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Research Article

The Developing Functional Iron-rich Drinks from Cowpea (*Vigna unguiculata*), Sweet Corn (*Zea mays* L.var. *rugosa*) and Torbangun Leaves (*Coleus amboinicu* Lour) as An Alternative to Combat Anemia in Pregnant Women

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Abstract

The cause of iron deficiency anemia in developing countries is the lack of iron in the diet. The results of Riskesdas showed that the prevalence of anemia in pregnant women was 37.1% in 2013 and increased to 48.9% in 2018. The prevalence of anemia in pregnant women increased by 11.8% from 2013 to 2018. The high prevalence of anemia is feared to have an impact on anemia in the next period. The purpose of this study is to develop functional drinks from local foods (sweet corn, tolo beans, guava, and gun leaves) that can be used for the intervention of iron nutritional anemia in pregnant women. The type of experimental research is Complete Random Design (RAL) with 3 treatments and 3 replications. The research was conducted at the Food and Taste Laboratory, Department of Nutrition of the Ministry of Health of Jakarta II, while the analysis test of Proxy Nutrients, Iron, Vitamin C and microbiological quality were carried out at the Saraswati Indo Genetech Bogor GIS laboratory. The data analysis method used Descriptive Analysis, Friedman test, and Wilcoxon test. This research was approved by the Ethics Commission of the Ministry of Health of the Ministry of Health II number LB.02.01/I/KE/31/463/2019. The results of the Friedman test showed that the addition of the concentration of torbangun leaves had a significant effect on the aroma and consistency of the functional drink ($p < 0.05$). Meanwhile, the addition of the concentration of torbangun leaves has no effect on the color, taste, and acceptability of functional drinks. The functional drink product that the panelists liked was the addition of 17% to ban gun leaves with the criteria of light green, very strong guava aroma, *strong corn after taste* and dilute consistency with a total energy nutrient content of 73%; protein 2.02%; total fat 1.3%; carbohydrates 13.3%; ash content 0.5%; moisture content 82.9%; Iron 7.03 mg and Vitamin C 15.6 mg, microbiological analysis results Total Plate Number (ALT) 2.4 x 101.

Abbreviations

RAL: Complete Random Design; RISKESDAS; Basic Health Research

Introduction

One of Indonesia's nutritional problems is Iron Nutritional Anemia. Iron Deficiency Anemia is a deficiency of Hemoglobin (Hb) levels in the blood that are less than normal and differ according to age group, sex, and physiological conditions. In Indonesia, most anemia is caused by iron deficiency. Meanwhile, iron deficiency anemia is anemia that occurs due to a lack of iron in the blood. Iron deficiency anemia is still a problem in pregnant women in Indonesia. The causes of iron

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deficiency anemia in developing countries are due to the food eaten lacking in iron, the high prevalence of worms, and the high prevalence of malaria in endemic areas [1].

The results of Basic Health Research (Riskesdas) 2013 and 2018) show that Indonesia still has anemia problems with the prevalence of anemia in pregnant women in 2013 of 37.1%, increasing to 48.9% in 2018. The prevalence of anemia in pregnant women increased by 11.8% from 2013 to 2018. The high prevalence of anemia is feared to have an impact on anemia in the next period [2,3].

The level of animal protein consumption of the Indonesian population, namely fish and processed meat is 78.4 g, meat and processed meat is 42.8 g, eggs and processed 9.7 g, milk and processed milk is 5 g per person per day. The consumption level of vegetable protein of nuts and their processed products was 56.7 g, and cereals and processed products were 257.7 g. Meanwhile, the consumption level of vegetables and fruits and their processed products is 57.1 g and 33.5 g per person per day [4].

Drinks are a type of substance in liquid form that can be consumed and can quench thirst, the requirement is that drinks according to SNI contain a sugar content of 10% - 20% brix and can be drunk directly without diluting first. While functional drinks are drinks that have benefits for body health, examples of functional drinks are drinks that contain proteins, vitamins minerals, and bioactive fibers in the drink. One example of bioactive food is the xanthophyll pigment found in yellow corn, which has a function as an antioxidant [5,6] Corn as a food ingredient contains a fairly high nutritional value when compared to other foods, especially yellow corn which contains a lot of vitamin A [7].

