International Journal of Multidisciplinary Research and Development

IJMRD 2014; 1(3): 60-66
www.allsubjectjournal.com
Received: 01-08-2014
Accepted: 13-08-2014
e-ISSN: 2349-4182
p-ISSN: 2349-5979

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Nutritional beverage production from the dried black glutinous rice malt

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Abstract
In our study of nutritious beverage from the dried black glutinous malt, the optimum cooking conditions were chosen at the ratio of water and material 1:4,3; the temperature 45 ^oC - 15 minutes, 63 ^oC - 50 minutes and 72 ^oC – 50 minutes with the highest extraction yield 71,65%. The percent of added sugar indicated the best result of sensory evaluation was 4%. The product pasteurized at 75 ^oC in 25 minutes achieved the standards of microorganism and sensory evaluation after stabilization stage of 15 days.

Keywords: black glutinous rice malt, extraction yield, sensory evaluation, nutritional beverage

1. Introduction

1.1 Factors affecting to black glutinous rice malt germination

Viability of the seeds: the process of sprouts and development of germinal granules can be seen as consisting of a number of successive steps make beads with moisture increasing low metabolic activity and which lead to the formation of sprouts from the embryo. Seeds can retain the ability to live for a long time from when they began to succumb to the harsh conditions outside. The ability to live of the seed is retained better in the storage conditions which allow for active metabolism of particles takes place slowly as low temperatures, low humidity and high CO_2 concentrations (Klaus, 1980).

Water absorption: the initial stages occur in the course of sprouts is the absorption of water which is mainly affected by the possibility of osmosis shell beads. However, the composition of the seeds soaked water content, as well as the concentration of dissolved substances in solution also affects the ability to absorb. This absorption process is unrelated to the ability to live of the particle, it occurs in both alive and dead particles. The absorption of water leads to significant increases in pressure, this is very important in the process of sprouts and growth of germinated seeds because it helps make the crust cracked grain. Water absorption ability of particle will decrease as the concentration of dissolved substances in the solution soak up due to the osmotic effects (Klaus, 1980). Composed primarily of water absorption is protein. Proteins carry both negative charge (-) and positive (+) easy-strong polar water molecules. By contrast, starch has a very weak affinity with water while lipids are absolutely no affinity with water (Miller, 2010).

Temperature: sprouts is a complex process consisting of many reactions and phases that every response and this period were affected by temperature (Miller, 2010). The temperature when it started sprouts varies according to breed, native seeds and the age of the seeds. At a temperature too low or too high, then the process of sprouts will be prevented. For rice, the minimum temperature is 10-12 ^oC, the optimal temperature is 30-37 ^oC and the maximum temperature is 40-42 ^oC inside (Klaus, 1980).

Air condition: the sprouts are affected by components of ambient air. Most seeds sprout in the environment the air containing 20% O2 and 0.03% CO2 – this is the normal condition of the atmosphere. However, seeds will sprout when oxygen concentrations rise above the 20% level, because the process of sprout requires use of energy and the most common energy needs process is the oxidation process. There are converse about the inhibition of CO2 to the sprouts. Most seeds do not sprout when the CO2 concentration rose too high (Klaus, 1980).

Light: in the process of annealing germinated, it is also limited to light because the light increases the activity of chlorophyll to, develop stem leaf dry matter exhausted and reduced enzyme activity (Nguyen Tan Vien, 1992). The inhibitor of the sprouts: herbicide and insecticide can inhibit sprouts, as well as the chemicals used to preserve the seeds. Therefore, should use the nuts don't over handle to make sprout (Klaus, 1980).

1.2 The transformation occurs in the seeds of rice sprouts

Physiological processes: Grain sprouts continue respiration to maintain life. The process of respiration increases the more powerful than particles when not soaking water, oxygen demand increases, the majority of the amount of oxygen to oxidations reserve substances created the energy needed for the enzyme to function. At the same time the substances needed for growing sprouts (Nguyen Tan Vien, 1992). Biochemical process: place sprouts in the activity of the enzyme hydrolysis process, the high quality of complex molecules into simpler substances and new substances process (Nguyen Tan Vien, 1992). Chemical process: The reciprocity effect reactions between substances that form after hydrolysis to form aromatics (Nguyen Tan Vien, 1992). Physical processes: transport of water and nutrients dissolved reserves to feed the work piece. The movement of substances from the endosperm into sprouts and vice versa (Nguyen Tan Vien, 1992).

