Analysis of total plate count and fungus yeast of mahkota dewa fruit as raw material for making syrup

S Winarni¹, F Arifan², A Setyawan³, A Nurdiana⁴, Windari⁵

¹Department of Biostatistics and Population Study, Public Health, Diponegoro University, Semarang, Indonesia
²Programme Diploma of Chemical Engineering, Vocational School Faculty, Diponegoro University, Semarang, Indonesia
³Department of Physics, Faculty of Science and Mathematics, Diponegoro University
⁴Department of Civil and Planning, Vocational School Faculty, Diponegoro University, Semarang, Indonesia
⁵Department of Biology, Faculty of Science and Mathematics, Diponegoro University

Corresponding author: wiwin.undip@gmail.com

Abstract. Mahkota Dewa (Phaleria macrocarpa L.) or Simalakama plants are native plants from Papua. The Mahkota Dewa fruit can be used to treat various diseases ranging from flu, rheumatism, lungs, cirrhosis of the liver to cancer. The Mahkota Dewa fruit contains alkaloids, saponins, and flavonoids. The presence of flavonoids in the fruit of this plant can be used as an antioxidant. One of the innovations in the use of this fruit is to turn fruit into syrup. Syrup manufacturing process has several stages, namely by choosing the fruit that is ripe and dried first. The Mahkota Dewa syrup from Tazakka in Pledokan Village, Sumowono Subdistrict still uses direct sunlight during the drying process. This study aims to determine the bacterial content of the dried fruit of the Mahkota Dewa with the sun and dry with the oven so that producers can still use the oven aids if the results are not much different. The test site is located in Peldokan Village, Sumowono District, Central Java Medical Laboratory and Medical Devices Testing and Diponegoro University Semarang. The materials and tools used are the mature Mahkota Dewa, tray, oven, dried fruit Mahkota Dewa and oven, the crown god syrup sample, and laboratory equipment. Bacterial testing uses the TPC (Total Plate Count) and Fungus Yeast methods. Based on the results of the bacteriological test analysis of the dried fruit Mahkota Dewa it is known that the number of general germs or TPC and Fungus Yeast in oven dried fruit is more than that of the sun dried which is 1.8 x 10⁵ CFU / gram and 3.9 x 10⁴ CFU / gram. The proximate content of the Mahkota Dewa syrup is 1.43% protein, 0.09% fat, 70.16% carbohydrate, 28.18% water content and 0.14% ash content.

1. Introduction

Mahkota Dewa (Phaleria macrocarpa L.) is a native plant from Papua. This plant is also often referred to as the Simalakama plant. Mahkota Dewa is a shrub plant from the Thymelaceae tribe that thrives in the lowlands to an altitude of 1200 meters above sea level [1]. Cultivation of this plant can be done by vegetative and generative methods, for example by means of grafting or using seeds. The appearance of this plant is interesting when it is fruiting, where the fruit is maroon and has a clustered shape so that it is used by the community as an ornamental plant. The fruit of this plant can be used as
traditional medicine but only the flesh of the fruit because this fruit seeds can cause poisoning. The Mahkota Dewa fruit is usually used to treat various diseases ranging from colds, rheumatism, lungs, cirrhosis of the liver to cancer. According to Gotawa in Soeksmanto in the skin of the crown of the god contained alkaloid compounds, saponins, and flavonoids. The seeds are considered poisonous, so they are only used as an external medicine to treat skin diseases [2].

The presence of flavonoids in the fruit of this plant can be used as an antioxidant. The role of antioxidants themselves is very important in neutralizing and destroying free radicals which can cause cell damage and also damage biomolecules, such as DNA and protein. Damage to cells and biomolecules can trigger various diseases, such as cancer, heart disease, arthritis, cataracts, diabetes and liver [3]. According Harmanto in Dewanti states that Mahkota Dewa can be used in two forms. First, in the form of not being processed or eaten directly fresh or eaten with chilli sauce such as salad. Utilization like this is very dangerous. The side effects are quite serious, ranging from sores on the lips and in the mouth, numbness in the tongue, to intoxication and poisoning. Second, in the form it has been processed into concoctions. These herbs can be combined with herbs from other medicinal plants [4].