In this study, the development of functional beverage products using sweet corn, and tolo beans, to ban gun leaves and fresh guava. Of the four ingredients, they contain bioactive components such as xanthophyll, lactogogum, protein, Fe, and Vitamin C which are combined as functional drinks, especially for anemia sufferers in pregnant women.

The xanthophyll pigment in sweet corn is an antioxidant, and nuts as a source of protein, Fe, and other nutrients. The protein content of tolo beans is 24.4% which has the potential to be a plant-based protein food. Tolo nuts, in addition to being a source of vegetable protein, are also high in iron content or Fe of 13.9 mg, another source of iron that is high from the leaf group is torbangun leaves which reach 13.6 mg per 100 g of fresh leaves [6]. Guava is one of the fruits that contain the highest vitamin C compared to other types of fruits. The content of Vitamin C in guava is 87 mg. Fresh Red Guava Fruit (Psidium guajava L) is one of the fruits that contain high antioxidants. Vitamin C works to facilitate the absorption of iron, especially non hemp found in plant-based foods. The effective dose of guava that can reduce tracheal damage in mice is 0.26 ml/mice/day or equivalent to consuming 100 grams of guava for humans every day. (Novi & Rita). The guava used in functional drinks is in the form of fresh, filtered guava juice [7].

According to SNI 01-3719-1995, fruit juice is a soft drink made from fruit juice and drinking water with or without the addition of sugar and permitted food additives. The Total Plate Number (ALT) of the drink is max. $1x10^4$ [5]. Based on the explanation above, the researcher is interested in conducting research on the development of functional beverage products based on local food (sweet corn, tolo beans, tor bangun leaves, and red guava) in other words combining several types of food ingredients that use basic ingredients, carbohydrate sources, protein sources, vitamin and mineral sources that are very suitable for use for drinks in anemia patients, especially pregnant women, adolescents and children. The reason for developing products in the form of drinks is that it is very easy to consume whenever needed, besides that it also considers the need for water in the body at least 2 liters/person/day. Consuming functional drinks can increase the intake of iron-rich foods for people with anemia, relieve thirst, and increase enjoyment when consumed in a cold state [8-10].

Materials and methods

The scope of this research includes the calculation of material needs, the production of functional beverage products made from tolo nuts, sweet corn, gun leaves, and guava, and other additives of milk powder and granulated sugar in the manufacture of functional drinks. Organoleptic tests were carried out to determine the beverage products that the panelists liked including color, aroma, taste, consistency and acceptability, sugar content, and pH level. Furthermore, the product was analyzed for proximate nutrients and iron analysis, microbiological quality analysis (ALT) of the cup counting method [10]. This research was conducted in the Food Laboratory and the Taste Test laboratory of the Department of Nutrition, Health Polytechnic, Ministry of Health, Jakarta II. Meanwhile, the analysis test of Proxy Nutrients, Iron, Vitamin C and microbiology quality tests were carried out at PT. Saraswanti Indo Genetech (SIG) Bogor. This research included experimental research with a complete random design (RAL) design with 3 experiments and 3 replications so that 9 experimental units were obtained [11,12]. The ingredients used in this study were dried tolo beans 50g, sweet corn 100g, to ban gun leaves (16%, 17%, and 18%), guava 20%, milk powder 2.5%, and granulated sugar 10%. 100g of sweet corn produces 400 ml filtrate, 50 g of tolo beans are soaked then boiled and ground to produce 400 ml filtrate, 180g of guava total 900 ml filtrate. This research was carried out in two stages, namely preliminary research and main research.

Preliminary research includes:

1. Calculating the need for iron (Fe) used for functional drinks, based on the 2017 TKPI tolo beans contain 13.9 mg/100g of dried iron and 13.6 mg/100g of to ban gun leaves, tolo beans = 13.9 mg/100g = 0.139 mg/1g, jk 25 g is equivalent to 3.475 mg Fe

2. Calculating the iron requirement to ban gun leaves 13.6 mg/100 g fresh leaves = 0.136 mg / 1 g, jk 10 g is equivalent to 1.36 mg.

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3. Iron needs of pregnant women a day on:

Trimester II = 26 + 9 = 35 mg

Trimester III = 26 + 13 = 39 mg

4. Fe needs for interlude drinks, one drink calculation result:

Tri mester II = 12.5% x 35 = 4.375 mg

Tri mester III= 12.5% x 39 = 4.875 mg

5. The results of the calculation of the iron (Fe) requirement of functional drinks in 900 ml according to BPOM 1 serving size for fruit juice/shield drinks are 100-250 ml.

