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Production of untraditional vegetable juices fortified with fruits

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Abstract

This study performed to investigate the possibility of producing some new forms of beverages from taro corms mixes with some fruit juices and milk, evaluating the palatability of those aforementioned taro beverages among the panelists. Those beverages were processed from blanched taro corms only, mixes with mango, guava and strawberry juices and with milk. The chemical components of taro beverages and their treatments ranged between (75.95and77.17%), (22.82and24.05%), ((55 and57%), (0.903and1.656%), (0.88and5.09%), (3.65and6.14%), (33.20and47.8 2%),(0.089and 0.22 8%GAE), (5.2and7.1), (0.70and1.40%), (0.069and0.123 at420nm)and(0.558 and 20.309% FW) for moisture,, total solids, total soluble solids, ash, crude fiber, protein, total sugars, total phenols, ph, total acidity, color and antioxidant activity respectively. All products were saved for human consumption after storage for six months at ambient temperature. All taro beverages contain important minerals like potassium, Calcium, iron and zinc. No significant differences were found among the five taro beverages for most of the parameters, except taro milk beverage, also the texture was stabilize after storage for three months. Finally the panelists classified taro beverages as enjoyable.

Keywords

Taro; Fruits; juices; Chemical analysis; Sensory evaluation; Statistical analysis

INTRODUCTION

Taro is a plant in the Arum family (Aracea), belonging to the genus Colocasia and species esculenta. It is widely grown in many tropical and subtropical countries for the u se of its corms in food. This plant is known under different names especially in Cylon, M alaya and Hawaii.(Colocas) is the Egyptian name for taro, which is mostly grown in two horticultural variants. Colocasia esculenta var. Baladi and Colocasia esculenta var. Colocasia esculenta comes in two separate types. Nutritional value and customer acceptance must be evaluated when a crop is being considered for food. A food's nutritional value is determined by its nutritional content and digestibility, as well as the presence or absence of antinutrients and toxic substances. Taro (Colocasia esculenta), a member of the Araceae family, is an old crop grown for its delectable corms and leaves throughout the wet tropics **(Ikpeme et al 2010).** After yam and cassava, Colocasia is the third most important root crop after tannia (Xanthosomasagitifolium) and is widely farmed in Africa **(Obomegheive et al., 1998, Nwanekezi et al., 2010).** Global taro output is predicted to reach 9.22 million tonnes on 1.57 million hectares **(Ammar et al., 2009).** According to **Ikpeme et al. (2010)**, global Cocoyam production was 10.6 million metric tonnes, with 60% (about 5.8 million metric tonnes) grown in Africa, with Nigeria producing the most. **(Ammar and colleagues, 2009).** Low in fat (0.5–1.2%), protein (2.9–4.6%), and vitamins, but abundant in carbohydrates (90.8–95.5%) and minerals (1.6–5.5%), particularly magnesium (32.9–382 mg/100 g), calcium (25.4–192 mg/100 g), and potassium (3.5–59.7 mg/100 g) **(Aboubakar et al. 2008; Kaur et al. Njintang et al. 2011).** Taro is a good source of fibre, but it also has a lot of gum, which has been shown to aid with high blood pressure, hypercholesterolemia, and diabetes management **(Njintang et al. 2011).** Taro corms are strong in protein, vitamin C, thiamine, riboflavin, niacin, and dietary fibre, as well as easily digestible starch, according to studies **(Niba. 2003)** Calcium, vitamin E, and vitamin B, as well as magnesium, manganese, copper, and fibre, are abundant in taro. **(Enwelu et al 2014)** also claim that eating foods high in micronutrients, such as cocoyam, helps the body's utilisation of protein, carbohydrates, and other nutrients. The nutritional value, phytochemical components and ant nutrient contents of taro corm and its products were studied by **Richelle et al (2010)** they said that Processing taro corm significantly affected its proximate composition, mineral content, photochemical components and ant nutrient (oxalate and phytate) contents. Also, a significant reduction ($p<0.05$) was observed in the proximate composition, mineral content, phytochemical components and ant nutrient contents when taro corms were made into powder and were further decreased when processed into taro noodles and cookies. Exposure to high temperature during processing could have greatly affected the reduction in nutrient and phytochemical as well as antinutrient contents of raw taro.

