

Improving The Quality and Quantity of Instant Functional Beverages of Ginger at KUB Tlogosari, Temanggung

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Abstract. Ginger (*Zingiber officinale*) is a tropical plant which grows among the year and widely cultivated in South Asia especially in India, South China, Taiwan, Indonesia, and Philippines. This plant is commonly used as spices, seasoning, and flavor enhancers. It also has been used for medicinal purpose, including for treating headache, colds, and increasing human's appetite. Ginger plant contains antioxidant which known as oleoresin or gingerol. Ginger can be processed into a functional drink. Temanggung is one of some producing regions of instant ginger drink. It is located in four districts of Temanggung Regency : Kaloran, Kandangan, Kranggan, and Kedu districts. Currently, the producing of instant ginger drink is a home industry and just a side business thus it cause a low productivity and uncontrolled quality. The aim of this study is to find the optimum formula of instant ginger drink, by varying its formula : Ginger/Sugar ratio (1: 2, 1: 3 and 1: 1). The rendemen obtained were 66,33%, 42,67% and 69, 33%.

Keywords: ginger; drink; industry; formula; quality; quantity

1 Introduction

Processing of herbs into a functional drinks requires a knowledge about its active compounds [1]. Ginger (*Zingiber officinale*) is one of the most useful commercial crops which commonly used as spices, seasoning, and flavor enhancers. It also has been used for medicinal purpose, including for treating headache, colds, and increasing human's appetite. Ginger plant contains antioxidant which known as oleoresin or gingerol.

Oleoresin is non volatile compounds containing 15% -35% of extracted essential oil from ginger powder. Higher number of oleoresin content would give more spicy taste and higher antioxidant effect [2]. Antioxidant compounds which contained in ginger crop are Shogaol and gingerol [3]. The number of gingerol in oleoresin was between 14% -25% and shogaol in oleoresin between 2.8% - 7.0% [4]. The main component is gingerol. It has an anticoagulant characteristics, which prevents blood clotting and maintain blood circulation and to prevent stroke, heart disease and other degenerative diseases [5].

The spicy flavor characteristic of ginger comes from its chemical compounds such as zingeron, shogaol, and gingerol while flavor constituents of essential oils such as sineol, borneol, geraniol, linalool, and pharmacen (give a distinctive aroma to ginger). Ginger oleoresin contains flavor components that give a spicy (pungent) ginger flavor.

The development of science food products which combine nutrition and health functions are often called functional food. Functional food is a food product which give health benefits [6]. Instant ginger quickly dissolves in water at low or hot temperatures make it easy to supply as a functional drink. Ginger can be processed into a functional drink with casia vera as a coloring [7]. The product of ginger foods and beverages can be found in candy, *wedang*, *sekoteng*, coffee, etc.

Temanggung is one of some producing regions of instant ginger drink in Indonesia. Development of tools for producing instant ginger drink by using vacuum photogranulator at KUB Tlogosari Temanggung can increase the efficiency in terms of techno-economy. The application of the vacuum photogranulator technology in KUB Tlogosari will be able to avoid imperfect granulation process, which is useful to improve the quality and quantity of instant ginger products. Increasing the concentrated of ginger extract using vacuum granulator causes the water gas granulation process to be carried out at 60°C (relatively low temperature).

In recent years, the application of UV technology have grown very fast both in household and commercial industries. The oxidizing properties of UV was safe and non-toxic, so it makes UV as a disinfectant in drinking water treatment (US Patent No. 5,780,860) and degradation of organic components in wastewater (US Patent No. 2006/0163168 A1 and US Patent No. 7,279,092), UV is also widely used for purification and sterilization in food production processes (US Patent

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No.7.391.041 and US Patent No. 2007/0114465 A1). Ultraviolet light also developed for inactivating enzymes. Cellular destruction methods which followed by affinity force have also been developed physically through UV rays [8]. Ultra violet rays are able for inactivating enzymes, and killing the bacteria, pathogenic microorganisms. Therefore, it necessary to develop vacuum photogranculator application for instant ginger drink industry center at KUB Tlogosari to increase the productivity, energy saving, work efficiency, yield and quality.

This dedication and research activity aims to improving the quality and quantity of instant ginger beverage production by determine the optimum formula and the effective solubility using aquades for instant ginger drink production in order to applying food safety to KUB Tlogosari Temanggung

2 Materials and Method

2.1 Materials

Materials for instant ginger drink production include sugar, ginger, spices (black pepper and cinnamon). Chemical reagents for product analysis, such as CaCO_3 , $\text{Na}_2\text{C}_2\text{O}_4$, $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$, glucose standard solution, Methanol, HCl, H_2SO_4 , ethanol, H_2BO_3 , K_2SO_4 , NaOH, and $\text{Na}_2\text{S}_2\text{O}_3$.

2.2 Apparatus

The instant ginger drink production in this work employed mainly with vacuum granulator. While the analysis used spectrophotometer, kjehdall flask, and glassware equipment.