1.3 Nutrition of rice germ

Rice sprouts not only bring more nutrients, but also Cook very easy and gives us a taste slightly sweet because of the enzymes have an impact on the sugars and proteinin rice seed (Duong Thanh Liem, 2010). A group of Japanese scientists have found black rice soak for long hours to 22 plenty nutritious brown rice because the sprouts. "The enzymes in rice seed in this State is enable and provide a maximum of nutrients", Dr. Hiroshi Kayahara, Professor of biology and biological engineering at Shinshu University, University in Nagano, has said so in the article reports the results of research of the group in the international chemistry Conference "The 2000 International Chemical Congress of Pacific Basin Societies" in Hawaii. Throughout the course of sprouts, levels of nutrients such as γ-aminobutyric acid (GABA), ferulic acid, inositol, soluble fiber, tocotrienol, Mg, K, Zn, γ-oryzanol, etc. increased significantly. Compared with seeds not sprouts, GABA 10 times higher; fibrous talc, vitamin E, niacin and lysine increased by 4 times, vitamin B1, B6 and Magnesium increased about 3 times (Kayahara and Tsukahara, 2000). Soluble fiber increase several times in the groats are very beneficial in the prevention of many diseases such as cancer risks, in many soluble fiber β-glucan that stimulates white blood cells make up the type of pathogen of bacterial origin or germs and cancer cells (Duong Thanh Liem 2010). Ikujelola and Fashakin (2005) also showed that the process of sprouts increases the amount of biologically active substances, e.g. antioxidants such as tocopherol, carotenoids, vitamin C and phenolic compounds. The scientists also found in rice germ contains an enzyme that prevents prolyl endopeptidase and regulates the activities at central brain. The energy of a grain of rice sprouts yet equivalent fiber content but, Ca, vitamins and minerals are significantly higher, especially in vitamins B1, B2.

1.4 The process of cooking rice malt in the production of nutritional drink

In the production technology of fermented drinks from barley malt, important process is the process of cooking malt. Most of the compounds of the malt powder, insoluble in water. Cooked malt (often called the merchandise) to move the crushed powder's soluble substances into soluble form, essentially the process of hydrolysis of starch by enzyme systems available in malt that is mostly of amylase. The purpose is to create more extracts and quality as high as possible. Most of the extracts were created thanks to the enzymatic reaction; the enzyme activity at the proper temperature. Therefore, the process of the goods is carried out at the appropriate temperature for the activity of enzymes (Nguyen Thi Hien, 2007; Hoang Dinh Hoa, 2002).

The objective of this our research was to build workflow manufacturing nutrition from black glutinous rice malt: survey the cooking process (influence of malt ratio: water to the dry substance extraction performance; the influence of temperature and cooking time to sugar content of extracts), the mixed ratio of sterilization mode survey.

2. Material and Method

2.1 Raw material

2.1.1 Sticky black rice: Vietnam. The main raw material for the product is rice glutinous varieties Oryza sativa L. glutinosa Tanaka bought at the Vinh Hung plant protection stations, Long An province, Vietnam.

2.1.2 Water: meeting standard TCVN 5502:2003

2.1.3 Refine sugar: Use refined sugar is produced at Bien Hoa sugar joint stock company in Bien Hoa I industrial zone, Bien Hoa, Dong Nai, Vietnam.

2.1.4 Kali sorbat: Potassium sorbate is the additive group in additives for preservation, anti-oxidation, stable. The INS: 202, ADI: 0-25 (3742/2001/QD-BYT). Against the decision on the drinking water from the sticky black rice malt products there are 1000 ML: ppm (non-carbonated soft drinks)

2.2 Chemicals & equipments

2.1.1 Chemicals

$CoSO_4.7H_2O$	H_2SO_4
Iod solution	HCl
Ethanol	NaOH
Glucose	Phenolphtalein

2.1.2 Equipments

Water bath	Philip mixer
Electric cook	Spectrophotometer UV-VIS
Brix meter	Vaccum filtration
Dry oven	Vaccum packing
Analytical balance	Sterilizer
pH meter	Others.

