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Effect of Orange and Pineapple Fruit Juice Replacement on Proximate and Sensory Attributes of Soymilk Mixed Fruit Juice Drink

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ABSTRACT---- ***Soybean seeds, fresh ripe orange and pineapple fruits were processed into soymilk, and fruit juices respectively. The orange and pineapple juices were blended at equal proportion to get mixed fruit juice (MFJ). MFJ was used to replace soymilk (SM) at 10%, 20%, 30%, 40% and 50% levels without addition of any chemical preservatives. The proximate, vitamins A, C and sensory properties of the soymilk-mixed fruit juice drink (SMFJ), SM and MFJ were evaluated. The SM which served as control contained higher amount of protein (3.77± 0.04), fat (4.91 ± 0.12), ash (0.88 ± 0.04) and calories (69.81 ± 1.62) while MFJ contained higher amount of carbohydrate (12.32 ± 1.84) and vitamin C (55.00 ± 1.41). $SMFJ_{1-5}$ contained the range as follows: protein (2.35-3.2), fat (2.41-4.85), ash (0.51-0.81), calories (62.37-76.05), and carbohydrate (4.88-7.80). All the samples had high moisture contents which ranged from (83.90 – 88.00%). There were appreciable increase of carbohydrates and vitamin C in all the replaced samples with the highest occurring in sample $SMFJ_5$ (CHO 7.80 ± 0.18 and Vitamin C 30.70 ± 1.72). All the samples were generally accepted ($P > 0.05$) but sample $SMFJ_5$ (50:50) received the highest (8.7) overall acceptability score. Carbohydrate and vitamin C were observed to increase as the level of replacement with fruit juice increased. Also, protein and fat in the blends were within the recommended dietary allowance, thus, the beverage is of high nutritional and economical value and can provide enhanced energy.***

Keywords--- fruit juice, proximate, replacement, sensory attributes, soymilk.

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1. INTRODUCTION

It is common knowledge that increasing number of people in developing countries is malnourished. This is partly due to low income per capita and high cost of foods especially animal proteins (Nsofor and Osuji, 1997). Plant proteins are often lacking in some essential amino acids but good quality formulations could be made from it by careful selections and combinations of some plant foods that complement each other (Palmer, 1992). The high rate of micronutrient deficiencies in Nigeria has been attributed partly to poor dietary habits (Obizoba *et al.*, 2004). Fruits are good source of micronutrients especially minerals and vitamin C. Orange and pineapple are available in almost all parts of rural Nigeria at affordable prices, and can still be processed into fruit juices with longer shelf-life and can be useful in bridging the nutrient gap experienced in Nigeria and many other developing countries. Researchers have shown that for optimal antioxidants protection of the body, carotenoids available in fruits like orange, pawpaw, mango and flavonoids found in citrus fruits such as oranges, lime and grapes should be taken on daily basis. Fruits can check constipation and help to reduce weight. They are rich in vitamin C, which prevent scurvy, body malfunctioning and general malnutrition (Baje, 2004).

Pineapples are rich in vitamin C although there is variation of vitamin contents from fruit to fruit and the quality of pineapple is dependent on a number of factors which include; variety, nutrition, exposure, weather conditions such as light intensity, rainfall and seasonal changes, and ripeness (Marvin, 1978). He further reported that the flavour and composition of pineapple juice are dependent on the composition of the fresh fruit from which it was processed. The edible portion of the pineapple fruit as reported by Okaka (1997) constitute about 60% of the fresh fruit and contains approximately 85% water, 0.4% protein, 14% sugar, 0.4% fat, 0.5% fibre, 110IU vitamin C, 30IU vitamin A. The main carbohydrates in pineapple are sucrose and fructose. The main amino acid is asparagine. It also contains some important enzymes which includes, peroxidase, indo-zyl-acetic acid, phosphatase and bromelin (Ihekoronye and Ngoddy, 1985),

Sweet orange is native to north eastern India, Southern China, but has spread to other tropical and subtropical region of the world (Pantastico, 1975). The proximate composition of edible portion is water 86%, protein 0.6%, fat 0.1%, calcium 25mg, iron 0.3mg, vitamin A 120IU, vitamin C 50IU, thiamine 0.6mg (Ihekoronye and Ngoddy, 1985). Orange are eaten fresh or processed by canning the segment, bottling or freezing the juice or by drying the juice to give powdered product (Ihekoronye and Ngoddy, 1985). Orange juice is probably the most widely recognized and accepted worldwide. Nutritionally, orange fruit is a source of quick energy in the form of sugar. It contains significant amount of vitamin C and folic acid (Brickln, 1993)

