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Sensory Characteristics of Ready to Drink Juice and Yoghurt Analogue Made from *Balanites Aeqyptiaca* Fruits Pulp Products

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ABSTRACT

Studies on organoleptic quality of drink, yoghurt from *balanites aeqyptiaca* fruits pulp at various pretreatment of cold mashing, Ten minutes of fruit pulp boiling sixty minutes of fruits pulp boiling using sixty trained panelist from both academic and non-academic staff of the faculty. These treatments investigated were given the following dilution rations of (80:20) %, (70:30) % and (50.50) %, respectively for blends. Results showed that panelist preferred balanites juice made from 60 min of boiling for pulp drink for taste, appearance, flavour and general acceptability these were significantly at (0.5)% level. Similarly, yoghurt blends from 60 min pulp boiling at (50:50)% ration blends were significantly different at 0.5% levels of significance for taste , appearance, flavour and general acceptability however most preferred analogue yoghurt than the other ration blends.

Key words: Sensory characteristic, Balanites fruit, Ration blend, Treatments, Drink and yoghurt.

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INTRODUCTION

There has been significant use of plants, for food and as animal protein substitutes. This is arousing interest among consumers, dieticians and nutritionists. Plant is now being used in the preparation of food of high energy value by dietetics: "yoghurt, flour for babies jams, marmalades. It has been reported that dates products have been developed including Ketchup (Mikki et al., 1987), biscuits (Siboukeur, 1997), ice (Greiner, 1998), Tamarheep (a mixture of flour of dates and milk) (El Nakhal et al., 1987), Fresh fermented dairy products such as yoghurt are widely consumed foods in many countries (Hayat and Salem, 2011). Yogurt is one of the most dairy products sold on the market because of the diversification of it constitution, such as fat yoghurt, probiotic yoghurt, yoghurt mousse, ice cream yoghurt, liquid yoghurt for drinking (Fiszman et al., 1999*)* yoghurts are healthy food because of its beneficial live bacterias. However in competition with pathogenic bacteria in both food and the environment (Tamime and Robinson, 1985).

The extract of balanites such as its pulp, leaves, juice had been reported to be rich in micro and macro nutrients especially proteins and vitamins (Okia et al., 2013). According to Hayat and Salem (2011) reported that dates are rich in fibre and pectin, minerals such as (Ca, P, K and Fe) and other biological active substances like Group B vitamins, essential amino acids and polyphenols. Formulation of drink and yoghurt analogue from balanites pulps drink, these products will be a functional food base material that may meets consumers' expectations in the modern day of infection, diseases and age related issues due to its high polyphenols contents Okia et al. (2013) and (Hayat and Salem 2011). Reports on the nutritional and anti-nutritional profile of *Balanites aegyptiaca* seed powder had shown that the seed powder contains high amount of

