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Research Article

Phytochemical Properties of Mechanically Expelled Pretreated Balanites Seed Oil and Cake

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Abstract

The study investigated the phytochemical constituents of pretreated seed oil of *Balanites aegyptiaca* oil and cake to understand its bioactivity, bio-pesticide, feeds and therapeutic potentials. Phytochemical analysis showed the presence of phenol, flavonoids, tannins, saponin, and alkaloids in pretreated seed oil and cake which was extracted using mechanized centrifugal expelling rotor at 100rpm speed. The common bioactive constituents; alkaloids, saponin, flavonoids, tannins and phenols were present in all the samples. The raw balanites seed powder had alkaloid (29.0)%, saponin (30.0)%, flavonoid (2.03)%, Tannin (0.069)% and phenol (108.05)%. The roasted seed oil sample contained (0.56)% alkaloid, (1.04)% saponin, (6.40)% flavonoids, (0.58)% tannins and (8.60)% phenols. Boiled seed oil sample had alkaloid (0.40)%, saponin (1.16)%, flavonoid (7.20)%, Tannin (0.42)% and phenol (8.80)%. The five minutes heated oil sample had alkaloid (0.42)%, saponin (0.42)%, flavonoid (7.60)%, Tannin (0.52)% and phenol (6.40)%, while the soaked seed oil had (0.56)% alkaloid, (1.08)% saponin, (7.20)% flavonoid, (0.76)% Tannin and (6.00)% phenols. The cake sample had (4.20)% alkaloid, (6.8)% saponin, (13.40)% flavonoid, (8.80)% tannin, and (10.40)% phenolic contents for boiled pretreatment while the soaked cake pretreated sample had (5.60)% alkaloid, (8.20)% saponnin, (12.40)% flavonoid, (9.60)% tannin and (1.60)% phenols. The roasting, boiling, five minutes oil heating and soaking Pretreatments of Balanites aegyptiaca seed oil and cake reduced the presences of alkaloids, saponins, and phenols but increased the presence of flavonoids and tannins. The use of these oils at unrefined level outside its anti-microbial potentials could still posse risk on nutrient absorption and utilization. However, the results suggest that the seed oils and cakes of Balanites aegyptiaca with these bio actives could be suitable for bio pesticide, therapeutic agents and feed as well as industrial oil applications.

Keywords: *Phytochemicals; Pretreatment; Balanites Aegyptiaca; Seed; Oil and Cake*

Introduction

Chemicals are universally present in all plants and can be classed as first metabolites which include proteins, amino acids, sugars, purines and pyrimidines of nucleic acids, chlorophylls amongst others while secondary metabolites as alkaloids, terpenoids and acetogenins to different types of phenols [1]. The qualitative and quantitative distribution of these metabolites differs from plant to plant and in plant parts [1]. Alkaloids found in low concentrations relative to the phenolic compounds are offset by their biological potency in vegetative tissue. Thus, the presence of phytotoxins in Balanites may limit its intensive utilization in diets for man or livestock (Annongu., *et al.* 2009). Besides this, alkaloids are found in higher concentration in storage tissues (roots, fruits and seeds) as compared to the green leaves [2]. Many of these alkaloids and glycosides are poisonous but still many are harmless and possess medicinal properties if used in small amount. Oil seeds are energy dense foods containing protein and carbohydrate. Phytochemicals are the major source of natural plant sterols in diets. Plant sterols have similar structure with cholesterol; hence reduce cholesterol absorption and the levels of total and low

density lipoprotein circulating in the blood [1,3]. Refining vegetable oils decreases the sterol level to (40%) averagely, depending on the oil and processing conditions employed, thereby decreasing their potential in lowering serum cholesterol [3]. The major sources of edible oils in Nigeria are few. Oil from plant sources are nutritionally secured, and maybe because of it poly unsaturated fatty acid constituents [4], they tend to be eaten crude because of their flavour or aroma that are natural unlike the refine oil. Cake from this oil press could also serve as protein and mineral supplement for ruminant and non-ruminant animals feed formulation (Annongu., *et al.* 2009). Cake from seed oil source has been used extensively in making feeds. Although, some bioactive may be completely harmful to both man and farm animals, some are specie specific as observed in the case of tannins and they have also been demonstrated to possess anti-nutritional effects due to their ability to reduce palatability and digestibility of food stuffs (Annongu., *et al*. 2009). The research work seeks to ascertain presence of bio- actives at various pretreatment of the seed oil, cakes and advocates its safety level for human and feed use.

