

PRODUCTION AND ASSESSMENT OF QUALITY ATTRIBUTES OF ZOBO DRINK ENRICHED WITH DATE AND MANGO FOR FAMILY SUSTAINABILITY IN RETIREMENT

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Abstract

The study assessed the quality attribute of Zobo drink enriched with Date and Mango. Four (4) research questions were raised and one (1) hypothesis formulated and tested @ 0.05 level of significance. Research and Development Design (R& D) was adopted. Judges were presented with four possible formulations of Zobo drink enrich with Date and Mango-ZO=100% Zobo Only, ZD=50% Zobo+ 50% Date, ZM=50% Zobo+ 50% Mango, ZDM=40% Zobo, + 30% Date + 30% Mango. Sensory Evaluation was judged using 7 point hedonic scale. Nutrient contents of the products were calculated to determine the proximate analysis. The result shows that the sample **ZD**=Zobo and Date was the most preferred in colour, taste and overall acceptability 6.35(±.62).. Findings of nutritional value revealed that Sample **ZO**=Zobo only has the highest protein (2.14%) and moisture content (92.55%) **ZDM**=Zobo, Date and Mango has the highest fibre, carbohydrate and ash content (1.30%). Findings of hypothesis revealed a significant difference in level of acceptability of Zobo drink enriched with Date and Mango in varying proportion (P<0.05). The study concludes that Zobo drink enriched with Date and Mango is suitable for consumption and therefore recommends that the drink should be encouraged as it increases opportunities for both young and old people to drink healthy vitality drink instead of the carbonated drinks. Retiree could start production of Zobo drink enriched with Date and Mango on a large scale for sale to increase their financial stability.

Keywords: Zobo Drink, Date, Mango, Family Sustainability, Retirement

Introduction

According to Garba and Usman (2014) retirement is a stage in life where one go out of work entirely. A lot of retirees in Nigeria suffer and died due to delay or non-payment of their hard earned money (Oniye, 2001; Ajeka, George, & Okechuku, 2014). For Retirees to avoid problems that come with retirement such as sicknesses, depression, worry, sudden death, they need to plan ahead for what to do after retirement. (Garba and Usman, 2014).

According to Mohammed (2013) sustainable development is a fiscal development pattern where supplies are utilized to meet human population needs while preserving the environs simultaneously. Using resources to meet current and future human needs is

sustainable development (Royal academy of science international trust, 2020) Sustainability is the technique of living in the confines of accessible source of supply in a way that allow individuals to prosper. (Sustain SU, 2016; United Nations General Assembly, 2005). Sustainable family development involves using human, social, economic, and environmental pillars of sustainability through family projects (Johnston, 2003).

Sustainable development specialists advise moving slowly to reach the final destination that allows others to meet their needs in preparation for retirement (Ukaga, 2010). To this effect, this paper assessed production of Zobo drink enriched with Date and Mango which can be marketed after

retirement to bring in extra income for sustainable family development

Drink is liquid intended for human intake, drink such as water, tea, soft drinks, tiger nuts drink, milk, juice, coffee, and Zobo satisfy thirst and is very important in human lives. Steps in drink production includes; purification of water, pasteurization, juicing, infusion, percolation, carbonation, fermentation, distillation, mixing (Benjamin, 2001).

Zobo drink is prepared using plant (roselle) flower (*Hibiscus sabdariffa*) which contains seed, stem, leaves and calyces. Zobo drink is made by boiling and filtration (Ogiehor *et al.*, 2008; Kolawole and Okeniyi, 2007). Zobo is a reddish liquid drink that has a sour taste. It is called Roselle in Australia and Wonjo in Gambia. (Chau, Jin, Wea, Chia, Fen, Tsui, 2000). In Nigeria, it is called Isapa in Yoruba, Zobo in Hausa and Aukan in Igb (Mohammed and Ismail, 2014). Zobo drink contains, antioxidants, vitamin C, calcium, magnesium, zinc, protein and natural carbohydrate. Zobo drink is, medicinal, has low glycemic index and is non-alcoholic (Obboh, Obahiagbon, Osagie, and Omotosho, 2011).

