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### Acceptability and Nutritional Value of Black Plum Fruits (*Vitexdoniana Sweet*) and Shea Butter Fruits (*Vitellaria paradise*) Drinks

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#### Abstract

Black plum fruits (*Vitexdoniana sweet*) and Shea butter fruits (*Vitellaria paradise*) are healthy fruits due to their high in dietary fiber and therefore are suitable for people of all ages. This study was aimed at assessing the sensory quality and acceptability of drinks prepared from Black plum fruits and Shea butter fruits. The population for the study consists of 145 panelists from the three senatorial zones in Gombe State. Purposive and stratified random sampling techniques were used to select thirty (30) respondents out of the population which were used for the

study. Score card drafted on 5 points numerical rating scale was used for gathering data. All data were subjected to one way Analysis of Variance at 0.05 significance level. The results showed that there was no significant difference in sensory qualities of Black plum fruits and Shea butter fruits in term of taste, texture and general acceptability, while significant differences exist in appearance among the samples. Significant differences in the general acceptability level of Black plum fruits and Shea butter fruits drinks were also noticed and some few recommendations were made.

**Keywords:** Black Plum, Shea Butter, Epicarp, Mesocarp

#### Introduction

Agriculture and Home Economics Education is the study that deals with sciences and arts in order to take care of individual, family, society and the environment. It derived its core subject from sciences and art subjects to enable learners obtain maximum knowledge related to human being parts relate within a society and have a good living in his environment. The part of the related science in Home Economics is nutrition and in agriculture is the source of food, which deals with food and drinks processing and to be acceptable by consumers. Black plum fruits (*Vitexdoniana sweet*) and Shea butter fruits (*Vitellaria paradise*) are flowering plants derived from the fertilization of specific tissues such as one or more ovaries Sobhana, (2015) [24]. The fruits are among the highly perishable, non-staple foods which make up about 39% of the food intake (fresh state) of people living in developing Countries Sobhana, (2015) [24]. The trees produce fruits whose pulps are sweet and edible when ripe. The nutritious pulp of the fruits composed of epicarp and mesocarp. They are widely consumed among rural dwellers and are sold in local markets, medicinally it is use to cure, oral problems such as oral cancer and teething of children, diabetics, dysentery, swelling of the liver and ulcer are among the medicinal importance of black plum fruits (Carbonel- Capella *et al*, 2015) [7]. For shea butter fruits, the fresh fruit pulp is serves as food, cure fungus, the oil is use for hair smoothening, skin drying. The fruits ripen at the early part of the rainy season providing farmers a source of food while at the farm, complementing the depletion of food reserved at that critical time (Lamien *et al*, 1996) [14]. Therefore, both fruits have their economical and medicinal importance, this is in line with Chen *et al*, (2016) [8] that persimmon is highly nutritious with a lot of vitamins A, B, C, give strong bones, brightened eye sight and are being appreciated by many customers because of its taste and pleasant aroma. The consumption of fruit juices and nectars has increased in recent years driven mainly by higher consumer awareness about the importance of choosing healthy foods or drinks to reduce the risk of developing diseases and improving quality of life (Carbonell-Capella *et al*, 2015) [7]. Similarly, consumers are increasingly concerned about their nutrition and fruit juices are source of vitamins, minerals, organic acids and fiber whose effect on human health is fundamental (Jimenez-Sanchez *et al*, 2015) [10]. Processing also allows adding economic value to raw materials, transforming perishable products into storable and marketable products (Paula *et al*, 2015) [23]. The processing of pulp and fruit juices is an important agro-industrial activity in that it adds economic value to the fruits, avoiding wastage and minimizing losses that may occur during the marketing of the fresh fruits, while also providing the producers with an alternative use for the fruits.

