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Submission date: 27-Nov-2020 09:07AM (UTC+0700)

Submission ID: 1457877593

File name: KUM_B1._JURNAL_INTERNASIONAL_2018.pdf (470.55K)

Word count: 2936

Character count: 14490



ChemTech

1 International Journal of ChemTech Research

CODEN (USA): IJCRGG, ISSN: 0974-4290, ISSN(Online):2455-9555

Vol.11 No.05, pp 295-300, 2018

Moringa Leaf Potential (*Moringa Oleifera*) for the Manufacture of Instant Drink Powder with Variations in Tween 80 Volume and Drying Temperature as an Antioxidant Drink

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Abstract : This study is expected to provide opportunities for the food industry that is closely related to the development of new products and increase the selling value of the moringa leaves in the form of antioxidants instant drink. This is because a lot of active substances are contained in the moringa leaves (*moringa oleifera*) one of them is quercetin. Quercetin is an antioxidant compound that can neutralize free radicals and prevent damage caused by free radicals to normal cells, proteins, and fats. Antioxidants are also defined as compounds that protect cells from harmful effects of reactive oxygen free radicals. The purpose of this research is processing moringa leaf into an antioxidant instant drink of high nutritional value and demanded by consumers. The method used is the experimental method in the laboratory. Using variation variables of addition of tween 80 (0.5 ml, 0.75 ml, 1 ml, 1.25 ml, 1.5 ml) and variation of drying temperature (40 °C, 45 °C, 50 °C, 55 °C, 60 °C) using the method of foaming drying to determine the effect on the making of antioxidant instant drink from moringa leaves with optimal quality to produce instant drinks rich of natural antioxidants and durable. The results showed that the best drying temperature is 60 °C and addition of tween 80 volume as much as 1.5 ml, with result of analysis that is 1.67% water content, 89.83% solubility. While when viewed from the total quercetin and total antioxidant activity, the best temperature is at 40 °C and the addition of 80 ml tween volume of total quercetin 230.96 ppm and total antioxidant activity of 395,710 ppm.

Keywords : moringa leaf, foam mat drying method, instant drink, tween 80.

Introduction

Moringa plants are used as the main ingredient of hundreds of drugs, both for prevention and treatment. One of them is because it contains novel isothiocyanate compound which is a Bio-Availability Phytochemicals class contained in leaf and Moringa pods. Even the content of nutrients, especially protein is not

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International Journal of ChemTech Research, 2018,11(05): 295-300.

DOI= <http://dx.doi.org/10.20902/IJCTR.2018.110532>

only located on the leaves of Moringa but also seeds kelor. Kelor seed contain protein about 34% (Harimbi S, 2017) The world of science recognizes that Moringa is the most nutrient-rich plant. Moringa leaves have an essential source of nutrients and have a very complete nutrient so widely used for the formulation of additional food for children. (Dwi Ana A, 2017).

Moringa contains 46 powerful antioxidants, including carotenoids and quercetin, compounds that protect the body against the damaging effects of free radicals by neutralizing it before it can cause cell damage and become a disease. Moringa leaf is a good source of natural antioxidants because the content of various types of antioxidant compounds such as ascorbic acid, flavonoids (quercetin), phenolics and carotenoids (Krisnadi, 2015). Therefore we aim to increase the selling value of moringa leaf by applying moringa leaf into instant drink of antioxidants.

Previous Studies

Research on the manufacture of antioxidant instant drinks has been done by Yesi et al. in 2014 entitled “**Manufacture of Red Passion Fruit Powder (*Passiflora Edulis F. Edulis Sims*) (Study of Tween 80 Concentration and Drying Temperature)**”. The study was conducted using Group Random Design. The first factor was the concentration of tween 80 (0.10%, 0.50%, and 1.00% v / v total) while the second factor was the drying temperature (50°C and 70°C). Research procedures that have been done include: Passion fruit is prepared and then washed to remove dirt on the fruit. Passion fruit is blanched at 70°C for 2 minutes, after it is peeled and its meat and fruit seeds are taken. Flesh and seeds are crushed with a blender. After blended, tween 80 according to treatment and dextrin 10% dimixer are added for 10 minutes. Then it is dried with oven for 8 hours with temperature according to treatment. After dried, it is crushed to powder and sieved with a 60-mesh sieve to homogenize the powder sizes. Then the passionfruit powder is packed to be more durable. The best treatment of passionfruit powder according to physical and chemical parameters is with treatment of tween 80 1% concentration and 50°C dry temperature, it obtains the best value, i.e.: water content (4.91%), antioxidant activity (90.34%), vitamin C (15.45 mg / 100g) solubility (81.33%), water absorption (1.56), crude fiber (5.06%). (Yesi et al., 2014).