The same researcher discovered the chemical composition of raw taro corm to be Moisture (%) 6.54 0.16, Crude Ash (%) 2.44 0.03. Crude Fiber (percentage) 3.01 0.03, Crude Protein (percentage) 7.79 0.03, Crude Fat (percentage) 0.65 0.02, Carbohydrate (percentage) 86.11 0.06, ZINC (mg/100g), IRON (mg/100g), and CALCIUM (mg/100g) were 1.67 0.06, 2.95 0.19, and 55.00 1.64, respectively, whereas Antioxidant (percent n Africa, the Caribbean, the Pacific region, and Asia, Colocasia esculenta, sometimes known as taro or cocoyam, is a common food staple. On a dry matter (DM) basis, the corms have a carbohydrate content ranging from 73 to 80 percent, the majority of which is starch at 77.9% and 1.4 percent crude fibre. Due to its high carbohydrate content, this tuber is one of the most important sources of energy in various parts of the tropics and subtropics, accounting for around a third of the food consumed by more than 400 people. Taro corms in large quantities, especially if consumed more than once a day, can provide a significant supply of dietary protein. Thiamin, riboflavin, iron, and phosphorus are also found in taro. Cocoyam flour can be used in soups, biscuits, bread, beverages, and puddings. Taro contains a lot of gum, which has been demonstrated to help with high

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blood pressure, hypercholesterolemia, and diabetes control **(Habashy and Radwan 1997; Nip 1997).**

Food thickeners have been made using taro flour **(Onyeike et al. 1995).** Because of its mucilage, precooked taro flour has been shown to have a stronger stabilizing effect on fruit juices separation than commercial stabilisers like locust bean gum, carboxymethylcellulose, and carrageenan gum. In their natural condition, taro gum are also thought to be employed as binding and emulsifying agents **(Nip 1997).**

The goal of this research was to figure out how much food was good for you. phytochemical components, and organoleptic properties of crude taro corms containing m ucilage or gums as binding and emulsifying agents in order to investigate the possibility o f producing beverages made entirely of taro or taro mixed with fruit juices and milk, as w ell as to assess the palatability of the aforementioned beverages among the panellists.

MATERIALS AND METHODS

Materials

A-Taro corms were prepared from agriculture Research Center (ARC) in Giza governorate, Egypt.

B-Milk, sugars, mango, guava and strawberry fruits were purchased from the local market in Giza governorate, Egypt.

C-All chemicals and reagents used in this study were of analytical grade and purchased from El- Gomhoria Company for Trading Medicine and Chemical Egypt.

Technical methods

Fresh fruit (mango, Guava and Strawberry) were cleaned, washed, blended using blender to obtain fruit juice

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Preparation of taro corms and its beverage products

The raw taro corms were undergone different physical treatments such as washing, peeling, chopping, before processed. Bring a pot of water to a boil and add a pinch of baking soda. Cut the taro corms in to cubes, boil until it is soft (15-20min). Drain and transfer the taro cubes to a large bowl and let them cool. When the taro root is cool, the beverage prepared as follow:

- The first treatment (control) was prepared without (control) any treatment, added 50 gm of cool taro corms, 40 gm sugar and 170 ml water
- The second treatment was mixed 50 gm of cooled taro root, 40 gm sugar, with 170 ml juice from every previous fruits (mango, Guava and Strawberry).
- The third treatment was prepared with 50 gm of cool taro corms, 40 gm sugar and 170 ml milk instead of water. blended all the treatments until became smooth, the obtained final beverage was kept in a bottle, sterilized at 120 c for 25 min, then stored at ambient temperature for analysis.

Chemical analysis

Moisture content, crude protein, crude fiber, total soluble solids (TSS), ash, pH value and total acidity were determined according to the methods of **AOAC (2010).** Total sugars were determined using Lane- Eynon procedure as stated in the **AOAC (2007).** Antioxidant activity was determined by the method of **Sheng and Silva (2006).** Total free phenols were determined using folin-Denis reagent as described by **Swain and Hills, (1959).**

Color measurement of non-enzymatic browning was determined according to **Ranganna, (1977).**

Determination of minerals

Minerals (Ca, Fe, and Zn) were determined using a Perkin Elmer Atomic Absorption Spectrophotometer (Type 2380, Japan), whereas K was determined using a Flame Photometer (model PE P7, England) as described with **AOAC (2010).**

Microbiological examination

Total bacterial count was determined according to the method described by Pundir and **Jan (2011).**

Calculation of nutrition value

Nutrition value was calculated for protein and minerals as percentage of RDR as follow:

$$\%\ \text{protein} = \frac{\%\ \text{protein for each product} \times 100}{\text{St of RDR}}$$

$$\%\text{Mineral} = \frac{\%\ \text{mineral for each product} \times 100}{\text{St of RDR}}$$

RDR = Recommended Daily Requirement.