The use of fruits species, which are often rich in vitamins, minerals and bioactive compounds, reflects in offering new

alternatives of fresh fruits, constituting a precious source of food (Oludemi & Akande, 2013) <sup>[22]</sup>. Industries are now always looking to develop differentiated product that can meet the changing demand of consumers. In the beverage segment, a new market that is opening up is that of juice originating from mixed fruits (Matsuura *et al* 2004) <sup>[16]</sup>. In a related report Zotarelli *et al*, (2008) <sup>[25]</sup> stated that mixed fruits products join nutritional characteristics of two or more fruits and provide pleasant sensory characteristics in order to gradually gain prime space in the consumer market. The combination of fruit can also contribute to reducing costs of some products by the addition of cheaper fruits to high-cost fruits fill storage. In the preparation of mixed fruit products, the food industry should make use of optimization tools, so that, based on the nutritional and mainly sensory characteristics, they can determine exactly the right proportion of ingredients. (Sobhana, 2015) <sup>[24]</sup>. This study will be more significance to our local farmers by serving as a source of income to the majority of famers in Nigeria and corporate organizations. The black plum fruits and black plum leaves are good for diabetes patient, black plum fruits help to convert starch into energy and keep your blood sugar levels in check. In the summer season, the sugar patient should eat black plum fruits regularly because of its low glycemic index. Black plum fruits reduce the symptoms of diabetes like frequent urination and thrusting. The extract of bark, seeds, and leaves are too beneficial in the treatment of diabetes. In a recent study, it has been found that the dried alcoholic extract of the seeds are good to reduce the level of blood sugar. The decoction of the bark and powdered seed is good in the treatment of diabetes (Chen *et al*, 2016) <sup>[8]</sup>. The extract of the bark, seeds and leaves are good in decreased of sugar in urine (glycouria). Black plum seeds powder contains jamboline, a type of glucose, which helps to control the conversion of starch into sugar. A bark infusion of shea tree is used as an eye wash against venom of the spitting cobra because it has the capacity to neutralize the venom, it is used as foot bath to extract jiggers, the shea tree produces latex. This latex is used traditionally in a mixture with palm oil to produce glue. Latex from shea nuts contain between 15 to 25 percent carotene which is not appropriate for use in the commercial production of rubber according to present technology. The shell or husks of the shea nut is used in the purification of water. It has the ability to remove substantial amounts of heavy metal from aqueous solutions. The shell is pounded and made into paste that is used in northern Ghana for plastering traditional mud houses. This treatment serves as decoration whiles promoting the lifespan by making them impervious and reducing their rate of absorption of moisture (Chen *et al*, 2016) <sup>[8]</sup>. Therefore, it is the intention of this study to find out how sensory evaluation of nutritional value of some natural drinks (Black plum fruits & Shea fruits) can be use as an appetizer among Muslims and Christians during their fasting period in Gombe state.

### Statement of the problem

Most bottle and canned drinks that are produced for sell in various shops, eating and drinking centers have more side effects especially on human health such as, obesities, diabetics, cancer and a lot of unknown sources of several diseases that sometimes, if care is not taken, can lead to lose of life. This can be with Nigerian problems of poverty, which are lack of sources of generating revenue or income to families especially in Gombe State. It is against this

background that the researchers wish to embark on finding solutions to this menace. This project work is aimed at making drinks from black plum fruits and shea fruits, that are diseases free, cure a lot of world turbulence diseases mentioned above and in addition bring back a lot of our lose wild plants especially black plum fruits and shea trees. Farmers, traders and manufacturers can increase their income and country revenues will also be increased.

### Objectives of the study

The major objective of this research work is to identify the acceptability of black plum fruit drink and shea butter fruits drink obtained from these plant trees. The specific objectives are to:

1. Assess the sensory quality of black plum fruit drink and shea butter fruits drink in term of appearance.
2. Determine the sensory quality of black plum fruit drink and shea butter fruits drinks in term of texture.
3. Determine the sensory quality of black plum fruit drink and shea butter fruits drinks in term of taste.
4. Determine the general acceptability of black plum fruit drink and shea butter fruits drinks.