Torbangun leaf concentration 0% =10.165 mg

Torbangun leaf concentration 16% = 27,749 mg

Torbangun leaf concentration 17% = 30.965 mg

Torbangun leaf concentration 18% = 32,195 mg

In 1 serving of 250 ml of drink contains iron (Fe)

Torbangun leaf concentration 0% = 2.823 mg

Torbangun leaf concentration 16% = 7,708mg

Torbangun leaf concentration 17% = 8,601 mg

Torbangun leaf concentration 18% = 8,943 mg

6. Functional Beverage-Making Procedure

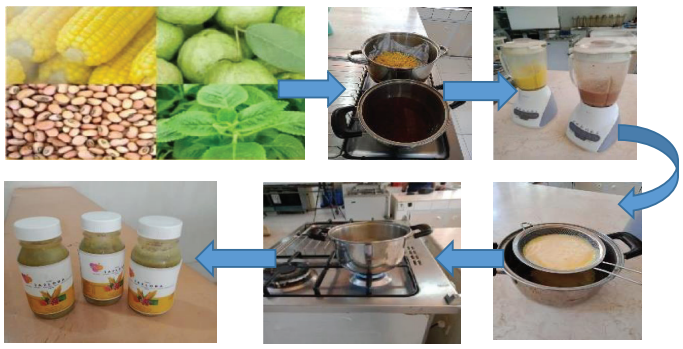
1. Weigh the tolo beans 250 g, soak for 12 hours then wash and drain.
2. Boil the tolo beans in 1000 ml of water over medium heat until the water runs out.
3. Grind the tolo beans by adding 2000 ml gallons of aqua water and then strain.
4. Clean the sweet corn and wash it thoroughly, comb the corn from the ponytail weighing 500g
5. Steam for 10 minutes from boiling.
6. Grind by adding 2000 ml gallons of aqua water until smooth then strain.
7. Wash Clean Leaves Torbangun weighs 16%, 17% and 18%
8. Blending at 82 °C for 3 minutes
9. Blend using sweet corn extract liquid, then strain
10. Mix corn extract and tolo beans, torbangun leaves into one, add 10% granulated sugar and 2.5% powdered milk, and heat at 70 °C.
11. Wash the guava thoroughly weighing 20% of the liquid volume of sweet corn and tolo nuts, then cut into the ground strain.
12. Put guava filtrate into a drink with a temperature of 50 °C.

a) Cool and pack in beverage bottles

b) Store in the refrigerator

The main research includes the preparation and manufacture of functional beverage products made from sweet corn, and tolo beans, to ban gun leaves and guava, then conducting organoleptic tests to obtain the results of the preferred functional beverage products and conducting a descriptive analysis based on percentage. Determine the beverage product preferred by the panelists, analyze the proximate nutrients, Fe, Vitamin C, sugar levels, and pH, and conduct microbiological quality tests to determine the total plate number (ALT) max. 1x104 of functional beverage products. [5] to find out whether or not there is an effect of the addition of to ban gun leaf concentration on organoleptic quality and functional drink acceptability is analyzed using non-parametric Friedman SPSS alpha = 0.05 statistics.

Functional Beverage-Making Process



The data collected is primary data, obtained from the results of organoleptic quality assessment which includes color, aroma, taste, consistency, and acceptability of functional beverage products that use sweet corn, tolo beans, torbangun leaves, and guava. In addition, there are also data from laboratory analysis of macro and micronutrients (Fe), Vitamin C, pH sugar levels, and microbiological quality analysis.

Data collection was carried out through the results of the organoleptic test assessment by panelists using the organoleptic test form. The organoleptic test assessment was carried out by semi-trained panelists, namely level II and level III students of the Department of Nutrition of the Ministry of Health of the Ministry of Health Jakarta II as many as 30 panelists who have taken courses related to organoleptic quality assessment. The data from the assessment of organoleptic tests, and acceptability was analyzed descriptively based on percentage. While the nutrient content was analyzed proximate, Iron was analyzed by the ICPOES method, Vitamin C was analyzed by Titrimetry.