Sensory evaluation

Organoleptic attributes, color, taste, odor, texture and overall palatability were evaluated through ten-point scale, where ten is extremely liked and 1 extremely disliked. Trained panelists were selected from Food Tech. Res. Institute (FTRI), including both male and female members **(Lee *et al.*, 2003).**

Statistical analysis

The results (mean± standard deviation) were statistically analyzed by analysis of variance (ANOVA) using the statistical package (Costat) software (version 6.311) according to **Steel and Torrie (1980).** A significant level of $p \leq 0.05$ was used to indicate a meaningful difference.

RESULTS AND DISCUSSION

Physicochemical properties of taro corms.

Data presented in Table (1) showed the physicochemical composition of fresh taro corms caleulatea on dry weight basis, it could be noticed that moisture content was 73.7%, while ash, crude fiber, fat, protein, total sugar and total acidity were 3.47, 3.7, 2.61, 6.68, 1.28, and o.13 respectively while pH value was 6.9 .Total phenol (mg GAE/ 100 g) was o.o34, taro is a good source of potassium (2251mg /100 g), while calcium, iron and zinc were 81.5, 2.72 and 1.51mg /100 g respectively, **(Richelle et al 2010)**

Table (1) physicochemical properties and mineral contents of fresh taro corms calculated (on dry weight basis)

Chemical composition	Taro corms
Moisture	73.7
Total solid (TS)	26.3
Total soluble solids (TSS)	-
Ash	3.47
Crude fiber	3.7
Protein	6.68
Total sugars	1.28
Total phenols (mg GAE/1oog)	0.03
PH	6.9
Total acidity	0.13
Calcium mg/ioog (ca)	81.5
Potassium mg/ioog (K)	22.51
Iron mg/ioog (Fe)	2.72
Zinc mg/ioog (Zn)	1.54

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Data presented in Table (2)showed the physicochemical composition of fresh mango, guava, strawberry fruit juice and milk .It was clearly observed that mango fruit juice had the high value of TSS (14.23),total sugar (11.37%) and potassium (16.8 mg/100ml),while guava fruit juice contained high value of ash, crude fiber and calcium which accounted 0.59% , 5.2% and 16.5 mg/100ml respectively, also strawberry fruit juice recorded high value of moisture content (88.65%), total phenol (1775 mg/100g), total acidity(0.59%) ,iron and zinc(o.312, o.2 mg/100 ml)respectively ,this results nearest with the obtained by **(Radwan et al 2015).** data presented in Table (2) showed that milk contained high value of ash, protein, calcium, potassium and zinc which being amounted 0.7%, 3.4%, 119.8 ,144.9 and 0.38 mg/100 ml, respectively.

Table (2) physicochemical properties and mineral contents of fresh mango, guava, strawberry fruit juice and milk.

Chemical composition	Mango juice	Guava juice	Strawberry juice	Milk
Moisture%	82.9	83.1	88.65	84.2
Total solid % (TS)	17.1	16.9	11.35	15.8
Total soluble solids (TSS)	14.23	9.9	8.45	8.8
Ash %	0.55	0.59	0.25	0.7
Crude fiber %	4.15	5.2	2.69	---
Protein %	0.47	0.45	0.48	3.4
Total sugars	11.37	8.01	7.85	5.0
Total phenols+	804.0	629.4	775.00	0.7
PH	4.0	3.7	3.34	6.66
Total acidity++	0.319	0.49	0.58	0.12
Calcium+++	15.88	16.5	11.0	119.8
Potassium+++	16.8	11.63	14.8	144.9
Iron+++	0.129	0.309	0.312	0.07
Zinc+++	0.09	0.149	0.200	0.38