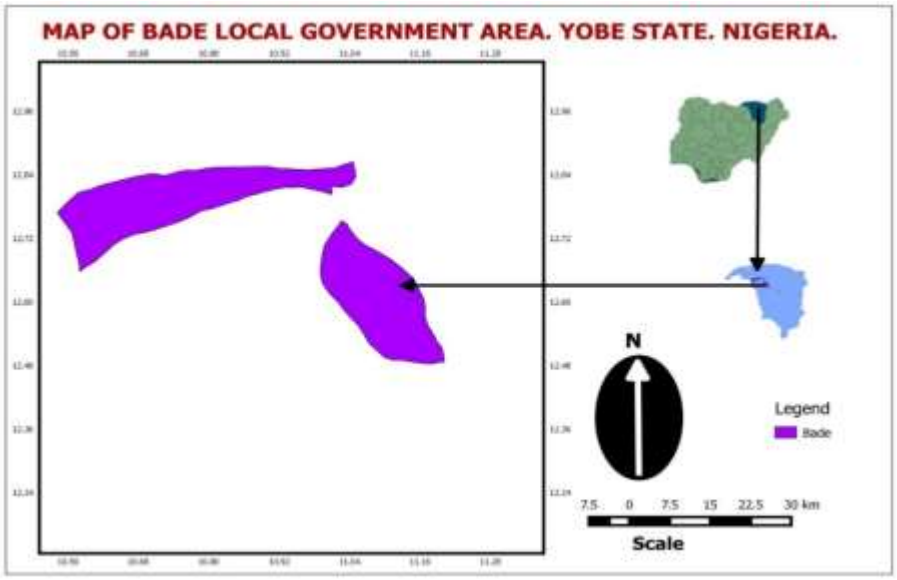

Figure 1. Bade mapped area.

protein and lipid. Balanites leaves, flowers, fruits and oil have been utilized for many generations by both rural and urban communities across dry land Africa (Hall and Walker, 1991). These products are also sold in both rural and urban markets in West Nile sub-regions of Uganda (Katende et al., 1999).

The balanites seed contains high level of anti-nutritional factors such as tannins, oxalate and phytic acid (Chothani and Vaghasiya, 2011). Tannins are secondary plant metabolites that are rich in phenolic hydroxyl groups and have been implicated in the inhibition of non-heme iron absorption, by complexion with iron in the gastro intestinal lumen (Brune et al., 1989). Tannins are also known to inhibit oxidation of alkaloids and morphine and form colored complexes with iron, thus reducing the bio-availability of important mineral (Brune et al., 1989). Pretreatment of balanites fruits into pulp drink and yoghurt could reduce these anti-nutritional factors to allow their utilization in human and animal gut as well as its sensorial acceptability, thus providing income and a source of livelihood to many rural households, as well as providing nutritional information that could widen the food diversification and choice for populations inhabiting the Sahel and other dry land regions of the North.

MATERIALS AND METHODS

Study Area

This study was conducted in the north eastern region between (latitude 023NE and Long 50NN). Where the tree plant abounds specifically Gashua in the districts of Bade local government environment (Figure 1).

Sample Collection

Balanites fruits samples were collected during the dry season when there are accessibility and availability. Fruit samples were collected from all the sub-regions in Bade local government areas and transported to the food and nutrition laboratory of the Home Science Department, Federal University Gashua

Sample Preparation

Collected fruits samples were broken for their mesocarps. About 1 gram of the fruit epicarps were removed by hand and the mesocarp separated in cold water using blender (Siaso 32034 made in Japan) for extraction The second sample of I gram was by boiling for (sixty) minutes in stainless steel pot and this sample of 1 gramm was by boiling for ten minutes, using heating mantle in a stainless steel pots. Each mash was sifted (60 uf) and diluted with equal 50 ml water ration respectively, for drink make. Figure 2 depicts each sample were refrigerate and ready for serving. The yoghurt sample were prepare from each drink treatment. Here a prepare culture stock from local cow milk called nunu was made into sub culture. This subculture was diluted with a warm balanites drink in a ratio of 50 to 20%. 70 to 30% and 50 to 50%. These were covered to ferment overnight in a bowl after stirring. Fermented aromatic yoghurt flavors were obtained; these were refrigerated cold and then served (Figures 3 and 4).

Data Analysis

The coded samples were given to twenty trained panelist which were academic and non-academic staff of the