Soybean (*Glycine max*) value in human nutrition is derived from its superiority to other edible legumes in terms of dietary quantities. These include total digestible nutrients and therefore metabolise energy, percentage protein, protein biological, protein efficiency ratio, percentage lysine, vitamin and mineral (Adeyeye and Ajemole, 1992). According to Salunkhe *et al*. (1992), soybean contains proteins and oil ranging from 32.4 to 50.2 % and 13.9 to 23% and Iwe (2003) justified the claim by opining that variation in protein and oil contents in soybeans is due to locality where the beans are grown and cultivars of the beans. Soybean also contains about 32% carbohydrate which includes starch, sugar, lignin and cellulose (crude fibre) and other minor carbohydrates such as pectin substances, arabinogalactans.

Soymilk when properly formulated, closely resemble cow milk and attractive alternative to conventional milk (Iwe, 2003; Ahmed, 1984). Cow and soy milk have approximately the same protein contents (3.5 to 4%) and their amino acid profile show a very close relationship. The difference is that, soymilk does not contain lactose, which constitutes a problem (lactose-intolerance) in infants consuming cow milk. Soymilk products were adopted as weaning food for babies and for treating malnourished children, whereby hundreds of Kwashiorkor and Oedema affected children were saved by feeding them with soymilk and other soy preparations (Iwe, 2003). Since soymilk is relatively inexpensive source of protein with least incidences of cardiovascular diseases and lactose intolerance, the use of soymilk in various diets is on the increase (Osundahunsi, 2003). Soy-protein has been found to promote health by lowering blood cholesterol and so have been used in prevention or treatment of heart diseases (Messina, 1995). According to Messina *et al*. (1994), a cup of soy milk and half cup of tofu per day lowers the risks for a wide range of various cancers. Therefore, the objectives of this work are to determine the proximate composition, Vitamins A and C content and sensory attributes of soymilk - fruit juice drink.

It is hoped that the result will help increase the utilization of fruits like oranges and pineapples as supplement to other plant crops in processing which will reduce micronutrients deficiencies in our diet.

2. MATERIALS AND METHODS

Fresh ripe pineapple, sweet oranges and soybean seeds were purchased from a local market in Imo state, Nigeria. All analysis were done at Food Science and Technology Laboratory, Imo State University, Owerri and National root crop research institute Umudike, Umuahia, Abia State, Nigeria.

3. SAMPLE PREPARATION

Soymilk preparation: Soybean seeds were thoroughly sorted to remove immature seeds, stones and foreign materials. 1kg of the cleaned soybean was washed and soaked in 3,000ml of water for about 14h at room temperature (27^0C). The soaked beans were blanched for 5min, drained, dehulled, milled and water added to it (ratio of 1:3 beans to water). The resultant slurry was filtered in a filter press (Muslin cloth) and pasteurized at 93^0C for 15min. The flow chat for soymilk (SM) production is shown in fig.1.

Fruit juice preparation: The fruits (orange and pineapple) were washed in a clean tap water, peeled manually with a sharp knife and sliced into cubes. 1kg of the sliced cubes of the mixture of orange and pineapple were pulped in a monanex blender. The resultant pulp was expressed through a cheese cloth to obtain a clear mixed fruit juice (MFJ).

Soymilk – Mixed Fruit Juice Drink Preparation: The mixed fruit juice (MFJ) was blended with soymilk (SM) at varying proportions on percentage basis (100:0, 90:10; 80:20, 70:30, 60:40 and 50:50). The resultant blends were homogenized and pasteurized at 80^0C for 10s in a water bath, hot-filled into sterile bottle, cooled to room temperature (27^0C) and stored in a refrigerator at 4^0C until analysed The flow chat for soymilk (SMFJ) production is shown in fig. 2.

All analysis were carried out in triplicate for each sample, results obtained were computed into means and subjected to analysis of variance (ANOVA).