### Research questions

1. What is the acceptability level in the sensory quality of black plum fruit drink and shea butter fruits drink in term of appearance?
2. What is the acceptability level in the sensory quality of black plum fruit drink and shea butter fruits drink in term of texture?
3. What is the acceptability level in the sensory quality of black plum fruit drink and shea butter fruits drink in term of taste?
4. What is the general acceptability level of black plum fruit drink and shea butter fruits drink?

### Hypotheses

**Ho1:** There is no significant difference in the mean ratings of general acceptability level of black plum fruits and shea butter fruits Drinks.

### Methodology

Quasi- experimental design was adopted for the study. The population of the study consist of 145 panelists from the three senatorial zone in Gombe State.

### Sample size and sampling procedure

Stratified random and purposive sampling techniques were used to draw sample size from the population. This is because each senatorial zone is a stratum of its own. purposive sampling is a method which the respondents will be deliberately selected due to certain operational factors. Borg and Gail (2006) reported that 5%,10%,20% and 30% of the population can be used as sample size. Thus, researcher used 20% of the total population to get the sample size of 29. This is based on the suggestion of Cresswel (2002) that for an experimental research work, sample frame should not exceed 30.

### Instrument of the study

Score card drafted on 5-point numerical rating scale of like extremely, like moderately, neither like nor dislike, Dislike moderately, and Dislike extremely was used. These were numerically assigned as 5, 4, 3, 2 and 1 respectively. To

establish the reliability of the instrument a test-retest method of reliability was adopted. The instrument was administered with the interval of four weeks to the same set of respondents. The two sets of scores obtained from pilot testing were correlated using Pearson Product Moment Correlation Coefficient. The reliability obtained was  $r=0.78$ . For the data analysis, statistical tool such as mean and standard deviation was used, while the hypothesis was analyzed using Analysis of Variance statistical tool.

### Procedures for preparation of black plum fruit and shea butter fruits Drinks.

**Recipe:** 900g black plum fruit Flour, and shea butter fruits flour and 1000ml Water

1. The black plum fruit and shea butter fruits were manually cleaned (separately) to remove sand, broken and infested fruits, dirt and other contaminants.
2. Black plum fruit and shea fruits each weighing 20kg will be separately pulped after steam blanching in a steamer. The pulps obtained from the black plum and shea fruits were dried separately by placing them in a household oven (Rosell Hob, England) at  $50^{\circ}\text{C}$  to a constant weight and the dried pulps was milled into flours using a kitchen blender.
3. Sieve the flour to remove larger particles using medium size sieve.
4. Boil water and allowed to cool then add each flour to soaked in 1:3w/v table water for 8 hours. The mixtures will then be filtered using cheese cloth to obtain the black plum fruit drink and the shea butter fruit drink. The drinks will be poured into jugs or plastic bottles and placed in the refrigerator between 2-3 hours in order for them to get cold prior to serving.
5. Each drink will be served to the panelists in transparent plastic cups, they will be asked to rinse their mouth with fresh room temperature water provided, before next serving.

### Results and discussion

**Table 1:** Mean, Standard Deviation and Standard Error ratings of sensory quality of black plum fruit Drinks and shea butter fruits Drinks in terms of appearance

Drinks Category	N	$\bar{X}$	SD	SE	Remark
Shea butter fruit	29	2.17	0.81	0.15	Not satisfactory
Black plum fruit	29	4.24	0.83	0.15	Satisfactory

**Source:** Fieldwork, 2022

**Key:** N = Number of respondents,  $\bar{X}$  = Mean rating, SD = Standard Deviation, SE = Standard Error.

Table 1 presented Mean, SD and SE ratings of sensory quality of black plum fruit drink and shea butter fruit drinks in terms of appearance. Out of the two drinks presented to respondents, black plum fruit drinks were rated higher in terms of appearance pleasing with mean value of  $4.24 \pm 0.83$  while the shea butter fruit drinks with mean value of  $2.17 \pm 0.81$  rated least. From these mean ratings, it can be concluded that acceptability level in the sensory quality of shea butter fruit drinks in terms of appearance as rated by the panelist from the three senatorial zone in Gombe State was not satisfactory as its computed mean value ( $2.17 \pm 0.81$ ) is less than cut-off mean point (3.00) on 5-point scale used in this study, whereas black plum fruit drink was rated

satisfactory as the computed mean values is greater than cut-off point. A close look at evaluated standard deviation (SD) of each drink indicated that the respondents' ratings or responses did not vary too much from each other because each SD was low when compared with its corresponding mean value.