+: mg GAE / ml
++: as citric acid
+++: mg/ 100ml

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Table (3) showed the chemical composition of taro beverage and its treatments (on dry weight basis), from that Table it could be observed that the moisture content of taro , taro mango, taro guava , taro strawberry and taro milk beverages were 76.89, 75.95, 76.32, 77.18,and77.17 %respectively, also total soluble solids (TSS) for the previous treatments were 55, 55, 57, 55, and 57% while ash and crude fiber were (0.903and 0.88 %) for taro beverage, (2.15 and 4.20%) for taro mango beverages , (2.35and 5.09%) for taro guava beverage, (2.38 and 3.o6%) for taro strawberry beverage and (2.20 and 0.87%)for taro milk beverage. Also, taro milk beverage had the high content of protein (6.14%) followed by taro strawberry beverage (5.70%), taro beverage (5.47%), taro guava beverage (4.37%) and 3.65% for taro mango beverage respectively. A slight variation in total sugars was observed between all the beverage products where taro milk beverage had the high content of sugar (47.82%) while taro strawberry, taro mango and taro guava beverages had the values 45.90. 45.44, and 45.38% respectively, on the other taro beverage had low percentage of sugar, this variation in total sugars may be related to the high temperature of sterilization which led to the hydrolysis of polysaccharides, hemicellulose and cellulose in all products to monomeric sugars, **Hernández et al (2012),** reported that temperature and time were the factors that had more effect on the release of reducing sugars. Concerning the percentage of total phenol (mg EGA/100g) they ranged between 0.084 for taro milk beverage and 0.228 for taro guava beverage, the other beverages recorded 0.155, 0.133, and 0.179 for taro, taro mango and taro strawberry beverages respectively. pH value was 6.4 for taro beverage while it also ranged from 5.2 to 7.1 for their beverage products, total acidity ranged from 0.11 to 1.4% for the other treatments of beverage products. Results in the same table (3) showed the color of beverage products which ranged from 0.069 to 0.125 for them, concerning antioxidant activity % FW, results revealed that guava beverage products had the highest value of antioxidant activity than that in the other beverages treatments, it was 20.369% for its followed by strawberry beverage (15.739%), mango beverage (10.739%), taro beverage

(4.324%) respectively, while taro milk beverage had the lowest value (0.558%) of antioxidant activity

Table (3) physicochemical properties of taro beverages and their treatments calculated (on dry weight basis)

Chemical Composition	Treatments				
	T1	T2	T3	T4	T5
Moisture	76.8 9	75.95	76.32	77.18	77.17
Total solids (TS)%	23.11	24.05	23.68	22.82	22.83
Total soluble solid (TSS)%	55	55	57	55	57
Ash %	0.903	1.378	1.495	1.061	1.656
Crude fiber %	0.88	4.2	5.09	3.06	0.87
Protein %	5.47	3.65	4.37	5.70	6.14
Total sugars %	33.20	45.44	44.38	45.90	47.82
Total phenols (GAE/100g)	0.16 5	.0.133	0.228	0.179	0.084
PH	6.4	5.6	5.6	5.2	7.1
Total acidity %	0.111	1.06	0.81	1.40	0.70
Color (at420 nm)	0.123	0.099	0.076	0.118	0.077
Antioxidant activity (FW%)	4.403	10.739	20.369	15.739	0.558

T1-Taro beverage, T2-Taro mango beverage T3-Taro guava beverage T4- Taro strawberry beverage 5-Taro milk bevera

Mineral contents of taro beverage and their treatments

Table (4) showed the composition of elements, calcium (Ca), potassium (K),), iron (Fe) and zinc (Zn) on dry weight basis. Data in Table (4) showed that beverage product of taro strawberry beverage had the highest amounts of Ca (483.26mg/100g) followed by taro milk beverage (248.53mg/100g),taro beverage (130.66 mg/100g) taro mango beverage (115.68 mg/100g) while taro guava beverage recorded the lowest value of Ca (86.04 mg/100g) Data in the same table (4) showed that all beverages treatments rich in potassium element ,taro milk beverage had the high values of potassium (1100.44 mg/100g), while ranged from 709.26, 588.25, 557.06 and 511.27 mg /100g for taro

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strawberry taro mango, taro beverage, and taro guava beverage respectively .Iron contents were 3.98, 3.26, 3.22, 1.32 and 1.225 mg/100g for, taro mango, taro strawberry, taro guava ,taro milk and taro beverage respectively. In this concern, zinc content was 4.142 mg/100g for taro guava beverage followed by taro milk (1.32), taro beverage (1.202), taro mango (0.848) and taro strawberry beverage (0.403), respectively.