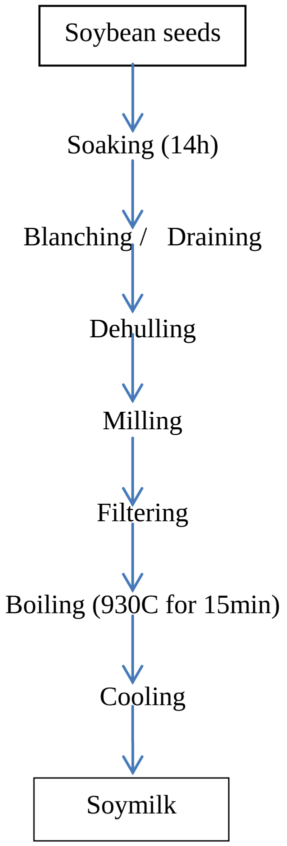

Fig.1: flow chart for soymilk (SM) production (Udeozor, 2012).

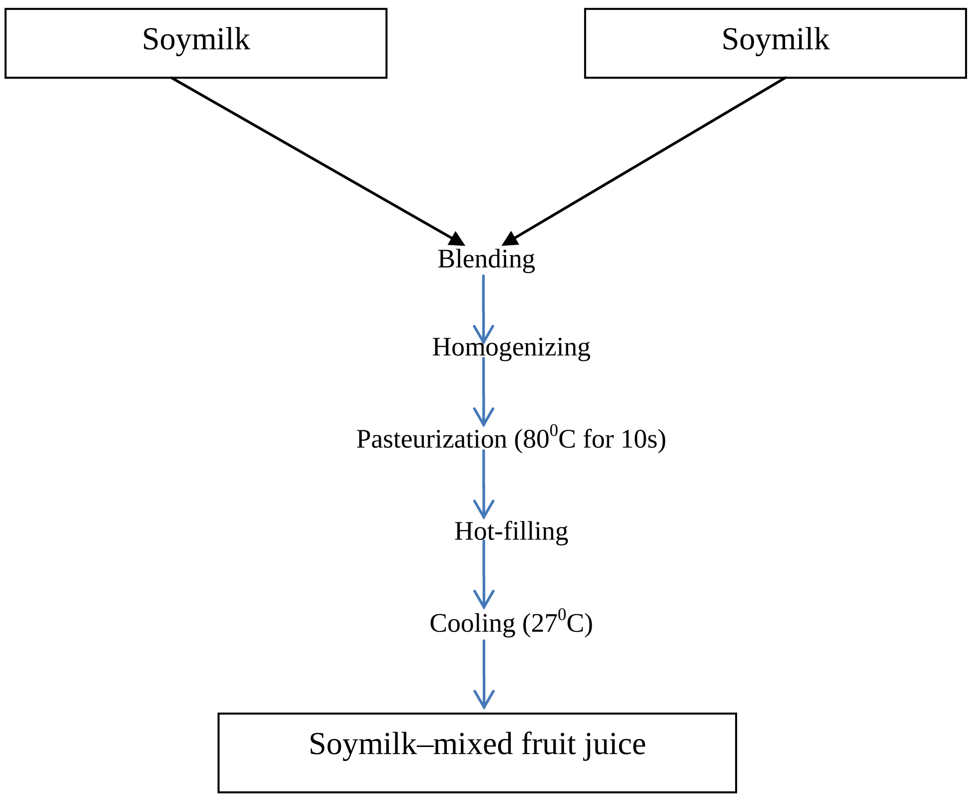

Fig. 2: flow chart for the production of soymilk-mixed fruit juice drink.

4. PROXIMATE ANALYSIS

Moisture Content Determination: This was done by the gravimetric method according to AOAC (1990). Ten (10) ml of the beverage sample was measured into a can that has been earlier washed, dried in an oven and weighed. The sample in the dried can was placed in the oven at a temperature of 105^0C for 3h; it was cooled in a desiccator and weighed. It was then returned to the oven for further drying. Drying, cooling and weighing were done repeatedly at 30min interval until a constant weight was obtained. The weight of the moisture lost was calculated and expressed as a percentage of weight of samples analyzed. This was given by the expression below:

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

Where, W_2 = weight of can + sample before drying
W_3 = weight of can + sample after drying
W_1 = weight of sample used

Ash Content Determination: The method described by James (1995) was use. Ten (10) ml of the beverage samples was measured into a previously weighed porcelain crucible. This was transferred into a muffle furnace and heated at 550^0C for 2h. The ashing continued until all the samples became completely ash. The crucible and its content were cooled in a dessicator and re-weighed. Then percentage ash was calculated.