**Table 2:** Mean, Standard Deviation and Standard Error ratings of sensory quality of black plum and shea butter fruits Drinks in terms of texture

Dish Category	N	$\bar{X}$	SD	SE	Remark
Shea butter fruit	29	4.00	1.28	0.24	Satisfactory
Black plum fruit	29	4.07	0.10	0.19	Satisfactory

**Source:** Fieldwork, 2022

**Key:** N = Number of middle-aged respondents,  $\bar{X}$  = Mean rating, SD = Standard Deviation, SE = Standard Error.

Data presented in Table 2 figures out Mean, SD and SE ratings of sensory quality of black plum fruit drinks and shea butter fruit drinks in terms of texture. Out of two drinks presented and assessed by respondents, black plum fruit drinks were ranked highest in terms of texture with mean value of  $4.07 \pm 0.10$  and Shea butter fruit with  $4.00 \pm 1.28$ . From these mean ratings, it can be concluded that acceptability level in the sensory quality of two categories of drinks in terms of texture as rated by panelist from the three senatorial zone in Gombe State was satisfactory because all the mean ratings for two samples were higher than the cut-off point (3.00) on 5-point scale used in this study. Critical observation of evaluated standard deviation (SD) of each sample indicated that there was closeness in response of the respondents'.

**Table 3:** Mean, Standard Deviation and Standard Error ratings of sensory quality of black plum fruits Drink and shea butter fruits Drink in terms of taste

Drink Category	N	$\bar{X}$	SD	SE	Remark
shea butter fruit	29	3.83	1.00	0.19	Satisfactory
black plum fruit	29	4.17	1.00	0.19	Satisfactory

**Source:** Fieldwork, 2022

**Key:** N = Number of middle-aged respondents,  $\bar{X}$  = Mean rating, SD = Standard Deviation, SE = Standard Error.

Table 3: Shows that out of the two drinks presented and assessed by respondents, black plum fruits had higher mean value  $4.17 \pm 1.00$  and shea butter fruit with  $3.83 \pm 1.00$ . From these mean ratings, it can be deduced that acceptability level in the sensory quality of two categories of drinks in terms of taste as rated by the panelist from the three senatorial zone in Gombe State, was satisfactory because all the mean ratings for two drinks were higher than the mean cut-off of 3.00 on 5-point scale used in this study. Besides, computed standard deviation (SD) of each drink indicated that there was closeness in the respondents' ratings because each SD was low when compared with its corresponding mean value.

**Table 4:** Mean, Standard Deviation and Standard Error ratings of general acceptability level of black plum fruits Drink and shea butter fruits Drink

Drinks Category	N	$\bar{X}$	SD	SE	Remark
Shea butter fruit	29	3.33	0.90	0.17	Satisfactory
Black plum fruit	29	4.16	0.84	0.16	Satisfactory

**Source:** Fieldwork, 2022

**Key:** N = Number of middle-aged respondents,  $\bar{X}$  = Mean rating, SD = Standard Deviation, SE = Standard Error

Table 4: above depicts Mean, SD of black plum fruit drinks and shea butter fruits drinks. black plum fruits had higher acceptability mean value  $4.16 \pm 0.84$  and shea butter fruits had acceptability mean value of  $3.33 \pm 0.17$ . From this acceptability mean ratings, it can be concluded that general and SE ratings of general acceptability level of the two categories of drinks as rated by the panelist from the three senatorial zone in Gombe State was satisfactory because all the mean ratings for the two drinks were higher than the mean cut-off of 3.00 on 5-point scale used in this study. However, the most preferred drink was black plum fruits drink and the least preferred was shea butter fruits drink. Besides, observation at computed standard deviation (SD) showed that each drink indicated that, there was closeness in the respondents' general acceptability level ratings because each SD was low when compared with its corresponding mean value.