2.3 Research method

Define processing parameters in stages of cooking, mixing, pasteurized in the build workflow manufacture nutrition from malt rice coal. Water quality standards of malt product. Using wet grinding method, this method makes the ingredients in malt is easily separated from the pod, which was crushed and pod of crushed, not crushed when help for filtering process room houses after cooking. The dried malt is added to water at a rate of 0.7 1malt: water, soak for 20 minutes at 30 ^oC and then for the mills to malt grain runs out then bring ruin upon cooking. (Hoang Dinh Hoa, 2002; Nguyen Thi Hien, 2007). Black glutinous rice malt once crushed will be mixed with water in a proper ratio, called the milk malt, making the cooking process may stir and adjust the pH to fluid cook about 5.5. Cook performed through 3 stages: stage 1: fluid malt milk cooked at a temperature of 50 ^oC, holding for 20 minutes to protein chemistry under the

effect of protease enzymes. Stage 2: Raise the temperature to cook 63 ºC (max temperature of the enzyme β-amylase), keep to the obtained extracts the maximum reduction of sugar content. Phase 3: Upgrade the cooking temperature 72 ºC (max temperature of the enzyme α-amylase), keep to the obtained extracts of the total maximum. The cooking process is considered finished when we mix 1 drop of aqueous hydrolysis with a drop of liquid silica, 0.02N without color change iot (Hoang Dinh Hoa, 2002; Nguyen Thi Hien, 2007). After cook, it was then filtered by vacuum filtration equipment, remove the excess, the currency pulled fluids. Fluid the currency was mixed with refined sugar to increase sensory values more in line with the tastes of consumers. Products with the addition of potassium sorbate (E202) with allowed aims to extend use of the product. The following products are invisible bottle, close the cover and proceed with the pasteurization temperature and proper time so as not to affect the quality of the product and lasts is storage time. While insulation 15 days to give the product the sticky black rice malt drink be stable, at the same time discovered the damage of the product when pasteurized bottled or failed before put into use. Product pick out after the insulation is rated for sensory and physiochemical testing, microbiology products.

2.4 Analyzing method

2.4.1 Quality control of the finished malt beverage

Table 1: The indicators examine nutrient content of malt beverage

Indicators	Method
Moisture	Drying at 105 ºC to basic weight
Crude protein	Kjeldahl
Lipid	Soxhlet
Glucid	FAO FNP 14/7
Anthocyanin	Color comparison $CoSO_4$
Dietary fiber	AOAC 991.43-2010
Dry matter	QTTN/KT3 036:2005

- Sensory evaluation of product: TCVN 3215-79.
- Nutritional elements.
- Microbiological indicators, heavy metals and toxins: test according to regulation 46/2007 of the Ministry of health.

2.4.2 Basic standards for nutritional malt beverage

This product belongs to the group of non-alcoholic beverage products, based on theanalysis results of dry malt ingredients used and the test results the physiochemical,biological, heavy metals and toxins in accordance with 46/2007 of the Ministry of health,conducted the standard basis for building products under the guidance of Decision 867/1998/QD-BYT.

2.4.3Analysis of physiochemical, sensory used in research

Moisture:	Drying at 105 ºC to constant weight
Dry matter:	Refractometer Atago 0-32%
Amylase activity:	Klimopski and Rozdevic method
Mashing capability:	Le Thanh Mai et al., 2005
Anthocyanin:	Compare color to $CoSO_4$ standard
Extraction recovery:	Weight method
Reduced sugar:	Ferrycyanure
Total sugar:	Ferrycyanure
Sensory evaluation:	TCVN 3215 – 79

2.5 Statistical analysis

Using Statgraphics Plus, Excel softwares to handle experimental data.

3. Result & Discussion

3.1 Effect of malt: water ratio to dry substance extraction

Table 2: The performance of dry substance extraction technics of malt mixer: water

Ratio of malt: water	1:2.3	1:3.3	1:4.3	1:5.3
Extraction (%)	45.38[a]	62.88[b]	71.65[c]	73.34[c]

Note: a, b, c, d, e, ($p < 0.05$); meaningful differences; the metric is the average of 3 times repeated