Material and Methods

Fruits of Balanites aegyptiaca were collected from the villages around Gashua town and its suburbs; Nguru, Gari alkali, karasuma, Jajimaji, and usufari in zone C senatorial district of Yobe states. The fruits collected from all these locations were cracked and the succulent mesocarp picked before pretreatments.

Methodology

Oil and cake from balanites seed were extracted following the figure one flow diagrams of unit processing diagram below.

Phytochemical screening for both the raw balanites seed and the pretreated samples extracted *Balanites aegyptiaca* were carried out according to the methods of Harborne and Sofowora [5], Harborne [6], Obadoni., *et al* (2001), Trease and Evans [7].

Alkaloids [8]

0.5g extracts from fruits and leaves of Lubeg species was diluted with 10ml of acid alcohol, boiled and filtered. To 5 ml of the filtrate was added 2 ml of dilute ammonia, 5 ml of chloroform was added and shaken gently to extract the alkaloid base. The chloroform layer was extracted with 10 ml of acetic acid. This was divided into two parts each of the fruit and the leaves. Mayer's reagent was added to one portion of the fruit extract and the leaves extract and Draggendoff's reagent was added to other portion of extract. The formation of cream (with Mayer's reagent) or reddish brown precipitate (with Draggendoff's reagent) Then quantitively estimated.

Saponins [9]

To 0.5g of extract was added 5 ml of distilled water in a test tube. The solution was shaken vigorously and observed for a stable persistent froth. The frothing was mixed with 3 drops of olive oil and is shaken vigorously. An appearance of creamy mass of small bubbles indicated the presence of saponins.

Tannins [10]

0.5g of the extracts (fruits and leaves) were boiled separately in 10ml of water in a test tube and then filtered. A few drops of 0.1% ferric chloride were added and were observed. The appearance of brownish green or a blue-black colouration indicates the presence of tannins.

Flavanoids [11]

Add few fragments of magnesium ribbon to the test solution and add Hydrochloric acid, pink scarlet, crimson red or occasionally green to blue colour appears after few minutes.