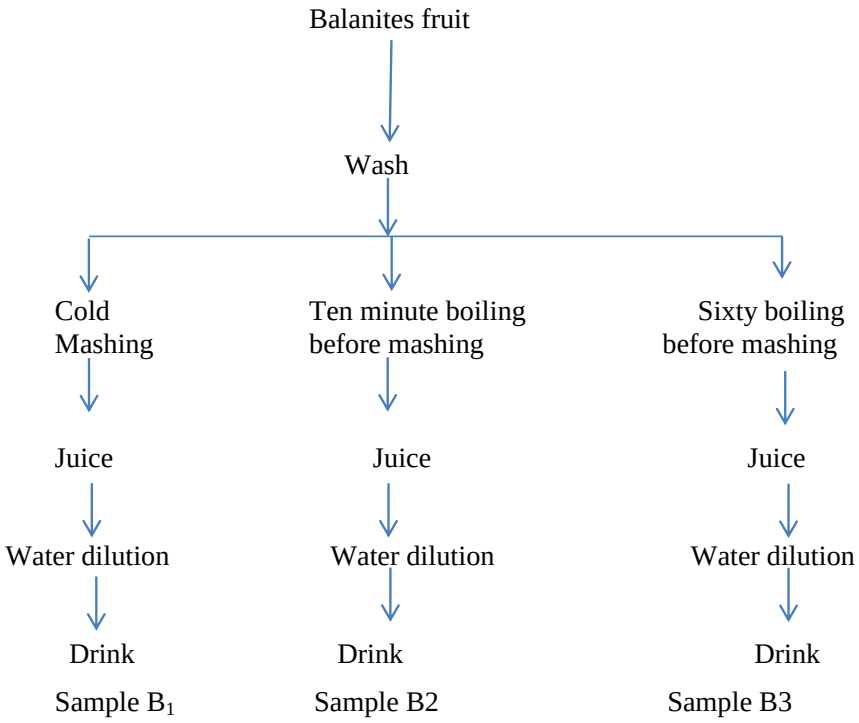

Figure 2. Flow diagram for making balanites pulp drink and yoghurt analogue.

Faculty of Agriculture Federal University Gashua, Yobe State using five point hedonic scale questionnaire of five sensorial characteristics. A one-way analysis of variance (ANOVA) in SPSS Version 21 was used for the data analysis.

RESULT AND DISCUSSION

Sensory evaluation on balanites drink for characteristic taste, appearance, flavour and general acceptability of pretreated balanites pulp drink were studied. Table 1 show that one hour boiled pulp drink B1 had better taste than sample B2 and B3. The taste, appearance, flavour and general acceptability of sample B1 shows significance characteristic difference than B1and B2 samples at 0.5% level of significance, however less compare with the control sample A. This characteristic quality of B1 sample might be due to time of boiling during pulp treatment. Table 2 shows zero minutes boiled pulp analogue yoghurt at varied dilutions. Sample B3, B2 and B1 shows significant difference for characteristic taste at 0.5%. Sample B1 and B2 showed no significantly difference for appearance. Sample B1 and B2 shows significant difference for appearance but sample A and B3 were not significantly different for mouthful characteristic qualities. Odour characteristics reveal that sample B3 and A are not significantly different from sample B1 and B2.

The flavour quality characteristic revealed that sample A is significantly preferred to the rest sample, however sample B3 for taste revealed for better flavour than the rest samples. The general acceptability shows that sample A is significantly different from sample B1, B2 and B3 for acceptability characteristics, respectively at 0.5% level. Sample B3 revealed that it has better characteristic taste, appearance and mouthful as well as odour which were significantly differently better than sample B2 and B1. This observation may have revealed masking ability of the drink and fermentation potential of the pulp drink which might have converted its bioactive to active ingredients. Table 3 shows ten minutes boiled pulp analogue yoghurt. The result in samples A showed significant difference from other samples but sample B2 and B3 are not significantly different. The observation might be due to close effects of heating and dilution ratios which might have altered tannin content. Sample B1 and B2 were not significantly different from sample A and B2. This might have come from heating effects experienced. The mouthful sensory characteristic of sample A is significantly different from B1 B2 and B3 mouthful, respectively at 0.5% level. There were no significant difference among the treated sample B1 and B2. Sample A shows significant difference in sample B1, B2 and B3. This difference may be due to varied concentration of bioactive despites pretreatment approaches. The general acceptability reveals that B1 and B2 had no significant differences from the sample B3 and