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

Where , W_2= weight of the sample + crucible
W_3 = weight of empty crucible
W_1 = weight of sample used.

Fat Content Determination: The fat content was determined using the method as described by James (1995). Twenty (20) ml of the beverage samples was measured, evaporated to dryness on a water bath and transferred to an oven. Ten (10) grams of the dried sample was weighed and put in a soxhlet reflex flask containing 200ml petroleum ether. The upper end of the reflux flask was connected to a condenser by heating the solvent in the solvent in the flask through electron thermal heater; it vaporizes and condenses into the reflux flask. Soon the sample was immense in the solvent and remained in contact with it until the flask filled up and siphoned over, thus carrying oil extract from the sample down to the boiling flask. This process lasted for 4h before the defatted sample was removed. The solvent was recovered and the extracting flask with its oil content was dried in the oven at 60^0C for 3 min (i.e. to remove residual solvent). After cooling in a dessicator, the flask was reweighed. Its fat content was calculated as:

$$\%\ \text{fat} = \frac{W2 - W3}{\text{Wt of sample}} x\ 100$$

Where , W_3 = weight of empty extraction flask
W_2 = weight of flask and oil extract

Crude Fibre Determination: This analysis was done using the AOAC (1990) method. Twenty (20) ml of the beverage sample was measured and poured into hot 200ml 1.25% H_2SO_4 and boiled for 30min in a beaker. The hot acid sample solution was filtered and progressively washed with boiling water, alcohol and petroleum either. The residue was drained out and it was transferred completely to a porcelain crucible and dried in an oven at 150^0C to a constant mass. It was cooled and weighed and incinerated at 600^0C for 2h in muffle furnace. The crucible and the content were weighed after cooling in a dessicator. The loss of incineration is the mass of crude fibre.

$$\%\ \text{crude fibre} = \frac{M2 - M4}{M2 - M1} x\ 100$$

Where, M_1 = mass of crucible
M_2 = mass of crucible + sample
M_3 = mass of crucible + residue.
M_4 = mass of crucible + ash after incinerator

Crude Protein Determination: The protein content of the beverage was determined by the micro-kjedahl method as reported by James (1995). Ten (10) ml of the beverage sample was weighed into a micro Kjedahl flask. A tablet of selenium catalyst and 5ml of concentrated tetraoxosulphate (VI) acid (Conc. H_2SO_4) were added. Another 5ml samples was measured and the same treatment stated above was given to it. The sample in the flask was digested at red hot temperature in a fume cupboard for 2h. The digests were transferred into a volumetric flask each. Meanwhile, the digestion was evidenced by a clear solution obtained after the 2h. Each of the transferred digests was diluted to 50ml with distilled water. Ten (10) ml of each dilution was pipette into powered heat and distillate collected into 10ml of 4% NaoH. Each mixture was distilled by steam-powered heat and distillate collected into 10ml of 4% boric acid solution containing 3drops of mixed indicator, 50ml of distillate from each duplicate was titrated with $0.02NH_2SO_4$ to pink colour. The percentage Nitrogen calculation in each was multiplied with a factor 6.25 to get percentage protein.

Calculation:
The total Nitrogen content was calculated using the relationship that 1ml of H_2SO_4 = 14mg of H_2SO_4 thus,

$$N2 = \frac{100 \times N \times 14 \times Vt \times T - B}{W}$$

Where, T = Titre value of the sample
B = Blank titre value
Ca = Volume of digest distilled
Vt = Total volume of digest
N = Normality of acid used
W = Weight of sample used.
Crude protein (CP) = $\%N_2 \times 6.25$

Carbohydrate Determination: Carbohydrate was calculated by difference method according to AOAC (1990).
% carbohydrate = 100 – (% moisture + % ash + % crude protein + % crude fibre + % fat).