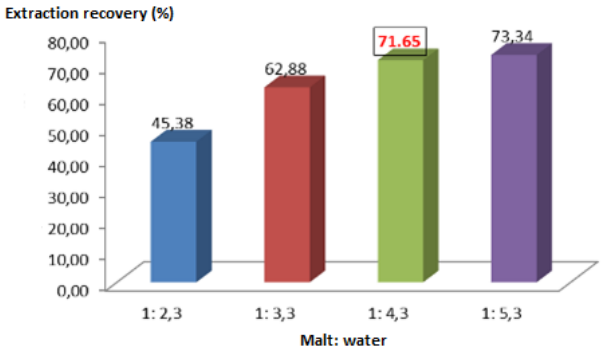

Fig 1: Extraction recovery by malt: water ratio

Through the graph we see under the water rate increase steadily increasing extraction performance, in the ratio of 1: 1 and 4.3: 5.3 the solubility is highest, this can be explained as follows: in the low water ratio (1: 1: 2.3, 3.3), the amount of solvent is not sufficient to extract glass extracts, the concentration of dissolved substances will rise, fluid will gradually saturated state and cannot increase the concentration of the substance dries up anymore, even in the water ratio 1: 4.3, 5.3: 1 high amounts synonymous with sugar will dilute more, the substances obtained from the same amount of malt will increase or increases process efficiency. This increase, however, the amount will be limited due to the amount of organic matter in malt diminishing over time enzyme systems of hydrolysis. From the graphs and statistical processing results over illustrates the performance values (71.65 and 73.34) at two malt ratio: 1 water: 4.3 and 5.3: 1 difference there is no statistical significance, to avoid wasting we select malt mixer: water ratio is 1: 4.3 for the next phase.

3.2 Hydrolyzing time at optimum temperature for β-amylase activation

Table 3: Reduced sugar by hydrolyzing time

Time (minutes)	30	40	50	60	70
Reduced sugar (g/100ml)	4.04[a]	4.44[a]	5.86[b]	6.23[b]	6.42[b]

Note: a, b, ($p < 0.05$); meaningful differences; the data are the average of 3 times repeat

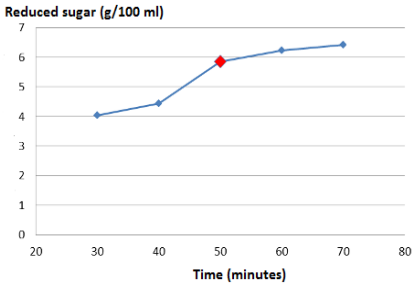

Fig 2: Reduced sugar by hydrolizing time

From results of experiments showed that when time increases, then the reducing sugar hydrolysis in ascending extracts. However, after a certain period of time then the reducing sugar extraction rose insignificant, particularly in the period of 30, 40 minutes, reducing sugar levels rise slowly, through statistical processing results we see the value of reducing sugar increases which have no statistically significant at the 95% confidence levelSimilarly, we also found time for 50, 60, 70 minutes, the reducing sugar levels increased significantly and the increased value was also not statistically significant at the 95% confidence level. We can interpret this result as follows, the reducing sugar obtained here is from the activity of the enzyme, β-amylase enzyme mainly when resolution of starch in grains of malt, activity of the enzyme is obtained at the optimum temperature and pH range separately, with the aim to get the sugar maltose for should the subject has to control the temperature in the cooking stage 63 ºC, and adjust the pH = 5.4 optimal enzyme β-amylase hydrolysis, then over time enzyme contact cooking and reducing sugar intake should increase quality muscle also increasedthat way, the amount of the substance that the enzyme exposure will decrease, and the enzyme activity decreased over time and the amount of catalytic hydrolysis products will decline. The process of enzymatic hydrolysis of β-amylase is relatively long because it only has an impact on the 1.4 link glucoside from the start is not reduced, stopped at 1.6 linkages glucoside and 1.4 glucoside in close branching points. The survey results we select cooking time malt in 63 ºC is 50 minutes, going for the reducing sugar high as 5.86 g/100 ml.