Table (4) Mineral contents of taro beverage and their treatments (mg/l00 g Dm)

Mineral contents	Taro beverage	Taro mango beverage	Taro guava beverage	Taro strawberry beverage	Taro milk beverage
Calcium (ca)	130.66	115.58	86.04	483.26	248.53
Potassium (K)	557.06	588.25	511.27	709.26	1100.44
Iron (Fe)	1.225	3.98	3.22	3.26	1.32
Zinc (Z)	1.202	0.848	4.143	0.403	1.32

Effect of storage period on microbiological examination of taro beverage and their treatments (cfu/g).

Fruit juice produced in a sanitary manner has the potential to improve consumer health by reducing the risk of breast cancer, congestive heart failure (CHF), and urinary tract infection. Fruit juice's nutritional richness makes it an excellent medium for microbial development, a carrier for food-borne infections, and associated complications in the absence of adequate manufacturing practises **(AI-Jedah and Robinson,2001)** Table (5), on the other hand, shows the overall bacteria count of taro beverage items. At zero time, no microbial growth was detected in any of the taro beverage treatments; this could be owing to the beverage's sterilising process during preparation, which lowered the microbial load significantly and increased the shelf-life of the product. After three and six months of storage at room temperature, the total bacterial count, of all beverage treatments increased somewhat, and there was minor contamination. The findings are consistent with those of **Silva and Gibbs (2004)** and **Sampedro et al (2009)**, who found that fruit juice has a high sugar content and a low pH, which encourages the growth of

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yeasts, moulds, and some acid-tolerant bacteria. In addition, the pH and moisture level of the food are the most critical criteria that influence the microbial development that causes food to deteriorate **(Patriarca et al., 2001).** These elements are crucial for spore germination and the growth of bacteria's vegetative cells.

Table (5) Total plate count of product taro beverages (CFU/G)

Treatments	**Storage Period**		
	Zero time	**After 3 months**	**After 6 months**
Taro beverage	**ND**	**2×10^1**	**1×10^2**
Taro mango beverage	**ND**	**2×10^1**	**1×10^2**
Taro guava beverage	**ND**	**2×10^1**	**2×10^2**
Taro strawberry beverage	**ND**	**5×10^1**	**3×10^2**
Taro milk beverage	**ND**	**3×10^1**	**4×10^2**

Nutritional evaluation of taro beverages products

From the Table (6) it could be noticed that 100 gm of tasted taro beverages products provides children aged (3-5) with 19.21 to 32.32 % of protein daily requirements, provides male and female aged (19-35 years) with 6.52 – 10.96% and 7.93-13.35 % of protein daily requirements respectively. From the same table (6) it was found that 100 gm of taro beverages products provides children aged (3-5 years) with 8.6o to 48.33 % calcium, 28.40 to 61.14 % potassium ,12.25 to 39.8 % iron and 8.06 to 82.26 % of Zink daily requirements respectively. (DRAs, 2005). while provides male with 8.6 to 48.33% calcium, 30.99 to 66.69% potassium, 15.31 to 49.75% iron and 3.66 to 37.66% of Zink daily requirements respectively. Concerning female taro beverages products provides them with 8.60 to 48.33% calcium, 30.99 to 66.69% potassium, 6.80 to 22.11 % iron and from 5.04 to 51.79% of Zink daily requirements respectively.

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Table (6) Nutritional evaluation of taro beverage treatments compared to daily recommended requirements for Children-males and Females.

Element	Daily Recommended Requirements			T1	T2	T3	T4	T5
	Children (3-5 years)	Males (19-35)	Females (19-35)					
Protein	19	56	46	5.47	3.65	4.37	5.70	6.14
Ca mg	1000	1000	1000	110.66	248.53	86.04	483.26	248.53
K mg	1800	1650	1650	557.06	100.44	511.27	703.26	100.44
Fe mg	10	8	18	1.225	1.32	3.22	3.26	1.32
Zn mg	5	11	8	1.202	0.848	4.143	0.403	1.32

1-Taro beverage 2- Taro mango beverage 3- Taro guava beverage 4- Taro strawberry beverage 5-Taro milk beverage

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Organoleptic evaluation of taro beverage and their treatments