Ascorbic Acids Determination: The vitamin C content of the beverage sample was determined by the barakal isometric method as described by Pearson (1976). Twenty (20) ml of sample was mixed with 0.02NEDTA by blending for 5min in a blender. The homogenate was filtered and filtrate used for the analysis. Each test sample was passed through a packed cotton wool containing activated charcoal to remove colour. The volume of the filtrate was adjusted to 100ml and 200ml of the filtrate was measured into a conical flask. Ten (10) ml of 20% potassium solution was added to each of the flasks followed by 5ml of starch solution (indicator). The mixture was done to an end point marked by black specks of the brink of the mixture. The vitamin C content was given by the relationship that 1ml of 0.01ml $CuSO_4$ solution = 0.88mg Vitamin C. Therefore, Vitamin C is calculated by:

$$Vit.C = \frac{100}{W} x\, 0.88\, x \frac{Vt\, x\, titre}{Va}$$

Where, W = Weight of sample used
Vt = Total extract volume used
Va = Volume of extract titrated

Vitamin A (Retinol) Determination: Vitamin A was determined as described by James (1995). A measured 20 ml of the beverage sample was dispersed in 30ml absolute alcohol and 3ml of 50% potassium hydroxide solutions was added to it and under 30min. After cooling rapidly under running water, 30ml of distilled water were added and the mixture transferred to a separating funnel. After separation the lower aqueous layer was discarded while the upper lay was washed with distilled water and in each case, the wash out water was discarded. The extract was evaporated almost to dryness and dissolved in 10ml of isopropyl alcohol meanwhile a standard solution was prepared and diluted to a desired concentration in 10ml isopropyl alcohol. The absorbance of the standard vitamin A solution and that of the test sample extract solution was separately measured at 325nm with a spectrometer. The vitamin A content was calculated thus:

$$Vit\,A = \frac{an}{as} x\, C\, x \frac{100}{W}$$

where, W = weight of sample used
an = absorbance of sample
as = absorbance of standard
e = concentration of standard solution

Calorie Determination: Food total energy was estimated using (4 x protein + 4 x carbohydrate +9 x fat) (Hunt *et al*., 1987).

Sensory Evaluation: Twenty panellists who were randomly selected from the university community were used for the sensory evaluation of the beverage samples. The samples were coded and presented to the panellists using white glass cups. Water was also provided for mouth wash in-between evaluations panellist rated the products for overall acceptability and sensory attributes of colour, aroma, taste and mouthfeel. A 9-point hedonic scale (Ihekoronye and Ngoddy, 1985) was used for rating. Scores were subjected to statistical analysis of variance to ascertain which sample were significantly ($p > 0.05$) preferred to other(s).

5. RESULTS AND DISCUSSION

Proximate composition of soymilk-fruit juice drink

The proximate composition of soymilk (SM) and their blends are presented in Table 1. In the beverage samples analysed, fat, carbohydrate and protein were found to be the major constituent of the beverage. Soymilk had more fat and protein than the mixed fruit juice (MFJ) (Akubor, 1998) while mixed fruit juice had more carbohydrate.

Protein content: protein contents of the beverages ranged from 0.70 + 0.05 to 3.77 + 0.04%. Sample SM (100% soymilk) had the highest value than the rest of the samples analyzed while sample MFJ had the least value. The high level of protein in soymilk is expected since soybean is a protein rich seed (Olaofe and Akogun, 1990). The protein value decreased with increasing level of fruit juice replacement.

Carbohydrate content: The carbohydrate contents of the beverages ranged from 2.63 + 0.02 – 12.32 + 1.84%. Sample MFJ (100:0) had the highest value (12.32 + 1.84%) sample SM (100:0) had the least value (2.63 + 0.02%). However, blending of the soymilk and mixed fruit juice increased the carbohydrate contents as the level of replacement increased. This is in line with the work of Turner (1991) that ripe fruits contain higher percentage of sugar than nuts.

Fat contents: from Table 1, sample SM (100:0) had the highest value with the least in (MFJ) (100:0). However, with the level of fruit juice replacement the fat content decreased with the highest in sample $SMFJ_1$ (4.85 + 0.12) and least in sample $SMFJ_5$ (2.41 + 0.08). The high fat content is in agreement with the works of Akukor *et al*. (2002) that high protein and fat content of soymilk were expected since soybean is a protein oil seed. The levels in the blends [($SMFJ_4$ (3.00 + 0.09) and $SMFJ_5$ (2.41 + 0.08)] was in line with minimum (3%) recommended level by the codex alimentorius standard (Passmore and Eastwood, 1986).

Crude fibre: crude fibre contents were low maybe due to the processing operations. However, sample SM had the highest value (1.96 + 0.12) but decreased as the level of MFJ replacement increased with the least value (0.96 + 0.03) occurring in sample $SMFJ_1$ (50:50).