One of the innovations in the use of this fruit is by turning the fruit into syrup. The Mahkota Dewa syrup can later be consumed not only by adults but can be consumed by children at certain doses. The Mahkota Dewa syrup has several stages by selecting the fruit is really mature and dried beforehand. The Mahkota Dewa syrup from Tazakka in Pledokan Village, Sumowono Subdistrict still uses direct sunlight during the drying process. This causes the producers in the rainy season requires a long time in the drying process so that production is hampered. Therefore, to support the quality of syrup that will be produced and continue to produce at the time of the rainy season it is necessary to do bacteriological tests on the dried fruit of Mahkota Dewa. This study aims to determine the bacterial content of the dried fruit of Mahkota Dewa with the sun and dry with the oven so that producers can still use the oven aids if the results are not much different. In addition to providing information to producers if using an oven the results are the same as solar heat so that production continues to run during the rainy season.

2. Materail and method

The examination was conducted on 15-26 August 2019 in Health Laboratory and Testing of Medical Devices in Central Java and previously performed drying process Phaleria. Assesment study was conducted on 27 August to 17 September 2019 at the University of Diponegoro.

Materials and tools used the Mahkota Dewa mature, trays, oven, sample Mahkota Dewa dried by the sun and oven, a sample of syrup Mahkota Dewa, and other laboratory equipment. Making samples of the dried Mahkota Dewa begins with cleaning the fruit of Mahkota Dewa and stripping parallel to the flesh of the fruit such as stripping the coconut fiber. Then after the flesh and seeds are separated, the Mahkota Dewa is dried in two ways namely with the sun and oven heat. Sun-dried starts at 08.00-11.00 WIB for ± 1 week and is dried in an oven until the fruit is completely dry. After the dried fruit is obtained in two different ways then stored in a sterile place and ready to be delivered to the Laboratory for bacterial content later tested. Testing bacteria use metode ALT (Total Plate Count) and AKK (Yeast Fungi). The data assessment process is carried out using an observation method that is by analyzing existing data and integrating it with references.

3. Result and discussion

Based on the results of the bacteriological test analysis of the dried fruit of Mahkota Dewa it is known that the general germ count or TPC (Total Plate Count) and Yeast Fungi on the dried fruit with an oven is more than that of the sun dry which is $1.8 \times 10^3$ CFU / gram and $3.9 \times 10^4$ CFU / gram. The results of bacteriological examination can be seen in the table below:
Table 1. Differences in bacteriological examination results in the crowns of dry god from the sun and oven

| No. | Sample Type                                 | Germ Numbers / ALT  | Yeast Figures   |
|-----|---------------------------------------------|---------------------|-----------------|
| 1   | Crown of the Gods Dry with the Sun.         | $2 \times 10^3$ CFU / gram | $2.4 \times 10^4$ CFU / gram |
| 2   | Dry Deity Crown with Oven                   | $1.8 \times 10^5$ CFU / gram | $3.9 \times 10^4$ CFU / gram |

In addition to the results of bacteriological examination on the raw material, also tested the content of proximate on the god's crown syrup which was previously produced by Mrs. Yatimah. The results of this inspection can be seen in the table below:

Table 2. Test results for mahkota dewa ibu yatimah syrup examination test results

| No | Parameter     | Results | Quality standards | Unit | Analysis Method       |
|----|---------------|---------|-------------------|------|-----------------------|
| A  | Proximate     |         |                   |      |                       |
| 1  | Protein       | 1.43    | -                 | %    | SNI. 01.2891.1992     |
| 2  | Fat           | 0.09    | -                 | %    | SNI. 01.2891.1992     |
| 3  | Carbohydrate  | 70.16   | -                 | %    | SNI. 01.2891.1992     |
| 4  | Water content | 28.18   | -                 | %    | SNI. 01.2891.1992     |
| 5  | Ash Levels    | 0.14    | -                 | %    | SNI. 01.2891.1992     |

The dried fruit of Mahkota Dewa on the dried fruit with an oven is more bacteri than that of the sun dry which is $1.8 \times 10^5$ CFU / gram and $3.9 \times 10^4$ CFU / gram. This could be because when drying there is dirt still attached which causes germs to still survive and can be due to a less hygienic storage process. Natural drying with direct sundrying has an advantage over other drying methods, besides being cheap, some products such as sunlight crackers are thought to affect the quality of the results of the dried product in the form of fluffy nature. But the drawbacks of the natural drying process in the form of drying under the sun that is very dependent on the time and weather as well as lack of guaranteed hygiene products [5].

The value of ultraviolet radiation from sundrying between 06:00-09.00 on average 330 W / m². At 12.00 noon in April, May and June, the sun's ultraviolet radiation reaches 549, 523, 502 W / m², respectively [6].

However, according to the Food and Drug Supervisory Agency R . I. Number 12 of 2014 states that the requirements for traditional medicines that are used boiled in Total Plate Numbers $\leq 10^7$ colonies / g and Yeast Fungi Numbers $> 10^4$ colonies / g so that the results obtained can still be included in the terms of drug use [7].