Date palm is of genus of phoenix and family of *Arecaceae*. The fruit produced is known as Dates. Dates also called Dabino in Nigeria is customarily used by the Muslims to break their fast. (Belewu, *et.al*, 2014). The nutritional quality of Dates is well documented in literature. Contains energy, protein, fiber, vitamins, minerals and regulate digestive process.

Mango is an economically essential fruit in the *Anacardiaceae* family, it is of the species *Mangifera indica* L, *Mangifera indica* (Seifu, 2010 and Bally, 2006). World production of Mangoes is estimated to be over 26 million tons per annum. Mango producing countries include Nigeria, China, Thailand, Mexico, Pakistan, Indonesia, and Philippines (FAO, 2002). Color of mango could be yellow or orange with smooth to fibrous texture (Bally, 2006 and Morton, 1987). Hausas in Nigeria call it 'Mangoro' (FAO, 2002) Tivs refers to it as mingo. There are diverse varieties of Mango in Nigeria which varies in colour, taste, flesh, flavour, Mango contains provitamin A, carotenoids, vitamin C, dietary fibre and phenolics which are crucial to human nutrition and health. (Lemmens *et al.*, 2013, Pott *et al.*, 2003, Rincon and Kerr, 2010). Mango similarly contains carbohydrates, potassium,

calcium and iron and low in fat and calories. (Sogi *et al.*, 2012).

The researcher observed that Zobo drink are mostly supplemented with artificial flavours which contain some chemicals in order to enhance the taste, flavor, nutritional contents and general acceptability and this could be harmful to health of the consumer. According Adeniji (2017) soybean which has high nutritional value and isoflavone was used to enrich Zobo drink to improve its nutritional value was widely accepted. Fasoyiro *et al.* (2015) also enriched Roselle extract (Zobo drink) with pineapple, orange and apple to enhance the shelf life of the drink and were more acceptable among the populace. Date and Mango are good sources of nutrient that could be used as supplements in Zobo drink; however, these two fruits have not been fully explored and applied as supplements in Zobo drink. Considering the nutritional content of both fruits, the calories value of Date is very high compared to the one in Zobo drink. Mango on the other hand, is rich in substantial amount of vitamins (especially B-carotene). Using Date which has high amount of calories value and Mango which is very rich in B-carotene as supplement to improve Zobo nutritional content, taste, flavor and general acceptability is worth trying. Hence, this study aims at assessing the quality attribute of Zobo drink enriched with Date and Mango to enhance its flavour, taste, nutritional content and to improve its general acceptability by consumer. The findings of this study should be advantageous to Home Economists, Zobo drink lovers, Zobo drink producers, retirees and general society. The findings will be beneficial to retirees as it will help them to be able to produce acceptable and nutritious Zobo drinks for sale to secure family future for family sustainability in retirement period

Objective: The main objective of this study is production and assessment of quality attributes of Zobo drink enriched with date and mango for family sustainability in retirement.

Research Questions

The following research questions were raised for the study:

- (1) What is the sensory quality of Zobo drink enriched with Date and Mango?
- (2) What is the acceptability level of Zobo drink enriched with Date and Mango?
- (3) What is the nutritional value of Zobo drink enriched with Date and Mango?

- (4) Is there any difference in the level of acceptability of Zobo drink enriched with Date and Mango in varying proportions?

Hypotheses

The following hypothesis was formulated for the study and tested at alpha 0.05 significance level.

H₀₁: There is no significant difference in the acceptability level of Zobo drink enriched with Date and Mango in varying proportion.

Materials and Methods

Design of the Study: Research and Development Design (R& D) was adopted for the study.