Research on the manufacture of instant powder with the method of foam drying has also been done by Kasma Iswari in 2007 entitled “**Study of Instant Carrot Powder Processing Using Foam Mat Drying Method**”. Research procedures that have been done include: Carrots is peeled, washed and sliced as thick as 5 mm, bleached in a boiling water for 2 minutes. Further it is destroyed using a blender by adding 500 ml of water to 1 kg of carrots and filtered. 150 g of dextrin, 0.5 g citric acid, and 1 ml of Tween 80 / kg of ingredients are added. Then the ingredients are shaken using a mixer for 10 minutes so that the suspension is foamed and dried at 50 ° C. in the extracts of dried carrots, is added with 370 g sugar, crushed and sifted. Drying carrot extract using foam mat drying method with temperature 50 ° C with 6 hours drying time produces instant powder that meet the quality standard. The best results for the analysis of α -carotene (1276 mg / 100 g material), particles that dissolve faster (0.1404 g / sec) and the content of vitamin C (15 mg / 100 g material). (Kasma *et al.*, 2007)

Experimental

The materials used:

The materials used in this study include 1 kgs of leaf, 6 hours drying time, 370 grams of white crystal sugar, 500 ml of aquades, 150 grams of dextrin, tween 80 with various kind of volum: 0.5 ml, 0.75 ml, 1 ml, 1.25 ml, 1.5 ml.

Equipments used

While the tools used include: blender, mixer, electric scales, spatula, basin, cabinet drying, baking sheet, strainer, gauze, plastic packaging. The use of cabinet drying varies temperature of 40 ° C, 45 ° C, 50 ° C, 55 ° C, 60 ° C

Research Procedure.

Stages of making antioxidant instant drinks :

The leaves of moringa are sorted and separated from the trunk, then washed and drained. 1 kilogram fresh moringa leaves are weighed and included in the blender, with as much as 500 ml aquades added, they are blended until smooth and then the leaf juice is taken by squeezing using gauze. After that, the extract of Moringa leaves is put into the container and 150 grams of dextrin is added and then it is stirred using a mixer, tween 80 according to the various of volume added and stirred using a mixer until homogeneous.

Drying Process

The mixture of material is put into a baking sheet and the surface is leveled, then the material is put into the cabinet drying, the temperature is adjusted according to treatment with a time of 6 hours

The ingredients are removed from the cabinet drying, waited until cool, the dry ingredients and the sugar crystals are put into the blender and blended thus becoming a powder (Anariawati, 2009). Next the powder filtered with a sieve to get the desired powder size.

Results and Discussions

Influence of temperature and volume of tween 80 to total antioxidant activity

The Figure showing the effect of temperature and volume of tween 80 to total antioxidant activity on instant drink product of moringa leaf:

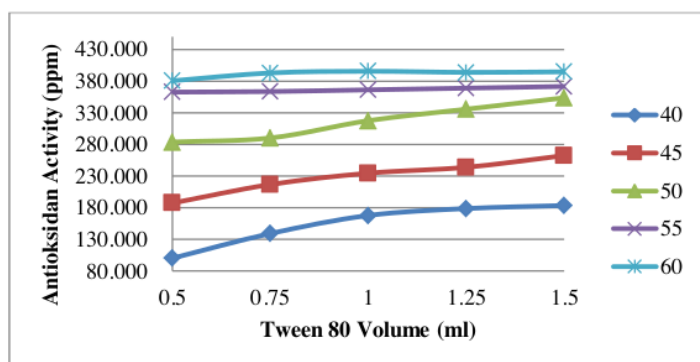


Figure 1. The relationship of temperature and volume of tween 80 to total antioxidant activity