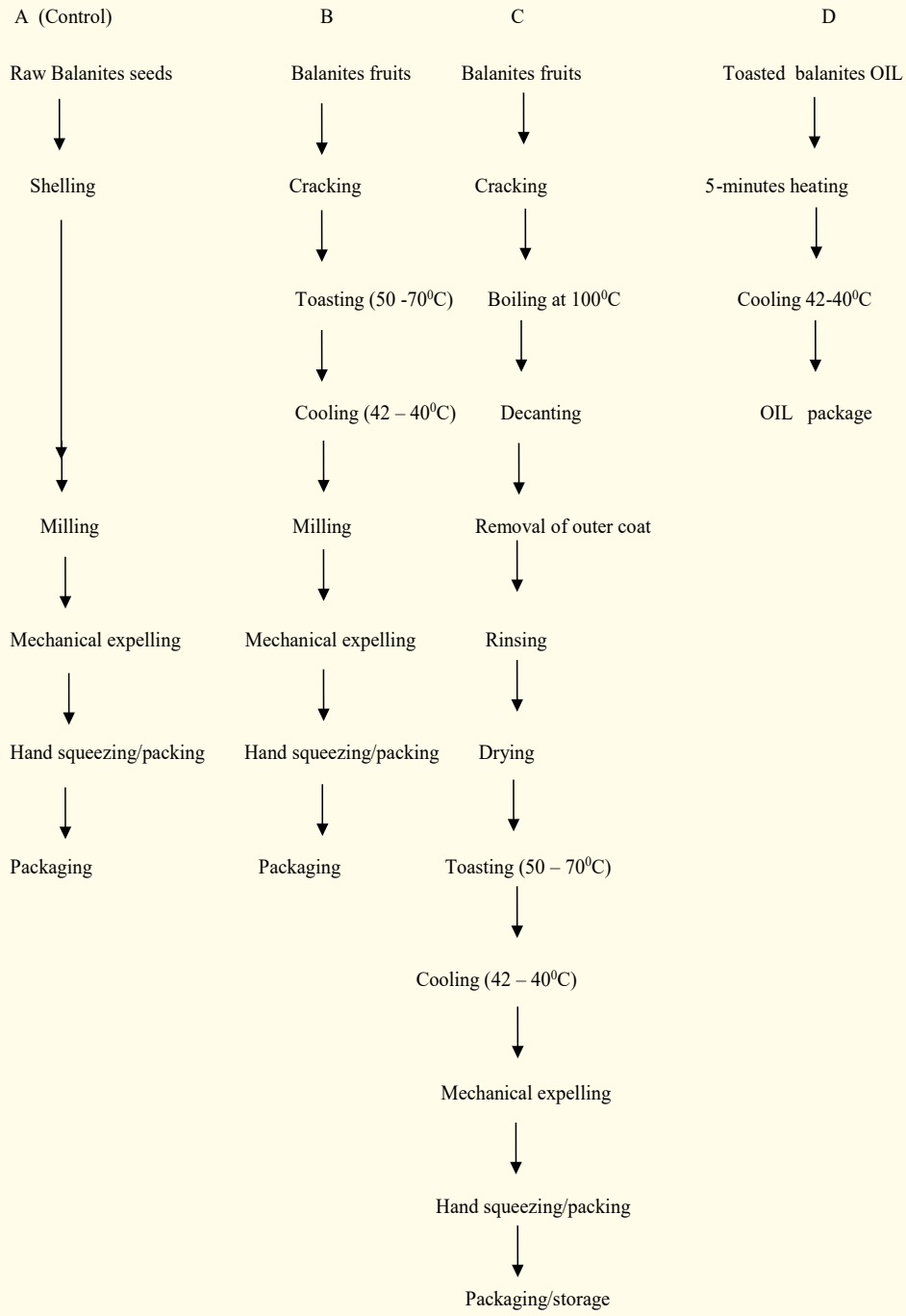

Figure 1: *Flow diagram of Balanites aegyptiaca various pretreatment approach for oil an cake.*

Results and Discussion

The bio actives such as alkaloids as anti-microbial agent, saponin for its bitter saturations, flavonoid as bioactive for anti-oxidant properties, Tannin as good anti- nutritional factor in food systems and phenol as conjugate bioactives.

Sample A (0.56)% have high alkaloid , this was followed by sample D (0.50) % alkaloid. B (0.42)% and C (0.42)% were observed. These variations maybe due to the varied processing treatments employed. Alkaloid is recognized for its microbial activities. Sample A have more better anti-microbial activity, this is followed by sample C.

Saponin is characterizes by coagulating, precipitating and bitterness in fluidly systems. Okwu [12] and Okwu [13] attributes saponin property to emulsifiers and inhibitory to sodium and calcium ions. Bitter compound are attributed to various chemical properties in food systems. This result showed that sample C, A and D would be bitter however less than the raw(control) balanites sample .

The anti-oxidant property revealed in flavonoid percentage content shows that sample C, D and B are better anti-oxidant substances than the raw control. But the (6.45)% flavonoid value is higher than the control sample.

The tannin constituent of these oil treatment reveals that sample D, C and A have high anti-nutritional tendency than the raw or control sample. These values are much higher than those reported for papaya, apple, water melon, guava, orange, prickly pear, apricot and paprika which are in the range of (0.24 – 10.60 $mg100g^{-1}$) [14]. This further revealed that tannin migration would have taken place during the process treatment however higher in sample D. This could bind nutraceutical during digestion; causes food system pigmentation [15] hence requires its minimal presence.

Phenolic is a conjugate bioactive that varies depending on expose condition in food, either in a vivo or invitro systems. Sample A, and B have high phenolic material lower than the control sample (108.05)%. Sample C and reveals value of (6.40)% and (6.00)% phenolic composition in the oil produced respectively . This reveals that process treatment affect negatively phenolic content in balanites oils hence reduced antimicrobial agents and inhibitive to growth of pathogens [12]. Flavonoids are antioxidants with anti-inflammatory activity [13].

Sample	Alkaloid (%)	Saponin (%)	Flavonoid (%)	Tannin (%)	Phenol (%)
A1(RBP)	29.0	30.0	2.03	0.069	108.05
A	0.56	1.04	6.40	0.58	8.60
B	0.40	1.16	7.20	0.42	8.80
C	0.42	0.42	7.60	0.52	6.40
D	0.50	1.08	7.20	0.76	6.00

Table 1: *Phytochemical (quantitative) analysis of Balanites Seed oil.*

Results are mean from duplicate sample

Key:

A1 = Raw Balanites seed powder sample

A= Roasted balanites seed oil sample

B= Boiled balanites seed oil sample

C= five minutes heated oil sample

D= Soaked balanites see oil sample

Table two shows bio-actives in cake from boiled and soaked balanites seed oil. Cake alkaloid from boiled (4.20) %, soaked (5.60)% pretreated samples shows reduce value content revealing reduce anti-microbial potency for feed use. The saponin content in the two cakes

samples showed a drastic reduction in saponin values. This revealed that in feed formulation, bitter associate compound from balanites may be reduce especially in boiled treated cake seeds. Cake from boiled and soaked balanites seed oils will not cause haemolytic problem, precipitating and coagulation of red blood cells in animal when use as feed ration.