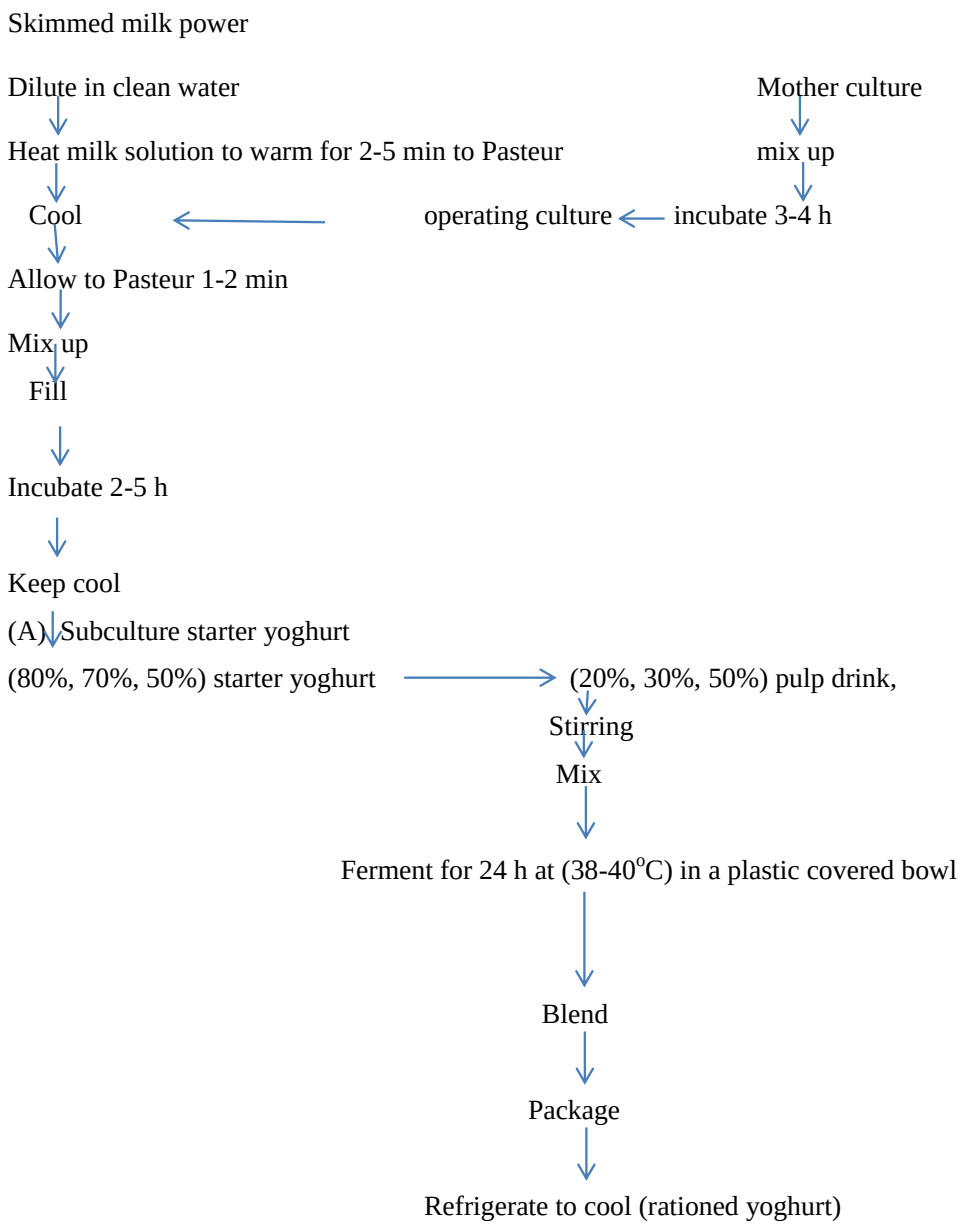

Figure 3. Yoghurt making/ analogue ration yoghurt.