Tables 7 and 8 indicate the main values of organoleptic evaluation, namely colour, taste, odour texture, and acceptability of beverages made from taro and various fruits (mango, guava, and strawberry) and milk at zero time and after 3 months of storage at room temperature. The results revealed that there were substantial variations in the mean values of colour, taste, odour, texture, and palatability between T5 and all processed taro beverages (T1, T2, T3, T4). The panellists' descriptions of overall palatability ranged from very palatable to palatable for all of the goodsThe results revealed that there were substantial variations in the mean values of colour, taste, odour, texture, and palatability between T5 and all processed taro beverages (T1, T2, T3, T4). The panellists' descriptions of overall palatability ranged from very palatable to palatable for all of the goods It was obvious that the taro milk beverage product received the lowest marks for all sensory characteristics of beverages. After 3 months of storage, it was clear that there were no significant differences in the mean values of all beverages for colour, taste, odour, texture, and palatability, while significant differences were observed between T5 and the previous beverage in the mean value of odour and texture, finely a slight variation was observed in all processed beverages, and there was no sedimentation and a clear stabilise in the texture of the beverages. This result revealed that the processing of taro beverages and various fruit juices, as well as taro milk, was safe at zero time or during storage at room temperature (25°C ±5).

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Table (7): Sensory evaluation of taro beverage and their treatments at zero time.

Sample	Color	Taste	Oder	Texture	Palatability
T1	8.8^{a} ±0.632	8.2^{c} ±0.422	8.3^{a} ±0.483	7.9^{ab} ±0.994	8.275^{a} ±0.381
T2	9.05^{a}±0.369	8.85^{ab}±0.58	8.55^{a}±0.832	8.4^{a}±0.966	8.713^{a}±0.485
T3	8.7^{a}±0.675	9^{a}±0.687	9.1^{a}±0.568	8.1^{ab}±1.197	8.725^{a}±0.65
T4	8.3^{a}±0.675	8.35^{bc}±0.669	8.3^{a}±0.675	8.45^{a}±0.599	8.35^{a}±0.503
T5	7.7^{b}±0.823	7^{d}±0.527	7.45^{b}±0.832	7.25^{b}±0.791	7.316^{b}±0.444

T1-Taro beverage T2- Taro mango beverage T3- Taro guava beverage T4- Taro strawberry beverage T5-Taro milk beverage

Table (8): Sensory evaluation of taro beverage and their treatments after storage for 3 months

Treatments	Color	Taste	Oder	Texture	Palatability
T1	8.28 ^{a}±0.994	8.2^{a}±1.549	8.1^{ab}±1.37	8^{ab}±1.247	8.075^{a}±1.118
T2	8.9^{a} ±0.876	8^{a}±1.247	8.2^{ab}±1.135	8.4^{ab}±1.265	8.45^{a}±0.815
T3	8.3^{a}±1.418	9.2^{a}±0.789	9.2^{a}±0.632	8.8^{a}±0.789	8.8^{a}±0.896
T4	8.2^{a}±1.619	8.7^{a}±0.823	8.7^{ab}±0.823	8.6^{ab}±1.35	8.725^{a}±1.03
T5	7.9^{a} ±1.595	8^{a}±1.563	8^{b}±1.563	7.6^{b}±1.265	7.825^{a}± 1.395

T1-Taro beverage T2- Taro mango beverage T3- Taro guava beverage T4- Taro strawberry beverage T5-Taro milk beverage

CONCLUSIONS

The results of this study support the use of taro corms as thickeners, which may help to improve the suspension of other components or emulsions, hence improving the stability of mixed beverages. Moisture, ash, protein, total sugar, calcium, potassium, iron, and zinc are all good sources of natural chemicals, as are various fruit juices and milk. The main ingredients of taro corms, fruit juices, and milk may be investigated for beverage processing. Taro beverage and their treatments with fruit juices and milk showed presence of important compounds and minerals such as calcium, potassium, iron and zinc in a moderate quantity which holds the potential to meet the daily requirement from such type of processed beverages. Regarding sensory analysis, no significant differences were found among the five taro beverages studied for most of the parameters, except taro milk beverage which had a moderate overall acceptability. Regarding the overall assessment, consumers classified them as enjoyable, also advice that consumption of taro beverage and their treatments are important for building a strong immune system that help the body to utilize protein, carbohydrates and other minerals **(Enwelu et al 2014).** Finally, it could be clearly concluded through this study that it is pracatable healthy economic and successful to produce taro beverages. These products were palatable among the panelists

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