Sample Formulation: Four blends of Zobo drink enriched with Date and Mango were formulated according to the method described by Okpala and Okoli (2011). These are **ZO**=Zobo Only (100% Zobo) (Control), **ZD**=Zobo and Date(50% Zobo + 50% Date), **ZM**=Zobo and Mango(50% Zobo + 50% Mango) and **ZDM** = Zobo, Date and Mango(40% Zobo + 30% Date + 30% Mango). A digital weighing balance and a blender were used for weighing and mixing the drink respectively.

Sources of Raw Materials: The Zobo leaves, Date and Mango were bought at Oja-Oba market Ilorin west local government area, kwara, State.

Production of Product: Zobo drink sample was prepared using the method of Ogundapo *et al* (2014). Dirt was removed from the dry calyces of *Hibiscus sabdariffa* (HS). Sixty grams (60 g) of the dry *Hibiscus sabdariffa* (HS) calyces were washed with cold water and added to two litres of boiling distilled water. It was boiled for 15 minutes and cooled, the mixture was then sieved with muslin cloth.

Making of Date Juice: Ingredients:-40 pieces Dates, ½ liters of water for soaking Dates.

Procedures: i) The Date was placed in a small bowl. ii) Cover with warm water and leave for 30 minutes iii) When the Dates have soaked, the water was drained and the Dates were blended till it becomes smooth.

Production of Mango Juice: Ingredient:-20 pieces large Mangoes

Procedures: i) The Mangoes were washed to remove dirt. ii) The Mangoes were peeled and the pulps cut into pieces. iii) The pulps were blended till it becomes smooth and the blended mixture were run through a muslin cloth

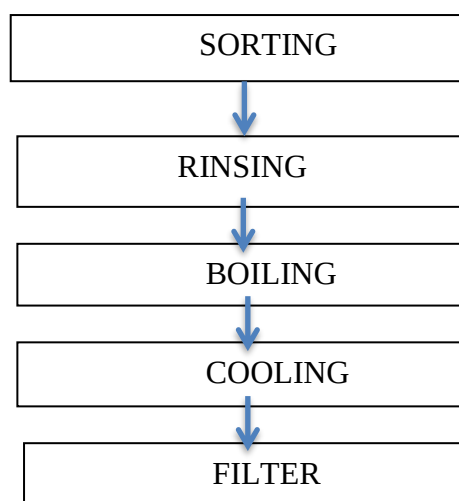


Figure 1: Flow Chart for Production of Zobo Drink

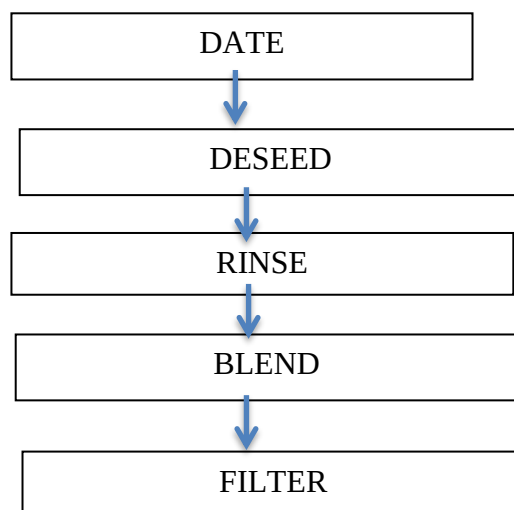


Figure 2: Flow Chart for Production of Date Juice

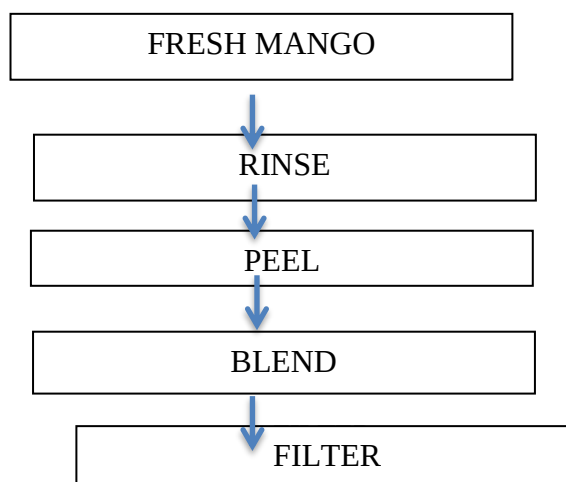


Figure 3: Flow Chart for Production of Mango Juice

Production of Zobo-Date and Zobo-Mango Drinks

Materials used; pot, muslin cloth, stirrer, bowl, mortar and pestle, blender, measuring cups.