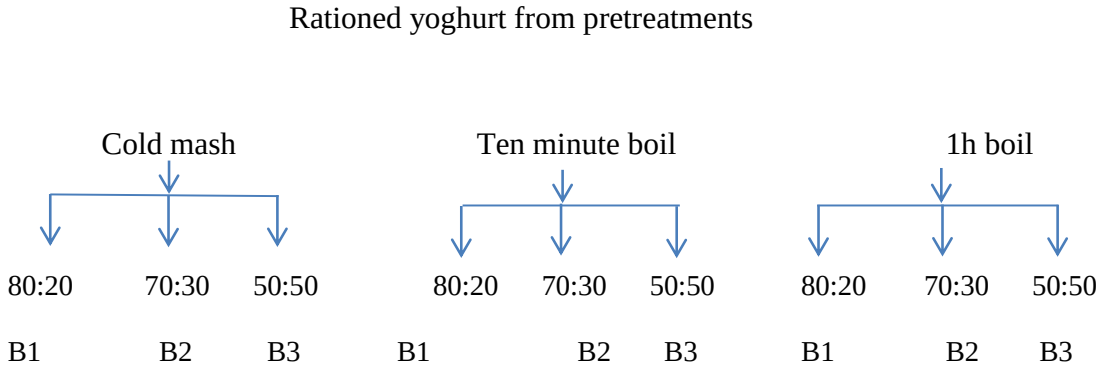

Figure 4. Rationed pulp analogue yoghurt from cold, ten and sixty minutes treatments.

Table 1. Sensory result of balanites drink samples.

Samples	Taste	Appearance	Flavour	General Acceptability
Control A	4.54 ±0.00^{a}	4.44±0.00^{a}	4.38±0.00^{a}	4.56±0.00^{a}
Sample B1	2.87±0.275^{b}	2.95±0.751^{b}	2.04±0.841^{b}	2.72±0.833^{b}
Sample B2	2.62±0.913^{d}	2.87±0.751^{c}	2.59±0.841^{c}	2.67±0.833^{d}
Sample B3	2.64±0.275^{c}	2.79±0.52^{d}	2.49±0.700^{d}	2.56±0.672^{c}

Column Values with the same subscripts are not significantly different. Keys. Sample A: Black current rink Sample $B_{1:}$ One hour boiled pulp drink. Sample $B_{2:}$ Ten minutes boiled pulp drink and Sample $B_{3:}$ Cold pulp drink.

Table 2. Sensory result on col mashed pulp analogue yoghurt.

Samples	Taste	Appearance	Mouthful	Odour	Flavour	General Acceptability
Control A	4.10 ±0.00^{a}	4.31±0.005^{a}	3.94±0.01^{a}	3.93±0.00^{a}	3.93±0.00^{a}	4.00±0.00^{a}
Sample B1	2.34± 0.42^{d}	3.28±0.00^{c}	2.97±0.16^{b}	3.03±0.90^{b}	2.52±0.523^{d}	2.72±0.716^{d}
Sample B2	2.55±0.42^{c}	3.28±0.00^{c}	2.76±0.16^{c}	3.03±0.90^{b}	2.69±0.52^{c}	2.83±0.716^{c}
Sample B3	3.07±0.04^{b}	3.86±0.085^{b}	3.24±0.503^{a}	3.52±0.16^{a}	4.17±0.006^{b}	3.38±0.03^{b}

Column Values with the same subscripts are not significantly different. **Keys.** Sample A 100% normal yoghurt. Sample B_{3}: 50 Normal yoghurt: 50(zero min) boiled pulp drink. Sample $B_{2:}$30 Normal: 70 (zero minute) boiled pulp drink and Sample $B_{1:}$20 Normal: 80 (zero minute) Cold pulp drink.

Table 3. Sensory result on ten minutes boiled pulp analogue yoghurt.