**Table 5:** One-way Analysis of Variance (ANOVA) in the general acceptability level of black plum and shea butter fruits Drinks

Sources of Variation	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	9.97	2	4.99	5.09	0.01
Within Groups	82.22	84	0.98		
Total	92.19	86			

Source: Fieldwork, 2022

Note: (F-critical = 3.07,  $p < 0.05$ )

The result of ANOVA test revealed that the drinks are significantly different in the rated general acceptability level by the panelist from the three senatorial zone in Gombe State. This is indicated that F-value (5.09) computed from the analysis which is greater than F-critical (3.07) obtained at  $P < 0.05$  of 2, 84 degree of freedom. Besides, the probability level of significance obtained in the test is 0.01,  $P < 0.05$ . From these results, the null hypothesis in this study which states that there is no significant difference in the general acceptability level of black plum fruit drinks and shea butter fruits drinks is rejected. The result clearly showed that there was preference to drinks appearance which was differed significantly and this has effect on the general acceptability level. Mean separation test conducted on Table 3 shows that black plum fruit drinks texture were rated higher than mean rating texture of shea butter fruits drinks. This agree with the submission of Selveraj, (2002) that tamba dough was hard, lack cohesiveness and difficult to sheet. *Tamba*, *acha* and green plantain are gluten free which make these foods perfect for people suffering from Celia disease. Gallagher, Gormley and Arend, (2008); Jideani (2011) <sup>[11]</sup> noted that *finger millet* and *acha* can be into flour and used in drinks, soups, stews and all kinds of healthy foods including bread and cakes. Abiodun-solanke (2010) <sup>[1]</sup>.

The result clearly showed that there was preference to drinks appearance which was differed significantly and this has effect on the general acceptability level. In order to ascertain which of the drinks has difference which is statistically significant; the computed means of drinks were further subjected to Turkey post-hoc test the results showed that there was significant difference between black plum fruit drinks and shea butter fruits drinks with probability value of 0.06 ( $P < 0.05$ ). This is in line with Eleazu and Okafor (2012) who ascertain in their study that regular consumption of unrefined staple foods such as tamba, acha and green plantain enhance good health of the body.

## Conclusion

Traditional African wild trees, Black plum (*Vitexdoniana sweet*) and Shea fruit (*Vitellania paradise*) are flowering plants derived from the fertilization of specific tissues such as one or more ovaries have potential to contribute significantly wellness of the body because they are healthy food and gluten free. Past researches show that middle aged people are prone to diet related diseases such as diabetes mellitus, high blood pressure among others. The kind food they needed more in their diet are dietary staple foods and not processed foods as unprocessed foods are nutritionally balanced and healthful. Black plum fruits and Shea butter fruits are staple foods not too common to many people in Nigeria especially south western states. Black plum fruits and Shea butter fruits were exceptional staple food that has high dietary fibre with insulin secreting qualities that helps with managing blood glucose levels in body. The study concluded that Shea butter fruits drinks was rated low compare to Black plum fruits drinks. The sensory attributes of the black plum juice and shea fruit juice shows that both juices are acceptable in terms of appearance, taste, mouth feel, flavor and overall acceptability.

## Recommendations

Unrefined Black plum fruits and Shea butter fruits are healthy foods because they contain all the nutrients needed by the body for the optimum growth of the family. These staple foods are very good source of dietary fiber, essential amino acids such as valine, selenium, tryptophan; micro nutrients and phytochemicals such as polyphenols and phytates which protect the body against diabetes, cardio vascular disease and other health related problems associated with middle age. Consumption of these unrefined staple foods promotes good health of the body and save the family from medical expenses. Therefore, Shea fruit pulp and black plum juices should be produced and sold in any other commercial drink markets. There should be public enlightenment on the available local drinks made from shea fruit and black plum. And Government should provide facilities for the production and storage of these local fruits and the drinks (shea fruit and black plum).

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