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Results

The research was conducted in 2 stages, the first stage of preliminary research and the main research. From the results of the organoleptic test, the concentration of woken leaves that were selected and had met the needs of Fe for anemia of pregnant women, namely 16%, 17%, and 18% of the leaves.

Product overview

The functional drink products produced in this study are light green to brownish-green, the aroma of guava is very strong and sufficient, the taste after taste of corn is strong, the shape of the consistency ranges from dilute to very diluted, the level of preference is a little like and very like, the liquid form is in the bottle packaging. For a more detailed overview of functional beverage products, the results of the study can be (Table 1).

Results of the organoleptic test assessment of functional beverages

The assessment of organoleptic tests of functional drinks made from tolo beans, sweet corn, torbangun leaves, and guava includes color, aroma, taste, consistency, and acceptability. For more details on the results of the organoleptic test assessment of functional beverages (Table 2).

Warna

Color assessment is an important factor in determining food quality. Color affects the initial perception of the panelists, the color appears first. In determining the quality of food in general depends on the color it has, the color gives the impression of the panelists' own assessment. The color of functional drinks ranges from dark green, light green, brownish green. The highest percentage of panelists' assessment stated that functional drinks had a light green color in the T2 treatment of 15 panelists (50%) then followed by the T3 treatment, the panelists gave a second assessment with the criteria of brownish green by 14 panelists (46.7%). While in the T1 treatment, the panelists gave an assessment with the criteria of dark green by 9 panelists (30%).

Aroma

Aroma plays a very important role in determining the assessment and quality of a food ingredient. In addition to color, aroma is also a major concern, next is the taste. The results of the panelists' assessment stated that the most functional drinks with the same criteria, namely the very strong guava aroma were found in the T1 and T2 treatments with a percentage of 10 panelists (33.3%) and 14 panelists (46.7%) respectively. Meanwhile, in the T3 treatment, the panelists stated that the criteria of guava aroma were sufficient for 13 panelists (43.4%).

From the results of Friedman's non-parametric statistical test analysis, it was obtained that the value $p = 0.016$. If the p-value is < 0.05, it can be concluded that there is an effect of adding different concentrations of ban gun leaves on the aroma of functional drinks made from tolo beans and sweet corn.

Taste

Taste is the most important factor in determining the decision for panelists to accept or reject a beverage or food product. Taste is very decisive even if the other criteria are good, if the taste is not good or suitable then the product will be rejected or not accepted.

In general, it can be seen that the percentage of panelists stated that most drinks had a taste with the same criteria,

Table 1: Overview of functional beverage products made from tolo bean base, sweet corn, torbangun leaves.

Criterion	Treatment		
	T1	T2	T3
Color	Dark green	Light green	Brownish-green
Aroma	The aroma of guava is very strong	The aroma of guava is very strong	The aroma of guava is enough
Taste	After taste strong corn	After taste strong corn	After taste strong corn
Consistency	Very diluted	Dilute	Dilute
Acceptability	Little likes	Really like	Little likes

Information: T1: Tornado leaves 16%; T2: Torbangun leaves 17%; T3: Torbangun leaves 18%

Table 2: Results of the organoleptic test assessment of functional beverages.

Color Criteria		T1		T2		T3
Dark green	9	30,0	2	6,7	3	10
Green	6	20,0	10	33,3	4	13,3
Light green	8	26,7	15	50	7	23,3
Brownish-green	6	20,0	3	10	14	46,7
Light Brown	1	3,3	0	0	2	6,7
Total	30	100	30	100	30	100
Aroma						
Unscented guava	1	3,3	0	0,0	2	6,7
The aroma of guava is lacking	6	20,0	9	30,0	9	30,0
The aroma of guava is enough	6	20,0	7	23,3	13	43,4
Strong guava aroma	7	23,3	0	0	1	3,3
The aroma of guava is very strong	10	33,3	14	46,7	5	16,7
Total	30	100	30	100	30	100
Taste						
After tasting strong corn and beans	6	20,0	1	3,3	2	6,7
After tasting corn and beans enough	5	16,7	11	36,7	10	33,3
After taste strong corn	14	46,7	12	40,0	12	40,0
After taste strong beans	2	6,7	5	16,7	5	16,7
After tasting corn and beans undetected	3	10,0	1	3,3	1	3,3
Total	30	100	30	100	30	100
Consistency						
Thick	1	3,3	0	0,0	0	0,0
Somewhat thick	9	30,3	6	20,0	7	23,3
Slightly diluted	3	10,0	5	16,7	8	26,7
Dilute	7	23,3	18	60,0	14	46,7
Very diluted	10	33,3	1	3,3	1	3,3
Total	30	100	30	100	30	100
Acceptability						
Dislike	3	10,0	2	6,7	1	3,3
Quite like it	4	13,3	6	20,0	10	33,3
Little likes	12	40,0	8	26,7	11	36,7
Like	2	6,7	1	3,3	1	3,3
Really like	9	30,0	13	43,3	7	23,3
Total	30	100	30	100	30	100