Samples	Taste	Appearance	Mouthful	Odour	Flavour	General Acceptability
Control A	4.41 ±0.00^{a}	4.69±0.00^{a}	34.14±0.00^{a}	4.31±0.00^{a}	4.10±0.00^{a}	4.59±0.00^{a}
Sample B1	2.55± 0.00^{c}	3.21±0.57^{c}	2.97±0.328^{c}	2.59±0.70^{c}	2.48±0.561^{d}	3.17±0.82^{c}
Sample B2	2.79±0.00^{b}	3.03±0.206^{c}	2.76±0.113^{c}	2.55±0.29^{c}	2.66±0.561^{c}	3.17±0.82^{c}
Sample B3	3.24±0.00^{b}	3.86±0.206^{b}	3.24±0.113^{b}	2.86±0.20^{b}	2.86±0.20^{b}	3.38±0.03^{b}

Column Values with the same subscripts are not significantly different. Keys Sample A: 100% normal yoghurt. Sample B_{3}: 50 Normal yoghurt: 50 (Ten minutes) boiled pulp drink. Sample $B_{2:}$ 30 Normal: 70 (Ten min) boiled pulp drink. Sample $B_{1:}$ 20 Normal: 80 (Ten minutes) pulp drink.

Table 4. Sensory result on sixty minutes boiled pulp analogue yoghurt.

Samples	Taste	Appearance	Mouthful	Odour	Flavour	General Acceptability
Control A	4.41 ±0.12^{a}	4.69±0.10^{a}	4.14±0.18^{a}	4.31±0.18^{a}	4.10±0.74^{a}	4.59±0.11^{a}
Sample B1	2.55± 0.22^{d}	3.21±0.22^{c}	2.97±0.22^{b}	2.59±0.24^{b}	2.48±0.24^{d}	3.10±0.25^{b}
Sample B2	2.79±0.20^{c}	3.03±0.19^{c}	2.69±0.23^{c}	2.55±0.21^{b}	2.66±0.20^{c}	3.17±0.217^{c}
Sample B3	3.24±0.15^{b}	3.34±0.16^{b}	3.14±0.16^{a}	3.21±0.21^{a}	2.86±0.22^{b}	2.97±0.24^{d}

KEY. Sample A 100% normal yoghurt. Sample B_{3}: 50 Normal yoghurt: 50 (sixty minutes) boiled pulp drink. Sample $B_{2:}$ 30 Normal: 70 (sixty min boiled) pulp drink and Sample $B_{1:}$ 20 Normal: 80 (sixty minutes) pulp drink.

the rest samples. The result reveals that fermentation of ratio dilution influences quality and acceptability of balanites yoghurt. Table 4 show results on 60 min boiled pulp analogue yoghurt. Sample A is significantly different from sample B1, B2 but not significantly different with B3 for taste. Similarly there exists no significant difference among sample B1and B2, hence sample B3 preferred.

The appearance of the yoghurt samples A and B3 were not significantly different except for B1, B2 samples. Sample B1 and B2 for appearance reveals that there exists no significance difference among them. Panelist also shows similar trend for mouthful sensorial characteristics at 0.5% level of significance. There exist no significance difference for sample A and B3, while significance difference exists at 0.5% level between samples. However sample B3 is preferred by panelist to B1 and B2 samples for all sensorial characters. The odour hedonic panelist result reveals that there exist no significance difference among samples A, B1, B2 and B3 at 0.5% levels for all sensorial characters. The flavour characteristics reveal that there exists significance difference for sample A with B1, B2 and B3, respectively. There also exist no

significance difference at 0.5% level for general acceptability between control samples A as well as with B1, B2 and B3. It is observed that B3 sample were prefer to the rest samples for taste, appearance, mouthful, and flavour characteristics

CONCLUSION

The sensory characteristics of juice and yoghurt analogue made from *Balanites aeqyptiaca* pulp by heating pulp at 60 min is preferred to pulp from cold mashing and ten min heating. Yoghurt products also ascertain that 50:50% ration blend of yoghurt stock and pulp drink yoghurt made were preferred by panelist compare with the (80:20) %, (70:30) % ration yoghurt blends.

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APPENDIX

Plate 1. Balanites pulp drinks.

Plate 2. Yoghurt analogues made from balanites pulp drink at various treatments.