3.3 Hydrolyzing time at optimum temperature for α-amylase activation

Table 4: Total sugar by hydrolyzing time

Time (minutes)	30	40	50	60	70
Total sugar (g/100ml)	5.00[a]	6.09[b]	6.90[c]	6.94[c]	7.16[c]

Note: a, b, c, ($p < 0.05$); meaningful differences; the data are the average of 3 times repeated

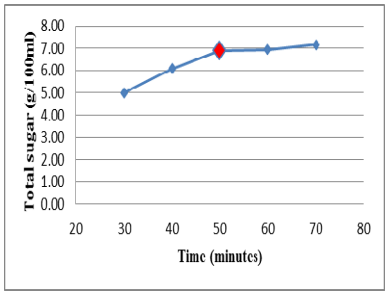

Fig 3: Total sugar by hydrolyzing time

Through the graph we see over time the total sugar hydrolysis increased, but after 50 minutes of total sugar rose insignificant and this energy has no statistically significant at 95%. We can explain as follows, the enzyme amylase hydrolysis of starch in the 1.4 link glucoside, after hydrolysis of organic substances decreases should total sugar yields should at least go, on the other hand the process of hydrolysis of α-amylase by mostly spawned multiple paths with different circuit structure, this sugar was place in the pot and it is also the path that both α-amylase and β-amylase is not hydrolysis to be, such as dextrin, is the sequence of the original 3-2 containing glucose affiliated 1.6 glucoside, hence the dextrin always exists in the path. The survey results we select cooking time at 72 ºC is 50, going for the highest concentrations of total sugar is 6.90 g/100 ml.

3.4 Effect of sugar supplementation

Table 5: Sugar evaluation

Sugar supplementation (%)	6	7	**8**	9	10
Sample name	501	502	**503**	504	505
Average score	2.67[a]	4.5[b]	**7.0[c]**	6.75[c]	3.83[b]

Note: a, b, c, d, e ($p < 0.05$); meaningful differences; the data are the average of 3 times repeated

By the results of statistical processing sample is seen with the symbol for the highest average score of 503 according to the tastes of the user, so the subject select samples with the symbol 503 mixing sugar with 8% on the room filter for subsequent experiments

3.5 Pasteurization and kali sorbat supplementation

Table 6: Finished product evaluation

Pasteurization		**Color, aroma, taste and appearance of beverage**			
Temperature (ºC)	**Time (minutes)**	**Kali sorbet supplementation (ppm)**			
		200	**300**	**400**	**500**
70	20	H	H	H	H
	25	H	H	H	H
	30	H	H	H	H
75	20	H	H	H	H
	25	H	O	O	O
	30	H	O	O	O
80	20	H	O	O	O
	25	H	O	O	O
	30	H	O	O	O

Notes: H: appeared in one of the following signs: the product is opaque, there are air bubbles; change color (lighter in color or have strange colors); strange smells nasty (foul, acidity, etc.). O: not yet appear among the damaged sign on

From sensory results showed samples are added 300ppm pasteurization, sorbate potassium in 75 ºC during 25 minutes; potassium sorbate content template is added at least that has not seen signs of damage after a 15-day insulation, this template should be taking for microbiological safety inspections in accordance with 46/2007 of the Ministry of health is the outcome the following table:

Table 7: Microorganism in pasteurized beverage at 75 ^{o}C in 25 minutes and kali sorbat supplementation 300 ppm

Parameter	Unit	Limit	Value
TPC	CFU/ml	10^2	49
Total mold & yeast	CFU/ml	10	Not detected
Pseudomonas auruginosa	CFU/ml	Negative	Not detected
Coliforms	MPN/ml	10	Not detected
Escherichia coli	MPN/ml	Negative	Not detected
Staphylococcus aureus	MPN/ml	Negative	Not detected
Clostridium perfringens	CFU/ml	Negative	Not detected
Streptococcus faecalis	CFU/ml	Negative	Not detected

Note: the above results were examined at the Institute of hygiene and public health HCMC

Pursuant to 46/2007 the Ministry of health for the group of non-alcoholic beverage products for this microbiological test results of the product is within the allowable limit, satisfactory microbiological safety. So choose pasteurized for product is a 25-minute concentrations of 75 ^{o}C and potassium sorbate added as 300 ppm

3.6 Anthocyanin loss after different treatments

Table 8: Anthocyanin loss in black glutinous rice malt beverage after different treatments

Treatment	Malt	Grind	Boil	Filtrate	Mix	Bottle	Pasteurize	Stabilise	Malt beverage
Anthocyanin (mg/ml)	26.14	15.36	7.78	7.04	6.94	6.94	5.86	5.42	5.42