Ingredient: 4 cups Zobo leaves, 3 liters of water, 40 pieces of Date, 20 pieces of Mangoes

Procedures: i) The Dates seed were removed ii) Date was blended till it becomes smooth. iii)The product was passed through a muslin cloth to be filtered and left aside in a bowl. iv)The Mangoes were washed to remove dirt.v)The Mangos were peeled and cut into pieces. vi)The Mangoes was blended till it becomes smooth, and the juice was left aside in a bowl. vii)The

product was passed through a muslin cloth to be filtered and left aside in a bowl.

viii)The Zobo leaves were carefully sorted out to remove dirt and were rinsed with cold water.ix)The rinsed Zobo leaves was boiled with 2 ½ liters of water for 15minutes.xi)The boiled Zobo leaves was left aside to cool down a little and was passed through a muslin cloth to have a clear filtrate. xii)The clear Zobo filtrate was enriched with Date juice and Mango juice and the mixtures were added in different proportion with the use of measuring cups to get Zobo only, Zobo (60%) +Date (40%), Zobo (60%) +Mango (40%) and Zobo (40%) +Date (30%) +Mango (30%).

Sensory Evaluation: Testing Sessions was conducted at the Department of Home Economics

and Food Science, University of Ilorin. The judges comprise of 40 Home Economics students. Sensory Evaluation was judged on a 7 point hedonic scale ranging from “1” which indicate “Dislike” to “7” which indicates “Like” extremely using sensory evaluation score card to test color, aroma, taste and general acceptability.

Method of Data Analysis

The judges evaluated the samples using a 7-point hedonic scale. Where (7 points) was expressed as like extremely, (6 points) like moderately, (5 points) like slightly, (4 points) neither like nor dislike, (3 points) dislike slightly, (2 points) Dislike moderately, and dislike extremely (1 point). The nutrient content (Moisture, Protein, Ash, Fat, Crude fibre, and Carbohydrate) assessment was calculated with Association of Analytical Chemists (AOAC, 1990) method. Data collected was being analyzed using descriptive statistics such as percentages, frequencies, mean and standard deviation and inferential statistics. One-Way Analysis of Variance (ANOVA) was used to test for significant differences in the level of acceptability of Zobo drink enriched with natural fruit Date and Mango in varying proportions. Hypothesis was tested using Analysis of variance (ANOVA). All hypotheses was tested at a 0.05 level of significance.

Presentation of Results

The following research question was raised for the study:

- (1) What is the sensory quality of Zobo drink enriched with Date and Mango?
- (2) What is the acceptability level of Zobo drink enriched with Date and Mango?

(3) What is the nutritional value of Zobo drink enriched with Date and Mango?

(4) Is there any difference in the level of acceptability of Zobo drink enriched with Date and Mango in varying proportions?

Hypotheses

The following hypothesis was formulated for the study and tested at alpha 0.05 significance.

H01: There is no significant difference in the acceptability level of Zobo drink enriched with Date and Mango in varying proportion.