Moisture content: From Table 1, it is observable to note that all the samples analysed had a high moisture content. This may be due to the moisture compositions of the sample. All the samples had between 83 to 87% moisture content. This implies that all the samples are susceptible to spoilage by microbial invasion especially fungi and mould (Ihekoronye and Ngoddy, 1985). This means that with this level of moisture content, the products stability and safety could be affected with respect to microbial growth and proliferation, hence, the products requires cold storage for shelf-life extension.

Ash content: ash contents ranged from 0.47 + 0.02 to 0.88 + 0.04, sample SM had the highest value 0.88 + 0.04) while sample MFJ had the least (0.41 + 0.02) as can be shown in Table 1. However, the levels of ash content decrease down the blends with the highest in sample $SMFJ_1$ (0.81 + 0.03) and the least in sample SFJ_5 (0.51 + 0.06). Total ash in the samples was lower than ash content of 1.5% as reported by Ukwuru *et al*. (2008) for beverages. Ash content is a measure of minerals in a food product. The variation in ash content may be due to variation in organic compounds especially calcium ion present in milk extracted from soybean.

Table 1: Chemical composition of mixed fruit juice (mfj), soymilk (sm) and soymilk-mixed fruit juice (smfj)

Samples	Protein	Fat (%)	Ash (%)	Crude fiber (%)	Moisture (%)	Carbohydrate (%)	Vit. C (%)	Vit. A I.U	Calorie I.U
MFJ	0.70±0.05	0.12±0.00	0.47± 0.02	0.10±0.04	87.50±2.41	12.32±1.84	55.00 ±1.41	2.40 ±0.12	53.10±1.12
SM	3.77± 0.04	4.91 ±0.12	0.88± 0.04	1.96 ±0.12	88.00± 2.63	2.63 ± 0.02	0.0± 0.00	0.18 ± 0.06	69.81± 1.62
$SMFJ_1$	3.20± 0.03	4.85 ± 0.12	0.81± 0.03	1.93± 0.14	86.00 ± 2.46	4.88 ± 0.12	6.40±1.62	0.76 ± 0.03	76.05±1.82
$SMFJ_2$	2.79±0.02	3.98±0.81	0.77±0.01	1.61±0 11	85.80 ± 2.42	5.31± 0.17	11.30±1.82	0.67± 0.04	68.43±1.60
$SMFJ_3$	2.50±0.01	3.57± 0.10	0.66±0.09	1.46 ± 0.02	85.00±2.43	5.80 ± 0.19	17.40 ±1.91	0.41 ± ±0.06	68.23±1.60
$SMFJ_4$	2.41±0.01	3.00± 0.09	0.63± 0.01	1.08± 0.01	84.20 ±2.43	6.61±0.22	24.60 ± 2.41	0.39 ± 0.03	64.84 ± 1.54
$SMFJ_5$	2.35± 0.02	2.41± 0.08	0.51± 0.06	0.97± 0.03	83.90 ± 2.40	7.80±0.18	30.70 ±1.92	0.32 ± 0.05	62.37±1.48

Key: MFJ =100:0, SM= 100:0, $SMFJ_1$ = 90:10, $SMFJ_2$= 80:20, $SMFJ_3$ = 70:30, $SMFJ_4$ = 60:40 and $SMFJ_5$ = 50:50

Vitamin C and A contents: from Table 1, the samples were found to possess appreciable amount of vitamins (A and C) with the exception of SM. Vitamin A content varied and ranged from 0.18 + 0.06 to 2.40 + 0.12 IU. Sample MFJ (100% fruit juice) had the highest value of vitamin A and sample SM (100% soymilk) had the least. It was observed that with increased replacement of soymilk, the vitamin A contents decreased. This may be attributed to lower content of vitamin A in soymilk. The relatively good content of vitamin A is necessary for proper eye development especially in children. For vitamin C, it ranged from 0.0 to 55.00 + 1.41. Mixed Fruit juice (MFJ) had the highest (55.00±1.41) while soymilk (SM) had none. In the blends, vitamin C level increases with the highest in sample $SMFJ_5$ (50:50). Vitamin C is very unstable since it oxidizes easily, thus, it is used as an index of quality (Onyeka, 2008). Pasteurization of the beverage samples was done at lower temperature thereby preventing heat liable nutrients from being lost. Vitamin C is necessary for the formation of intercellular connecting protein collagen. Body cells concerned in the formation of bone and enamel lost their normal functional activity in the absence of ascorbic acid (fox and Cameron, 1980). The soy-fruit drink has high potential for supplying enough vitamin C to meet the needs of children and adults. The recommended intake of vitamin C for adult is 30mg/day (fox and Cameron, 1980).