Information: T1: Tornado leaves 16%; T2: Torbangun leaves 17%; T3: Torbangun leaves 18%

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namely after the taste of strong corn in the T1 treatment of 14 panelists (46.7%), while the T2 and T3 treatment received the same assessment, namely 12 panelists (40.0%). The results of Friedman's non-parametric statistical test showed that the p = 0.569 value, if the p - value > 0.05 it can be concluded that there is no effect on the various formulations of functional drinks on the resulting taste.

Consistency

Consistency is the viscosity of a liquid can be seen by looking at the process of the liquid falling. In addition, consistency can be seen in the taste buds. From the results of the assessment of most panelists, it was stated that the drink had a level of consistency with the criteria of very diluted in the T1 treatment of 10 (33.3%) in the T2 and T3 treatments, the panelists gave an assessment with the same criteria, namely diluted by 18 (60%) and 14 (46.7%) respectively.

The results of Friedman's non-parametric statistical test analysis showed a p = 0.000 < value of 0.05, if the p < value was 0.05 then it can be concluded that there is an effect of adding different concentrations of torbangun leaves on the consistency of the functional drink produced. To find out if there are differences in functional drinks in the formula, a further test was carried out, namely the Wilcoxon Test with a meaning of 95%.

Based on the results of Wilcoxon's follow-up test analysis of the three treatments, the same values were obtained p = 0.01 < 0.05, namely T1 treatment with T2, T1 treatment with T3 meaning that there is a real difference in the treatment. Meanwhile, in the treatment of T2 with T3, the value of p = 0.685 > 0.05 was obtained. So it can be interpreted that there is no real difference in the treatment of T2 and T3.

Acceptability

The panelist's acceptance of a food product shows all aspects of the color, aroma, taste, and consistency of the product served according to the panelist's taste. Acceptance in general to find out the level of response from the panelists regarding their preference for the beverage formulation in each treatment.

The results of the percentage of panelists gave an assessment with the criteria of liking, if the criteria of liking were combined with the criteria of very liking became like the product. Panelists gave an assessment of liking the same beverage product in the T2 treatment of 14 panelists (46.7%) then the T1 treatment and T3 treatment with a percentage of 11 panelists (36.7%), and 8 panelists (26.7%) respectively. Meanwhile, in the T1 treatment, the panelists gave an assessment with different criteria, namely a few likes. So it can be concluded that for functional drink products based on tolo beans and sweet corn, the Panelist gave the highest acceptance assessment on functional drinks with the addition of 17% to ban gun leaves. The results of the analysis of Friedman's non-parametric statistical test obtained a p - value = 0.315 > from 0.05, if the p -value is > from 0.05, it can be concluded that there is no effect of adding different concentrations of banned gun leaves on the acceptability of the functional drink made from tolo beans produced.

Functional beverage nutrition

Nutrients were obtained from the analysis of the PT Saraswati Indo Genetech (SIG) Laboratory in Bogor. The results of the nutrient analysis from the three treatments were almost the same, except that Fe and Vitamin C levels obtained different results from the three treatments. For more details on the results of nutrient analysis (Table 3).

Based on the average results of the analysis of functional beverage nutrients in 100 ml containing the energy of 75.64 kcal in the T1 treatment, the T2 treatment was 73.085 kcal, while the T3 was 74.06 kcal; T1 treatment protein levels of 2.125g, T2 treatment of 2.02g and, T3 treatment of 2.165g; total fat content of T1 treatment was 1.39g, T2 treatment was 1.325 and T3 was 1.10; T1 carbohydrates of 13.86; T2 treatment was 13.27 and T3 treatment was 13.875; the ash content of T1 and T2 treatment with the same ash content is 0.465; while T3 is 0.455; for the moisture content of T1 treatment is 82.25; T2 of 82.92; and T3 by 82.405%; Vitamin rate. C T1 treatment of 20, 739 mg; T2 treatment was 15.613mg and T3 treatment was 17.873mg. Meanwhile, iron in the T1 treatment was 6.885 mg, T2 was 7.025mg and T3 treatment was 9.595 mg. Result the analysis found that the value of fe/100 ml of beverage content was higher than the calculation results using the TKPI table.