Based on table 1.2, it can be seen that the protein content in 1 bottle of Mahkota Dewa syrup is only 1.43%, 0.09% fat, carbohydrate 70.16%, moisture content 28.18% and ash content of 0.14%. A little fat content will not cause the addition of fat in the body. The carbohydrate content contained in sugar has fulfilled the syrup making requirements of the Republic of Indonesia's Minister of Health Regulation No. 033 of 2012 where the sugar and carbohydrate content in syrup making is at least 65%. The importance of additional information on the product being produced can provide the selling value of a product and provide confidence to consumers [8,9,10].

Packaging labeled with information is something that is used for containers or places that can provide material protection in accordance with its purpose and can provide information about the product. The packaging helps prevent and reduce product damage, protecting the material inside from pollution and physical disturbances such as friction, impact or vibration. So that the material is maintained hygienic. This package can function as a stimulus or attractiveness of buyers in terms of promotion [11].
Based on the Indonesian Industrial Standards (SII) issued by the Ministry of Industry, the quality of syrup is generally determined as follows:

a. Quality syrup 1: minimum sugar content of 65%

b. Quality Syrup 2: 60% - 65% sugar content

c. Syrup Quality 3: sugar content 55% - 60%

The following table contains the conditions for the requirements of the elements in the system.

| No. | Element Type | Requirements                      |
|-----|--------------|-----------------------------------|
| 1   | Sugar (Sucrose and Saccharin Invert which are counted as saccharose) | 55% minimum |
| 2   | Dye          | Not harmful                       |
| 3   | Artificial Sweetener Substances | Negative       |
| 4   | Substance (Essence), Glucose, Glycer (gelatin) | May be added |
| 5   | Dangerous Metals (Cu, Hg, Pb, and As) | Negative |
| 6   | Preservatives (calculated as benzoic acid) | Ma kisimal 350 mg / kg |
| 7   | Starch, Mushrooms, and Yeast | Negative |

4. Conclusion

The raw material for making crown of god syrup that is the fruit of the crown of god can be dried using the sun's heat and using an oven. The results obtained in general the germ and jam ur content in oven dried fruit more than the sun dried fruit. This can be overcome by cleaning, drying and storing which really must maintain cleanliness in order to reduce bacteria or fungi that grow. The test results obtained are still included in the conditions for making drugs in herbs. Producers can still produce crown of god syrup during the rainy season by using an oven-dried method so that product quality is maintained.

It is hoped that the producers will maintain the quality of the product in terms of cleanliness in order to continue the production of the existing crown of god syrup and always maintain the cleanliness or hygenity of both the production equipment and materials to be used.

References

[1] Burkhill I H 1966 Vol. II. Ministry of Agriculture and Co-operatives, Kuala Lumpur. h.1732
[2] Gotawa I B I, Sugiaro S., Nurhadi M , Widiyastuti Y, Wahyono S, Prapti I J 1999 Inventory of Indonesian Medicinal Plants. Jilid V. Departemen Kes. Badan Penelitian dan Pengembangan Kesehatan. Jakarta, h. 147-148
[3] Silalahi J 2002 Majalah Kedokteran Indonesia 52 (10): 361-4
[4] Dewanti T, Siti N, Indira N 2005 Jurnal Teknologi Pertanian Vol. 6 No. 1, Hal: 29-36
[5] Vatanasuchart N et al. 2003 Kasetsart Journal Natural Science Vol 37 No 3
[6] Dissa A O, Desmorieux H, Bathiebo J, Kouliadi J 2011 Glob J Pure Appl Sci. 17 (3):273-294
[7] Harmanto, N 2003 Mahkota Dewa Medicinal Heritage of the Gods Jakarta: PT Agromedia Pustaka
[8] Peraturan Kepala Badan Pengawas Obat dan Makanan Republik Indonesia Nomor 12 Tahun 2014 tentang Persyaratan Mutu Obat Tradisional
[9] Peraturan Menteri Kesehatan Republik Indonesia Nomor 033 Tahun 2012 tentang Bahan Tambahan Pangan
[10] Soeksmanto A, Yatri H, Partomuan S 2007 Jurnal Biodiversitas. Volume 8, Nomor 2, Halaman:
92-95

[11] Rahayul E dan Widjatni E 2007 The Effect of Packaging Conditions on Store Space and Store Period on Viability of Calsin Seeds. Jurnal Penelitian Pertanian. BUI. Agron.(35) (3) 191-196