The energy content of the blends increased with increased soymilk dilution, which may have been due to the high fat content of soymilk compared to mixed fruit juice. The energy of foods is much more related to fat than carbohydrate content (Ihekoronye and Ngoddy, 1985).

6. SENSORY EVALUATION OF SOYMILK- MIXED FRUIT JUICE DRINK

The mean sensory scores of the samples are presented in Table 2. At all levels of soymilk dilution with mixed fruit juice, the sensory scores of the soymilk- mixed fruit juice (SMFJ) drink for all the attributes appreciably increased. The mixed fruit juice (8.7) sample and sample $SMFJ_5$ (8.3) were significantly higher in colour rating than the rest of the samples ($p > 0.05$). Soymilk was significantly lowest for aroma (4.5) attribute ($p > 0.05$). This may be due to "beany flavour associated with soy products. However, as the concentration of the mixed fruit juice in the blends increased, the aroma scores increased from 6.5 ($SMFJ_1$) to 8.3 ($SMFJ_4$ and $SMFJ_5$) respectively. Earlier research opined that the "beany" flavour of soy product could be masked using artificial or natural flavourants (Rackis *et al.,* 1990). The scores for taste showed that all the samples were rated high samples. $SMFJ_1$, $SMFJ_3$, $SMFJ_4$ and $SMFJ_5$ (8.3, 8.2, 8.2, 8.3) were not significantly different ($p > 0.05$) but differ from the rest of the samples. The mouth feel were generally rated low for all the samples. SM had the highest score (5.5) and differed significantly from the rest of the samples which were not significantly different from each other ($p >0.05$). The general acceptability scores showed that all the samples were generally accepted. Soymilk (7.0) had the lowest while $SMFJ_5$ had the highest and also differ from the rest of the samples. Hence, fruit juice extract contributes to overall product quality as shown by general acceptability scores.

Table 2: mean of sensory scores of beverages prepared from fruit juice (mfj), soymilk (sm) and blends (smfj).

Sample	Colour	Taste	Mouth feel	Aroma	General acceptability
MFJ	8.7^{a}	8.0^{C}	4.0^{b}	8.5^{a}	7.3^{b}
SM	7.3^{b}	8.1^{bc}	5.5^{a}	4.5^{C}	7.0^{b}
$SMFJ_1$	6.7^{bc}	8.3^{a}	3.9^{b}	6.5^{bc}	8.3^{a}
$SMFJ_2$	6.5^{bc}	8.1^{bc}	3.9^{b}	6.5^{bc}	7.0^{b}
$SMFJ_3$	7.0^{b}	8.2^{ab}	3.7^{b}	6.5^{bc}	7.3^{b}
$SMFJ_4$	7.2^{bc}	8.2^{ab}	3.9^{b}	8.0^{b}	7.2^{b}
$SMFJ_5$	8.3^{a}	8.3^{a}	4.0^{b}	8.3^{a}	8.7^{a}

Means with the same superscript in a column are not significantly different @ ($P>0.05$). Key: MFJ = 0: 100, SM= 100:0, $SMFJ_1$ = 90:10, $SMFJ_2$= 80:20, $SMFJ_3$ = 70:30, $SMFJ_4$ = 60:40 and $SMFJ_5$ = 50:50

7. CONCLUSION

The replacement of soymilk with fruit juice on percentage levels resulted in beverage with improved nutrient composition and sensory properties. Soymilk-Mixed fruit juice beverage sample at 50:50% was generally accepted and was not significantly ($P>0.05$) different from 100% fruit juice extract with respect to the sensory attributes studied. Consumption of soymilk-mixed fruit juice beverage should be promoted because of its nutrient potentials, particularly its high vitamin C content. It is good for adult and children consumption to increase micronutrient intake and create variety in our daily diets and at the same time reduce problems associated with nutrition. Masking of the beany flavour associated with soymilk was also achieved.

8. RECOMMENDATION

It is necessary to determine the microbial stability of the products and their shelflife.