Based on Table 4, the results of the microbiological analysis showed that the sample drink in the T1 treatment with the addition of 16% to build leaves with the ALT parameter Total Plate Number obtained an average result of 4.1x102, the sample of T2 treatment with the addition of 17% to build leaves obtained an ALT result of 2.4x101. The T3 treatment sample with the addition of 18% to build leaves obtained an ALT result of 1.1x103, with the categories for high equipment sanitation, high environmental sanitation, and good personal hygiene. This means that functional beverage products as an alternative

Table 3: Analysis of the average nutritional content of tolo bean-based functional drinks per 100 ml.

No	Parameter	Treatment		
		T1	T2	T3
1	Total energy (Kal)	75,64	73,085	74,06
2	Protein (%)	2,125	2,02	2,165
3	Total Fat (%)	1,30	1,325	1.10
4	Carbohydrates (%)	13,86	13,27	13,875
5	Up to abu (%)	0,465	0,465	0,455
6	Up to Air (%)	82,25	82,92	82,405
7	Iron (mg /100 ml)	6,885	7,025	9,595
8	Vitamin C (mg /100g)	20,739	15.613	17,873
9	Energy from fat (Kcal/100g)	11,70	11,925	9,90

Table 4: Results of microbiological tests of functional drinks made from tolo nuts.

No	Treatment	Parameter	Results			Method
			Simple	Double	Friends	
1	T1	ALT	$4,5x10^2$	$3,7x10^2$	$4,1x10^2$	SNI ISO 4833-1:2015
2	T2	ALT	$2,0x10^1$	$2,8x10^1$	$2,4x10^1$	SNI ISO 4833-1:2015
3	T3	ALT	$1,1x10^3$	$1,0x10^3$	$1,1x10^3$	SNI ISO 4833-1:2015

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for patients with anemia in pregnant women have met the requirements of the 2014 SNI microbiological quality listed as a maximum of 1 x 104 [5]. The results of the microbiological analysis of the selected products of the panelists T2 to ban gun leaves 17% are very safe for consumption, related to nutrients that have met the needs including the category of high-iron drinks [9].

Discussion

Overall, from the results of the organoleptic test assessment of the three treatments, the higher the addition of ban gun leaves, the panelists gave an assessment with criteria ranging from dark hiaju, light green to brownish green. From the results of Friedman's non-parametric statistical test analysis, it was obtained that the value p = 0.080. If the p - value is > 0.05, it can be concluded that there is no effect of the addition of different concentrations of ban gun leaves on the color of functional drinks made from tolo beans and sweet corn. The color produced from functional beverage products is green chlorophyll pigment from ban gun leaves can defeat yellow xanthophyll pigment from corn and brown anthocyanin pigment from tolo beans so that it is able to maintain the green color. According to the results of Maulid & Laily's 2015 research, the chlorophyll content in dark green leaves is 50% greater than in light green leaves. This is because dark green leaves have a more dominant chlorophyll content than other colored leaves. Chlorophyll is a green-colored pigment found in chloroplasts. In high-level plants, chloroplasts are mainly found in the palisade parenchyma and leaf sponge parenchyma tissues [8].

The fresh guava juice added has a distinctive taste and aroma due to the compound eugenol (Rizkahendy) the aroma produced from functional beverage products comes from the strong aroma of guava. According to Soetopo, guava fruit has a distinctive aroma, which is "musky" when ripe. So that it can reduce other aromas (Soetopo in Riskahendy) Based on the results of Wilcoxon's follow-up test on the treatment of T1 with T3, a value of p = 0.008 < of 0.05 shows that there is a real difference in aroma in functional drinks. In the treatment of T2 with T3 from the results of the follow-up test, the value of p = 0.04 < of 0.05 was obtained, so it can be interpreted that there is a real difference between the treatment of T2 and T3. Meanwhile, in the T1-T2 treatment, the results of the follow-up test were obtained p = 0.059 > 0.05, meaning that there was no difference that resulted in the addition of different concentrations of torbangun.