Note: the data are the average of 3 times repeated

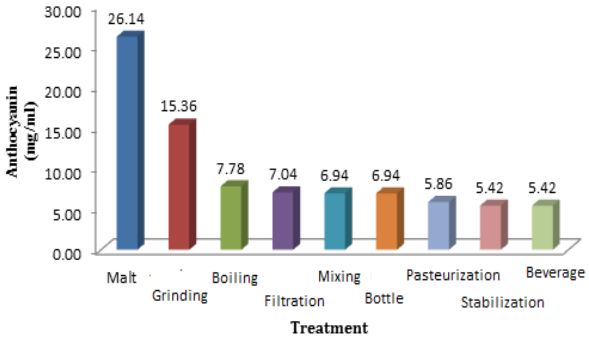

Fig 4: Anthocyanin in black glutinous rice malt beverage after different treatments

3.7 Quality control in black glutinous rice malt beverage

3.7.1 Sensory evaluation

The results of the sensory Board consisted of 10 members by the method for points (5 points, 6 degrees), with a total score of 16.0 is the weight. Therefore, the beverage products from glutinous rice malt with sensory evaluation results achieved the kind of quite.

Table 9: Sensory evaluation in black glutinous rice malt beverage

Indicator	Score of each specialist										Total	Important score	Unemphasized score	Emphasized score
	T_1	T_2	T_3	T_4	T5	T6	T7	T8	T9	T10				
Color	3	3	5	4	5	5	3	4	3	5	40	1.5	4.0	6.0
Aroma	4	4	4	4	3	4	3	4	4	4	38	1	3.8	3.8
Taste	3	3	5	5	5	5	3	5	3	5	42	0.8	4.2	3.4
Appearance	5	3	5	4	3	5	4	5	3	3	40	0.7	4.0	2.8
Total score													16.0	16.0

3.7.2 Nutritional elements

Table 10: Nutrional elements in black glutinous rice malt beverage

Parameter	Unit	Value
Protein	g/100ml	0.19
Lipid	g/100ml	0.01
Carbohydrate	g/100ml	16.53
Dry matter	g/100ml	18.66
Dietary fiber	g/100ml	1.65
Anthocyanin	mg/ml	5.42

Note: the above results were examined at the Institute of hygiene and public health HCMC

3.7.3 Microorganism, heavy metal and toxin

Table 11: Microorganism in black glutinous rice malt beverage

Parameter	Unit	Limit	Value
TPC	CFU/ml	10^2	49
Total yeast- mold	CFU/ml	10	Not detected
Pseudomonas auruginosa	CFU/ml	Negative	Not detected
Coliforms	MPN/ml	10	Not detected
Escherichia coli	MPN/ml	Negative	Not detected
Staphylococcus aureus	MPN/ml	Negative	Not detected
Clostridium perfringens	CFU/ml	Negative	Not detected
Streptococcus faecalis	CFU/ml	Negative	Not detected

Note: the above results were examined at the Institute of hygiene and public health HCMC

Table 12: Heavy metal and toxin in black glutinous rice malt beverage

Parameter	Unit	Limit	Value
Aflatoxin B1[(1)]	mg/kg	5	Not detected
Aflatoxin B1B2G1G2[(1)]	mg/kg	15	Not detected
Cadimi[(2)]	mg/kg	0.1	Not detected
Asen[(2)]	mg/kg	1	Not detected
Mercury[(2)]	mg/kg	0.05	Not detected

[(1)]: The results were examined at the Institute of hygiene and public health HCMC
[(2)]: Results analysis in the technical center quality assurance 3

3.8 Production cost of black glutinous rice malt beverage

The finished black glutinous rice malt beverage volume obtained = 4.78 x used malt

Table 13: Production cost of black glutinous rice malt beverage from 1 kg raw malt

Component	Unit	Quantity	Unit price (VND)	Amount (VND)
Black glutinous rice malt	Kg	1	24,358	24,358
Sugar	Kg	0.08	20,000	1,600
Water	m^3	0.01	11,000	110
Electricity	Kwh	0.1	2,000	100
TOTAL (VND)				26,168

Note: the total cost of the product is not included in packaging contains, labor costs, and depreciation of equipment

Quantity of black glutinous rice malt beverage obtained = 4.78 x 1kg= 4.78 kg (nearly 4780ml), cost 26.168 VND. With this price, nutritional drink products from black glutinous rice malt would be subjected to high profits attract businesses to industrial scale production, the product will easily compete and attract customers because of the cheap price, is made from the nutrient-rich source material, a product of dietary fiber, the distinctive scent of black glutinous rice, and especially the pigment anthocyanin antioxidant that helps the product's strengths.