Table 1 shows the Sensory Evaluation of Zobo drink enriched with Date and Mango. The table revealed that for **colour**, sample **ZD**=Zobo and Date was the most preferred with mean score $\bar{x} = 6.48(\pm.64)$ while the sample **ZDM**=Zobo, Date and Mango was the least preferred with mean score $\bar{x} = 6.03(\pm.95)$. For **aroma**, sample **ZM**=Zobo and Mango was the most preferred with mean score $\bar{x} = 6.25(\pm.78)$ While sample **ZDM**=Zobo, Date and Mango was the least preferred with mean score $\bar{x} = 5.63(\pm.1.05)$. For **taste**, sample **ZD**=Zobo and Date was the most preferred with mean score $\bar{x} = 6.33(\pm.73)$ while the sample **ZO**=Zobo only was the least preferred with mean score $\bar{x} = 4.33(\pm1.56)$. For **overall acceptability**, the sample **ZD**=Zobo and Date was the most preferred with mean score $\bar{x} = 6.35(\pm.62)$ while the sample **ZO**=Zobo only was the least preferred with mean score $\bar{x} = 5.53(\pm.99)$.

Table 1: Sensory Evaluation of Zobo drink Enriched with Date and Mango

Sample code	Color	Aroma/ flavor	Taste	Overall acceptability
ZO (A)	6.30±.85 ^a	5.68±.94 ^b	4.33±1.56 ^c	5.53±.99 ^b
ZD (B)	6.48±.64 ^b	5.88±1.02 ^c	6.33±.73 ^a	6.35±.62 ^a
ZM (C)	6.13±.97 ^d	6.25±.78 ^a	5.73±1.38 ^a	6.00±.93 ^a
ZDM (D)	6.03±.95 ^a	5.63±1.05 ^d	5.70±1.04 ^e	5.73±.93 ^f

Mean (±SD) with **different** letter superscript in the same row are significantly different (P<0.05) while means with the **same** letter superscript in the same row are **NOT** significantly different (P>0.05)

Key: ZO=100% Zobo Only, ZD=50% Zobo+ 50% Date, ZM=50% Zobo+ 50% Mango, ZDM=40% Zobo, + 30% Date + 30% Mango.

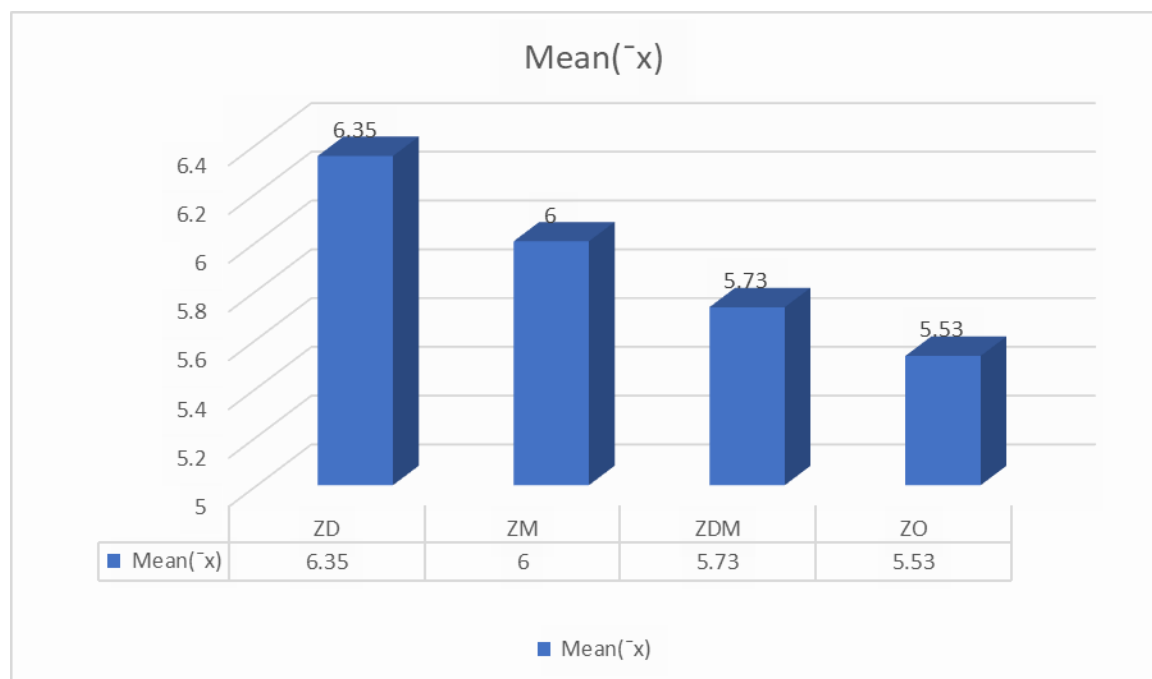


Figure 1: Sensory acceptability Level of Zobo drink enriched with Date and Mango.