The flavonoid value were high for boiled (12.40)% and soaked (12.40)% samples compare with the raw or control sample. This confers that cake from balanites seed oil will be natural anti-oxidants and also keep product feed longer. Phenolic values were low for boiled (10.40) % and soaked (10.6)%. The ability of these cakes to inhibits microbial growths or activities are reduce however, may have traceable microbial and toxicological inhibition on feed or animals [16,17].

Sample	Alkaloid (%)	Saponin (%)	Flavonoid (%)	Tannin (%)	Phenol (%)
A1 (RBP)	29.0	30.0	2.03	0.069	108.05
A Cake	4.20	6.80	13.40	8.80	10.40
B Cake	5.60	8.20	12.40	9.60	10.60

Table 2: *Phytochemical (quantitative) analysis of Balanites Seed Cake.*

Results are mean from duplicate sample.

Key

A1= Raw Balanites seed powder sample

A= Boiled balanites seed cake sample

B= Soaked balanites seed cake sample

Conclusion

Pretreatments through boiling, roasting, five minutes heating, soaking of balanites have high values phytochemical turns quantitatively on alkaloid, saponin and phenol contents but also a biochemical turn on flavonoid, and tannin. The oil seed from balanites seed will have anti-oxidant properties hence could keep longer but will be bitter or scratching throat test. The cake could be use and safe for animal feed formulation and an excellent anti-oxidant substance to keep additives in feed stable.

Bibliography

1. Emmanuel CO., *et al*. "Phytochemical Constituents of Seeds of Ripe and Unripe Blighia Sapida (K. Koenig) and Physicochemical Properties of the Seed Oil". *International Journal of Pharmaceutical Science Invention* 3.9 (2014): 31-40.

2. Walton JN and Brown DE. "Chemical from plants, perspectives on plant secondary products". Imperial College Press London UK (1998): 2-5.

3. Goldberg G. "Plants: Diet and Health. The Report of the British Nutrition Foundation Task Force". *Blackwell, Oxford* (2003).

4. Ong ASH., *et al*. "Developments in Palm Oil". In Developments in Oils and Fats (R.J. Hamilton, editors). Blackie Academic and Professional, Glasgow (1995): 153-191.

5. Sofowara A. "Medicinal plants and tropical medicine in Africa" (1993): 289.

6. Harborne A J. "Phytochemical methods a guide to modern techniques of plant analysis". *Springer Science and Business Media* (1998).

7. Trease G E and Evans WC. "Pharmacognosy". Baillere Tindall, London (12th ed) (1983): 475-476.

8. Phytochemicals.

9. Phytochemicals.

10. Phytochemicals.

11. Phytochemicals.

12. Okwu DE. "Phytochemicals and vitamin content of indigenous species of South Eastern Nigeria". *Journal of Sustain Agriculture Environment* 6 (2004): 30-34.

13. Okwu DE. "Phytochemicals, vitamins and mineral contents of two Nigerian medicinal plants". *International Journal of Molecular Medicinal and Advanced Science* 1.4 (2005): 375-381.

14. Samia FE., *et al*. "Chemical and nutritional evaluation of different seed flour as novel sources of protein". *World Journal of Dairy and Food Sciences* 7.1 (2012): 59-65.

15. Farquar JN. "Plant Sterols, their biological effects in human". Hand book of Lipids in Nutrition (BOCA Rotan HL CRC Press) (1996): 101-105.

16. Eleazu CO., *et al*. "Total Antioxidant Capacity, Nutritional Composition and Inhibitory Activity of Unripe Plantain (Musa paradisiacae) on Oxidative Stress in Alloxan Induced Diabetic Rabbits". *Pakistan Journal of Nutrition* 9.11 (2010): 1052-1057.

17. Odebiyi OO and Sofowora EA. "Phytochemical screening of Nigerian Medicinal plants (2nd OAU/STRC Inter-African Symposium on traditional Phamacopoeia and African Medicine (1979): 216-220.

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