Fig 5: Black glutinous rice malt beverage

Fig 6: Black glutinous rice malt beverage in bottle with label

3.9. The basic standard for nutritional black glutinous rice malt beverage

This product belongs to the group of non-alcoholic beverage products, based on the analysis results of dry malt ingredients used and the test results the physiochemical, biological, heavy metals and toxins in accordance with 46/2007 of the Ministry of health, conducted the standard basis for building products under the guidance of Decision 867/1998/QD-BYT nutritional drink products, from black sticky rice malt basic standard as follows:

Table 14: Basic standard for nutritional black glutinous rice malt beverage

No	Raw material	
1	Black glutinous rice malt	- Moisture 11.7% - Germinating capability 95.44% - Foreign matter 2.12%
2	Water	- TCVN 5502:2003
Black glutinous rice malt beverage		
3	Appearance, status	- Clear liquid - Color: brown red
4	Nutritional value (in 100ml)	- Protein: 0.19g - Lipid: 0.01g - Carbohydrate: 16.653g - Fiber: 1.65g - Anthocyanin: 0.542g
5	Microorganism	- TPC: 49 (CFU/g) - Total yeast & mold: not detected (CFU/ml) - *Pseudomonas aeruginosa:* not detected (CFU/ml) - *Coliforms*: not detected (MPN/ml) - *Escherichia coli:* not detected (MPN/ml) - *Staphylococcus aureus:* not detected (MPN/ml) - *Clostridium perfringens:* not detected (CFU/ml) - *Streptococcus faecalis:* not detected (CFU/ml)
6	Heavy metal, toxin	- Aflatoxin B1: not detected (MLOD-0.1 μg/kg) - Aflatoxin B2: not detected (MLOD-0.1 μg/kg) - Aflatoxin G1: not detected (MLOD-0.1 μg/kg) - Aflatoxin G2: not detected (MLOD-0.1 μg/kg) - Cadimi: not detected (mg/kg) - Asen: not detected (mg/kg) - Mercury: not detected (mg/kg)

3.10 Production flowchart of black glutinous rice malt beverage

After the process of studying and conducting experiments, survey parameters in beverage production process from black glutinous rice malt, we draw out the following conclusions:

- **Boiling:** The dried malt after giving wet grinding with 1 malt rate: 0.7 water is cooked with 1 malt rate: 4.3 water; with the cooking mode: 50 ^{o}C cook in 20 minutes; raised 63 ^{o}C cook for 50 minutes obtained reducing sugar is 5.86 g/100 ml; and raised 72 ^{o}C cook for 50 minutes obtained total sugar: 6.90 g/100 ml.

- **Filtration, mixing and pasteurization:** excessive quantities of filtered accounts for 30% of the mass of material. Room filter to replenish the sugar is 8% gain perceptibility of sweetness; additional 300 ppm and kali sorbat. After endless bottles of 125 ml, take 25 minutes in the pasteurization 75 ^{o}C; microbiological standard products according to regulation 46/2007 of the Ministry of health.

- **Malt beverage:** Malt water products are evaluated fairly kind sensory quality; and the ingredients contained in this product are: 19.0 g protein/100 ml; lipids are 0.01 g/100 ml; glucid 16.53 g/100 ml; the dry substance 18.66 g/100 ml; dietary fiber 1.65g/100 ml; anthocyanins: 5.42 mg/ml; micro-organisms, toxins, heavy metals reached pursuant to 46/2007 of the Ministry of health. Price: 5,474 VND/liter. Rice malt beverage is invisible glass bottle 125 ml, brown color.

4. Conclusion

From the conclusions above suggest nutritional drink from glutinous rice malt, the product is rich in nutrition and safety proper use with multiple objects. Product viable, and capable of practical application as high as contains many nutrients with relative price accordingly. We also have some more recommendations: explore more malt grinding process, the filter room houses aimed at obtaining more filtering fluids. Protein hydrolysis time during cooking malt, this survey to under pin research on drinking water production fermentation followed. Survey on timing as well as the influence of the conditions of preservation of the quality of this nutrition drink products.

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