2.3 Procedure

In this work, there are 2 main procedures : (1) Production of Instant Ginger Drink at various formula, (2) Analyze of its physical properties. This works aims to obtain the optimum formula of instant ginger drink based on its physical properties. Physical properties tested through rehydration time, and organoleptic tests. This stage aims to determine the standard operating procedure (SOP) for the equipment, production, the methods and materials

2.3.1 Instant Ginger Drink Production

Production of instant ginger drinks begins by preparing some ingredients such as Ginger, sugar and spices (black pepper and cinnamon). In this work, there are 3 formulas used for the production of instant ginger drink

Table 2 Formula of instant ginger drink

Materials	A (2:1)	B (1:1)	C (3:1)
Sugar	500 g	375 g	562,5 g
Ginger crop	250 g	375 g	187,5 g
Blackpaper	1,5 g	1,5 g	1,5 g
Cinnamon	0,5 g	0,5 g	0,5 g
Water	250-300 ml	250-300 m	250-300 ml

2.3.2 Physical Properties Analysis

Rehydration Time

Weighed 0.1 g sample, then put it into 100 ml of water and recorded the time dispersed (the dissolution of the instant powder without stirring). This test is aims to know whether the product classified as an instant beverage.

Hedonic Organoleptic Test

Organoleptic test done with the preferred score or hedonic rating towards the formula which has been made. The scale used range from 1-7 which presents the panelist's favorite level from very like to very dislike. The attributes tested among others : flavors, aromas and appearances [2]

3 Results and Discussion

3.1 Rehydration Time

In this work, the formulation C was dispersed spontaneously at 27 seconds after the addition of hot water, while formula B dispersed at 43 seconds and formula A at 33 seconds. The results show that the formula undergoing rehydration time was formula C

However, formula A and B are also classify as instant drink, due to the relatively short of its rehydration time. The greater the addition of sugar give the tendency of the index of solubility in water, thus it increasing the amount of instant powder product. The minimum solubility rate is also a factor which determines the properties of instant ginger drink.

The results showed that the instant ginger drink was quickly dissolved in water

3.2 Organoleptic Test

The organoleptic test is performed to determine the formula chosen for the next will be conduct the final product test. The parameters tested to the panel include the taste, aroma and appearance. The hexic rating test was done with 30 panelists, with 20 panelists declared like, 8 panelists were disliked and 2 panelists expressed disliked. The panelist composition did not negatively

affect the instant ginger drinking test, this was due to a panelist composition which states dislikes only 6, 66%

Based on the organoleptic test on 3 formulas A, B and C, it results that there are no significant difference from the overall test performed. Formula C is chosen to be the best formula due to its best solubility, and more economical. Formula C is also chosen to be Standard Operating Procedure (SOP) of production in order to obtain a consistent formula.

3.3 Improvement of the Production Process

Improvement of the production process aims to increase the quality and quantity of products, include : (1) Repairing the cooking tools from the pan with capacity of 4 kg / day into the photo granulator vacuum with capacity of 50 kg / day ; (2) Repairing the packaging tool to be more hygienic ; (3) Repairing of the room and layout of equipment production.



Fig 1 Pan with capacity of 4 kg / day



Fig 2 Photo Granulator Vacuum with capacity of 50 kg / day



Fig 3 The previous packaging

After the best formula, the improvement of the crystallization equipment, and the packaging until the layout of the production site has been done, it is necessary to submit the product certification (SPPIRT) through BPOM in order to produce good quality food, which safe to consume [9].

4 Conclusion

Sukaesi, the owner of KUB tlogosari Temanggung does not have a standard formula and adequate facilities for producing instant ginger drink. This project has been helped her to find the standard formula for instant ginger production, repair the production tools and improve the product packaging.

The results show that the Formula C with sugar and ginger ratio of 3: 1 is the best formula, then the product is ready to be registered to get PIRT certificate

The basic idea of low carbon society is to cut down all carbon dioxide emissions without endangering any developing needs. The heating process in the granulator for the production of instant ginger drinks by fuel needs to be reviewed so that it is sustainable with developing lowcarbon society.

References

1. Ibrahim, H, Awang .k , Ali NAM., Malek, SNA., Jantan, Syamsir DR., 2008, Selected Malaysian aromatic plant and their essential oil Components,Malaysia (MY): University of Malaya
2. Meilgaard M., Civille GV.,and Carr BT., 2007, Sensory Evaluation Techniques 3rd Edition ,Boca Raton (US),CRC,Press
3. Koswara, 2012, Jahe dan olahannya ,Jakarta (ID); Pustaka Sinar Harapan
4. Larsen,K, Ibrahim H, Khaw SH., Saw LG., 2009, Ginger Of Peninsular Malaysia and Singapore, kota Kinibalu,Natural History Publications (Borneo);135 pp
5. Sabulai B.John aJ.,R Kurup,Pradeep NS.,Valsamma ,K.,2006 ,Caryophylenne-rich rhizome of zingiber nimmoni from South India;Chemical Characterization and antimicrobial activity,Phytochemistry :67(22) 2469-2473

6. Nielsen,SS.,2013 Food Analysis ,New York (US)
7. Bennion M,Scheule B,2011 ,Introductory Foods Mishawaka (US),Prentice Hall
8. Antara,NT, 2007, Aplikasi teknik kokristalisasi dalam pengembangan produk minuman sehat,Prosiding seminar Teknologi Pangan,323-333
9. BPOM (Badan Pengawas Obat dan Makanan), 2003 Pedoman Sertifikasi Produk Pangan Industri Rumah Tangga,Jakarta (ID) BPOM RI