucible, g

W3=weight of crucible + ash, g

*The Relative Percent Difference (RPD) shall be within ±5%

%RPD = $\frac{(A-B)}{(A+B)/2}$ x100

Where, A = First replicate

B = Second replicate

Table 3.7 Analysis of cashew leaves powder before and after extraction

	Protein	Nitrogen	Fat	Crude Fiber	Moisture	Ash
Before Extraction	7.765	1.240	1.3807	33.5231	7.1626	2.4122
After extraction	9.235	1.475	0.0890	46.2616	9.1975	2.9348

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