For **overall acceptability**, the sample **ZD**=Zobo and Date was the most preferred with mean score $\bar{x} = 6.35(\pm.62)$ followed by **ZM**=Zobo and Mango $6.00(\pm.93)$, then **ZDM**=Zobo, Date and Mango $5.73(\pm.93)$, **ZO**=Zobo Only $5.53(\pm.99)$,

Table 2 revealed that **Moisture contents** of Zobo drink enriched with Date and Mango range from 85.67% to 92.55%. Sample **ZO**=Zobo only has the highest moisture content (92.55%) while **ZDM**=Zobo, Date and Mango has the least moisture content (85.67%). **Ash contents** ranged from 0.58 % to 1.30 %, Sample **ZDM**=Zobo, Date and Mango has the highest ash content (1.30%) while **ZO**=Zobo only has the least ash content (.58%).

Crude Protein contents of the samples ranged from 1.50 % to 2.14 %. Sample **ZO**=Zobo only has the highest protein content (2.14%) and **ZDM**=Zobo, Date and Mango has the least protein content (1.50%). **Fat& Oil** contents of the samples ranged from .98% to 1.11%. Sample **ZD**=Zobo and Date has the highest Fat& Oil content (1.11%) while **ZM**=Zobo and Mango has the least Fat& Oil content (.98%). **Fiber** contents of the samples ranged from 0.15% to 1.13%. Sample **ZDM**=Zobo, Date and Mango has the highest Fibre content (1.13%) while **ZO**=Zobo only has the least Fibre content (0.15%). **Carbohydrate** contents ranged from 3.53% to 9.39%. Sample **ZDM**=Zobo, Date and Mango has the highest Carbohydrate content (9.39%) while **ZO**=Zobo only has the least Carbohydrate content (4.86%).

Table 2: Nutritive composition of Zobo drink enriched with Date and Mango

	Sample number	Moisture content (%)	Ash content (%)	Protein content (%)	Fat and oil content (%)	fibre content (%)	Carbohydrate content (%)
1	Sample ZO	92.55(1)	0.58(4)	2.14(1)	1.05(2)	0.15(4)	3.53(4)
2	Sample ZD	90.53(2)	1.26(2)	1.76(2)	1.11(1)	0.49(3)	4.85(3)
3	Sample ZM	87.42(3)	1.21(3)	1.52(3)	0.98(4)	1.10(2)	7.77(2)
4	Sample ZDM	85.67(4)	1.30(1)	1.50(4)	1.01(3)	1.13(1)	9.39(1)

Key: ZO=100% Zobo Only, ZD=50% Zobo+ 50% Date, ZM=50% Zobo+ 50% Mango, ZDM=40% Zobo, + 30% Date + 30% Mango.

Hypotheses Testing

Table 3 shows an F-value of 6.248 and a p-value of .001 since the p-value is less than the alpha level, ($p < 0.05$) the null hypothesis which states that 'There is no significant difference in the acceptability level

of Zobo drink enriched with Date and Mango in varying proportion is rejected. Therefore, There is a significant difference in the acceptability level of Zobo drink enriched with Date and Mango in varying proportion ($P < 0.05$),

Table 3: ANOVA on significant difference in the acceptability level of Zobo drink enriched with Date and Mango in varying proportion.

	Sum of Squares	Df	Mean Square	F	Sig
Between groups	206.883	27	7.662	6.248	.001
Within groups	14.717	12	1.226		
Total	221.600	39			

$\alpha = 0.05$

Discussion of Results

The main objective of this study is production and assessment of quality attributes of zobo drink enriched with date and mango for family sustainability in retirement.