This antioxidant test was performed with DPPH (1,1-diphenyl-2-picrylhydrazyl). The parameters used to show the antioxidant activity are the price of the concentration of inhibitor concentration (IC₅₀) which is the concentration of an antioxidant substance can cause 50% DPPH loses its free radical character or concentration of an antioxidant substance that proves% free radical inhibitor up to 50%. IC₅₀ prices are inversely proportional to the ability of compounds that are antioxidants. The smaller of IC₅₀ value means the stronger of antioxidant power.

² From Figure 1 it can be concluded that the higher the drying temperature and the more volume of tween 80 the content of antioxidant activity in instant drinks is lower. Where the antioxidant activity of a test compound can be categorized the level of antioxidant power into various intensities that are classified according to IC₅₀ values. Antioxidant activity is classified as very active if IC₅₀ is less than 50 ppm, classified active if IC₅₀ is 50-100 ppm, moderate if IC₅₀ is 101-250 ppm, and is classified as weak if IC₅₀ is 250-500 ppm, and is classified as inactive if IC₅₀ value is larger than 500 ppm. (Febby Hardiyanti, 2015)

The highest total antioxidant activity was 100,165 ppm at 40°C and 80 ml volume of tween 80, while the lowest antioxidant activity value was 394,825 ppm at 60°C and 1.5 ml volume of tween 80. The result of

antioxidant activity is lower than previous research result, where the result of previous research is 92,53 ppm. Because the results obtained are still classified as active antioxidant activity, instant drink products of moringa leaf is still quite active for total antioxidant activity.

Influence of temperature and volume of tween 80 to total quercetin

The Figure showing the effect of temperature and volume of tween 80 to total quercetin on instant drink product of moringa leaf

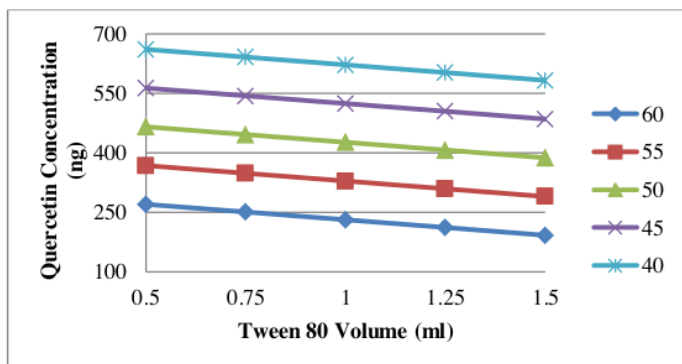


Figure.2. The relationship of temperature and volume of tween 80 to total quercetin

From figure 2, it can be concluded that the higher of drying temperature and the more volume of tween 80, the quercetin antioxidant content was decreases.

Tween 80 in certain concentrations may serve as a driving force for the formation of foam, in the form of an enlarged particle surface froth and may accelerate drying. Quercetin can be lost due to high temperatures and evaporation. (Yesi et al., 2014)

The highest quercetin value was 661,4237 ppm at 40°C and tween 80 volume of 0.5 ml, while the lowest quercetin value was 191,831 ppm at 60°C drying temperature and tween 80 volume of 1.5 ml. High quercetin value will affect total antioxidant activity. The results of this quercetin assay analysis were consistent with the results of the total antioxidant activity, as evidenced by the highest value of quercetin in harmony with the highest total antioxidant activity value.