The addition of different concentrations of torbangun leaves does not affect the taste of the functional drink. The original torbangun leaves have a slightly languishing and slightly spicy taste similar to mint leaves. Meanwhile, the taste produced from functional beverage products is a strong corn aftertaste. Corn has a sweet taste, the sweetness in corn is caused by the high sugar content in the endosperm. The addition of different concentrations of torbangun leaves and a slightly sluggish and slightly spicy taste in the manufacture of functional drinks that use the formulation of sweet corn, tolo beans, and guava and torbangun leaves are not detected.

The condition of the drink is diluted with a sugar content of 10% Brix [5]. The consistency of functional drinks is higher the added ban gun leaves will change the consistency of the drink from very dilute to more diluted. This is supported by the results of non-Friedman statistical analysis which shows that there is an effect of adding different torbangun leaves on the consistency of functional beverage liquids.

The advantage of this functional drink is the iron content because this drink is mainly intended for pregnant women who suffer from anemia so that by drinking this functional drink regularly it can reduce anemia sufferers, especially in pregnant women. Fortified beverages and supplementary foods, when given during pregnancy, have been shown to have positive effects on preventing maternal anemia and iron deficiency A few studies have also shown that fortified supplementary foods have an impact on increasing birth length and reducing preterm delivery [13-22].

From the results of the calculation for one drink in pregnant women in the second trimester as much as 4.375 mg, while for the third trimester, it was 4.875 mg, from laboratory analysis per 100 ml of functional drinks, the iron yield of 7.025 was obtained higher than the results of the calculation of iron needs of pregnant women. This iron requirement can be met by a functional drink made from tolo beans and sweet corn of 69 ml. Results of vitamin C analysis in functional drinks/100 ml (20,739; 15,613 and 17,873), vitamin C in drinks serves to help iron absorption. According to BPOM, for 1 serving of 100-250 ml of drinks. The results of Hilda Sulistia Alam's 2020 study showed that in pregnant women in the first trimester, there was a significant increase in Hb levels after being given corn (*Zea mays*) with a value of p = 0.000 < α = 0.05 [20].

The results of the microbiological analysis of the 17% torbangun leaf T2 panelists were very safe for consumption, related to nutrients that have met the needs including the category of high-iron drinks [9]. Prophylactic iron supplementation likely results in a large reduction in maternal anemia during pregnancy. Future research should qualify the impact of this benefit on women's quality of life and determine which subpopulations benefit most. Evidence surrounding the harms of iron supplementation in the non-anemic population is poor quality and inconsistent. Randomized controlled trials quantifying the risk of Gastrointestinal (GI) disturbance and iron overload are essential to inform iron supplement use and reduce unwarranted variations in international guidelines.

Conclusion

1. The functional drink product made from tolo beans and sweet corn that is preferred is the addition of 17% to ban gun leaves with the criteria of light green, very strong guava aroma, strong corn *aftertaste* taste, and diluted consistency.

2. There was an effect of adding the concentration of to-ban gun leaves on the aroma and consistency of functional drinks made from tolo beans and sweet corn.

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3. There was no effect of adding different concentrations of torbangun leaves on the color, taste, and acceptability of functional drinks made from tolo beans and sweet corn.

4. Functional drink products that are preferred with macronutrient content /100g energy total of 73.85 kcal; protein 2.02 %; total fat 1.325%; Carbohydrates 13.27%; ash content 0.465%; moisture content 82.92%; micronutrient iron 7,025 mg. The most preferred content of vitamin C in functional beverage products with an increase in the concentration of torbangun leaves of 17% by 15,613 mg.

5. ALT (Total Plate Number) of functional beverage products with an increase in the concentration of 17% torbangun leaves is an average of 2.4 x 101, meaning that the beverage products made are very safe to consume. The sugar content with the addition of different concentrations obtained the same measurement results, which was 13 %brix, while the pH of functional drinks obtained a measurement value of 6.5.

Acknowledgement

1. This functional drink product is very suitable for pregnant women in the 2nd and 3rd semesters.

2. Functional drinks are recommended to be consumed as a substitute for interlude meals.

3. This functional drink can be used as a government program to help reduce the prevalence of anemia, especially in pregnant women who are anemic.

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