9. REFERENCES

- A.O.A.C. (1990). Official method of Analysis 15th (ed). Association of official Analytical Chemist, Washington D.C. U.S.A. Pp. 121 – 142, 223-225.
- Adeyeye, A. and Ajemole, K. (1992). Chemical Composition and Fatty acid profice of cereals. *Nigerian Food Chemistry*, 44:41-45.
- Ahmed, M. (1984). Soybean the meat that grows on plants U.S Department of Agriculture farmers Bulletin No. 1617.
- Akubor, P.1. (1998). Physiochemical and sensory characteristics of melon seed milk. *J. food science technology*, 35(1): 93-97.
- Baje, A.O. (2004). The ban on fruit juice importation, prospects for local manufacturers. *Food and beverage*, 6(63) 15-17.
- Bricklin, M. (1993). Prevention Magazine. Nutrition Adviser-Rodele Press, Emman Pennysylviania. pp 61-62.
- Fox B.A., Cameron, A.G (1980) Food science a chemistry approach. Hadder and Stoughson London pp 267-268.
- Hunt, C., P. Burn and Z.C Adamezuk,(1987). Proximate composition and Fat type of three popular take away meal. *Int. J. Food Sci.Technol.*, 22: 669-75.
- Ihekoronye, A.I and Ngoddy, P.O. (1985).Intergrated Food science and Technology for the tropics Macmillian Publishers ltd. London pp 305-306.
- Iwe, M.O. (2003). The science and Technology of soybean: Chemistry nutrition processing and utilization. Rejoint communication services ltd. Uwani, Enugu Nigeria. Pp. 6
- James, S.C. (1995). Analytical Chemistry of Food. Chapman and Hill Printers. London. Pp. 23.
- Marvin, R (1978). Handbook of Foods and Beverages (2nd Edition). Academic Press Washington p 655.
- Messina, M.J. (1995). Modern application for an ancient bean: soybeans and the prevention treatment of chronic disease. *American Journal of nutrition*, 22:5675 –5695.
- Nsofor, L.M and Osuji .C.M. (1997). Stability, rheology and chemical properties of soymilk concentrate development from sprout soybeans. *J.food science and technology*, 34(1): 33 – 40.
- Obizoba, I.C., Nam N.M. and Okutozo, K.E. (2004) Nutrient composition of pineapple and soursop juice. *Nigeria Nutrition science*, 25 (1 & 2): 13 – 15.
- Okaka, J.C (1997). Tropical plant perishables; handling, processing and storage. Silicon valley publishers, Enugu, Nigeria pp 1 – 4, 71 – 90.
- Olaofe, O. and Akogun, O.O. (1990). Mineral and vitamin C contents and their distribution in some fruit Nigeria food journal 8:111-115.
- Onyeka, U.E. (2008). *Food and Nutrition*. 2nd ed. Characteristic Forum Publications. No. 21. Mbaise Road, Owerri, Nigeria, Pp. 157.
- Oshundahunsi, O. F. (2003). Production of yoghurt from soybean with varying levels of cow milk. NIFST proceeding of 27th Annual conference 13th – 17th October, Kano, Nigeria.
- Palmer, G.H. (1992). Sorghum food beverage and brewing potential process. *J. Biochemistry*, 27:145 – 153.
- Passmore, R. and Eastwood, W.A. (1986). Human Nutrition and Dietaries. 8thedition. New York

- Pearson, D. (1976). The Chemical Analysis of Food. (17th edition). Churchill Living Stone Edumburgh. Pp. 94 – 126.

- Rackis,J.J., Honig,D.A., Sessa,D.J. and Steggerda, F.R.(1990). Flavour and Flatulence Factors in soybean protein products. *J. Agric. and Food Chemistry*, 18:977.

- Salunkhe, D.K., Charon, J.C., Adsule, R.N. and Kadam, S.S. (1992). World oil seeds: Chemistry Technology and Utilization. Avi Books Published by Van Nostrand Reinhold New York pp 221.

- Turner, A. (1991). Studies on the preparation and shelflife of perishable fruits. *J. food Technology*, Japan 2:85-86.

- Udeozor, L.O. (2012). Tigernut-Soy Milk Drink: Preparation, Proximate Composition and Sensory Qualities. *Intr. J. Food and Nutri. Sci.,*1 (4): 18-26.

- Ukwuru, M.U., L.J. Omachona and N. Onokah. (2008). Production and quality assessment of tigernut (*Cyperus esculentus*) imitation milk during storage. *J. Food Sci. Technol*., 45: 180-182.