The influence of temperature and volume of tween 80 to % moisture content

The figure showing the effect of temperature and volume of tween 80 on the water content of instant drink product of moringa leaf

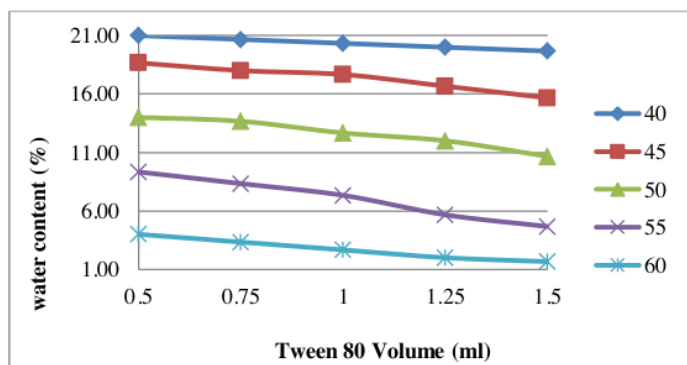


Figure3. The relationship of temperature and volume of tween 80 to % water content

From figure 3, it can be concluded that the higher the drying temperature and the more volume of tween 80 the less water content is in the product.

The result of analysis obtained from the test of water content of instant drink product of moringa leaf is that the highest water content is 21% at 40°C and tween 80 volume as much as 0.5 ml while the lowest water content is 1.67% at 60°C and tween 80 volume as much as 1.5 ml. From the results of the analysis there are several samples that matched the SNI standard of instant beverage (SNI-01-4320-1996) that is the content of instant drink product 3% maximum. The best water content obtained from the analysis was 1.67% at 60 ° C and 80 tween volumes of 1.5 ml, 2% at 60 ° C and tween 80 volumes of 1.25 ml and 2.67% at 60 ° C and 80 tween volumes of 1 ml. Result of moisture content obtained is smaller than previous research result where water content from previous research is 4,91%. Thus the water content for instant drink product of moringa leaf has matched the standard of quality of instant drink and marketable.

The effect of temperature and volume of tween 80 on solubility%

The figure showing the effect of temperature and volume of tween 80 to % solubility of instant drink products moringa leaf

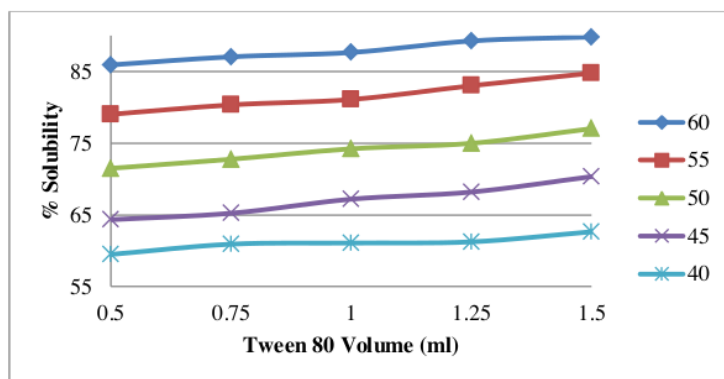


Figure 4. The relationship of temperature and volume of tween 80 to % product solubility

From Figure 4, it is prove that the higher the drying temperature and the more volume of tween 80 the higher the solubility%.

The drying temperature also showed significant differences in the solubility of instant drink of the leaves of moringa, the higher the drying temperature the higher the solubility%. This is because at higher drying temperatures the water content of the measured product will be lower than the low drying temperature, so that high moisture content in the product will lead to clumps that require more time to break the bonds between particles (Reza et al ., 2013)

From solubility test result, it was found that the solubility of sample of coconut leaf instant beverage was 89,83% at 60°C and tween 80 volume as much as 1.5 ml, while the result of solubility analysis of sample of instant drink product of lowest moringa leaf was 59,50% at a temperature of 40°C and a volume of tween 80 of 0.5 ml. % solubility of the best instant beverage product of moringa leaves that is 89.83% at 60°C and 80 tween 80 volume as much as 1.5 ml and the yield% of this solubility is better than the previous researcher on the manufacture of instant red passion fruit as much as 81,33%.

Conclusions

Based on result of analysis of instant drink product of moringa leaf, it can be concluded the best drying temperature is 60°C and addition of tween 80 volume as much as 1.5 ml, with result of analysis of water content according to SNI instant drink (SNI-01-4320-1996) that is 1.67% and solubility of 89.83%. While in terms of

total quercetin and total antioxidant activity is best at 40 ° C and tween 80 additional volume of 0.5 ml of total quercetin of 661.424ppm and total antioxidant activity of 100,165 ppm.

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