Result of sensory evaluation of Zobo drink enriched with Date and Mango revealed that for **colour**, sample ZD=Zobo and Date was the most preferred. Similar result was reported by Ezejindu and Iro. (2017) who discovered that the colour of uncarbonated sweetened Zobo drink was at 7.00 while Adelekan et al. (2014) reported the lowest acceptability with a mean value of 7.66 for colour of Zobo drink fortified with pineapple and pepper fruit

and Zobo enriched with iyeye having the best colour. For aroma, sample ZM=Zobo and Mango was the most preferred. This agree with Adelekan et.al (2014) who in their study discovered that Zobo enriched with pineapple and pepper fruit has a similar mean value of 6.40 and was discussed to be due to the flavour of the pineapple. For taste, sample ZD=Zobo and Date was the most preferred. For overall acceptability, sample ZD=Zobo and Date was the most preferred. This may also be due to the sweetening ability of the Date which contains fruit sugar (fructose) so was able to improve the taste compared to the bland taste of the Zobo drink.

Findings of nutritional value of Zobo drink enriched with Date and Mango revealed that for **Moisture contents** .Sample **ZO**=Zobo Only has the highest moisture content (92.55%) while **ZDM**=Zobo, Date and Mango has the least moisture content (85.67%). For **Ash contents** , Sample **ZDM**=Zobo, Date and Mango has the highest ash content (1.30%) while **ZO**=Zobo Only has the least ash content (.58%).For **Crude Protein** Sample **ZO**=Zobo Only has the highest **protein** content (2.14%) and **ZDM**=Zobo, Date and Mango has the least protein content (1.50%) while for **Fat&Oil** Sample **ZD**=Zobo and Date has the highest Fat& Oil content (1.11%) while **ZM**=Zobo and Mango has the least Fat& Oil content (.98%). For **Fiber** contents, Sample **ZDM**=Zobo, Date and Mango has the highest Fibre content (1.13%) while **ZO**=Zobo only has the least Fibre content (0.15%).for **Carbohydrate** contents sample **ZDM**=Zobo, Date and Mango has the highest **Carbohydrate** content (9.39%) while **ZO**=Zobo Only has the least **Carbohydrate** content (4.86%).This findings agreed with Luvonga, Njorge, Makokha, Ngunjiri, (2010) and Olayemi, Adebayo, Muhammad, Bamishaiye (2011). who found in their study that carbohydrate content (68.7%) was highest for Zobo drink followed by crude fibre (14.6%) and ash content (12.2%) and others.

Findings of hypothesis one revealed there is a significant difference in the acceptability level of Zobo drink enriched with Date and Mango in varying proportion. ($P<0.05$) This agree with Aberoumand (2015) who produced and evaluated organoleptic characteristics of fruit juice and low-sugar pulp of Behbahan variety Dates and discover no significant difference in the color and taste of the product but found significant difference in smell ($P<0.05$).

Conclusion

The study concludes that Zobo drink enriched with Date and Mango is acceptable and suitable for consumption based on the sensory and nutritive qualities observed and as a Home Economics retiree could start production of Zobo drink enriched with Date and Mango on a large scale for sale to increase their financial stability. The study also concludes that there is a significant difference in the acceptability level of Zobo drink enriched with Date and Mango in varying proportion ($P<0.05$).

Recommendations

Based on the findings of this study, the following recommendations are made

1. As Home Economics retiree could start production of Zobo drink enriched with Date and Mango on a large scale for sale to increase their financial stability.
2. There is need to enlighten the labour force on the need for planning for retirement to prevent workers entering into retirement as destitute.
3. Zobo drink enriched with Date and Mango should be encouraged by Home Economists and Nutritionists as it increases opportunities for both young and old people to drink healthy vitality drink.
4. Awareness should be created by Home Economists and Nutritionists for People to prefer Zobo drink enriched with Date and Mango to carbonated drinks because of the high nutrient and sensory quality.

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