Abstract
Herbal drinks are drinks that come from natural ingredients and give many benefits to improve body health, herbal drinks made from parts of plants or whole plants as well as spices. Bidara leaves are one of the plants of herbal drinks because they contain polyphenol compounds, flavonoids, and tannins which are efficacious as antioxidants. This study aims to determine the effect of boiling time on antioxidant activity using the DPPH method to capture free radicals and organoleptic properties and acceptability in bidara leaves herbal drinks. The type of study was Experiments with Completely Randomized Research Design (CRD). The results showed that the highest values were obtained for 5 minutes of boiling time with an average IC$_{50}$ value of 133.85 ± 3.081 in the medium and lowest category for 30 minutes of boiling time with values IC$_{50}$ 200.63 ± 10,047 including the weak category. The results of statistical analysis have the effect of boiling time on antioxidant activity p<0.05 this means that the longer boiling, the antioxidant activity will decrease/weaken. Organoleptic test of bidara herbal drink with a boiling time of 5, 10, 20 and 30 minutes from the assessment of aroma, color, and taste included in the category of life. 

Keywords: Antioxidant Activity, Herbal Drinks, Bidara Leaves.
INTRODUCTION

Bidara (*Ziziphus mauritiana* Lamk) is a plant that thrives in dry and rocky areas. Bidaras leaves are widely used by the people of NTT as traditional medicine to treat diseases including: diarrhea, laxative, nausea, vomiting, boils, liver disorders, rheumatism, sedation (sedative), asthma, fever and tonic. The compounds of the leaves of bidara include flavonoids, alkaloids, glycosides, saponins, resins, polyphenols, mucilago and vitamins. Compounds that have antioxidant properties are flavonoids, polyphenols and tannins. The study was carried out by Blegur, F and Lado, V (2017) which showed that the ethanol extract of the leaves of Bidara had a strong antioxidant effect with IC$_{50}$ values of 74.507 ± 3.934 ppm. The same study using plant bidara with different varieties carried out by Kusriani, et al. (2015) showed that leaf extract, fruit and bidara seeds (*Ziziphus spina-christi* L) had activities as antioxidants. Efforts to develop bidara plants in the form of instant beverage products are carried out by Blegur, F (2017) obtaining the results of instant powder anti-oxidant activity with a period of 200g powder classified as strong with an IC$_{50}$ value of 89.745 ± 6.760. The phenomenon shows that more and more consumers are aware of the importance of health, putting functional food products into a current food trend (Hariyadi, 2006). The results of this study can be used as ingredients for the manufacture of quality herbal drinks taking into account the length of boiling time which can provide good antioxidant activity.

MATERIAL AND METHODS

The type of this research is Experiments with the research design is Completely Randomized Design (CRD). The study was conducted in the laboratory of Pharmacognosy and Analysis of Instruments for the Health Polytechnic Pharmacy Study Program of the Ministry of Health of Kupang in May until August 2018.

Material

Leaves of bidara taken from leaves that are not too young and not old from the plants of midwives of the type *Zizyphus mauritiana* Lamk as a result of
the determination of the Biology Department of Universuty Gajah Mada, 95% Ethanol, concentrated HCl, acetic acid, Ether, Mg P powder, H₂SO₄, granulated sugar.

**Methods**

The research procedures included: making simplicia, making leaf herbal drinks, qualitative identification of active compounds, testing antioxidant activity of the DPPH method and organoleptic tests.

**Simplicia Process**

Leaves bidara which are not too young and old, cleaned and washed with running water to remove dirt and contaminants that are attached. Then dried by aerating and after drying, powder is made.

**Making herbal drink leaves bidara**

Bidara leaves powder weighs 200 grams, add 60 grams of sugar and 50 grams of ginger, add 1000 ml of boiled water using medium heat to boil the temperature of 98 – 100°C, leave it for 5 minutes. The same treatment is carried out for boiling 10, 20 and 30 minutes.

**Qualitative identification**

a. Identification of flavonoids

5 tubes each containing 5 ml of brewed drink are ready, first for the second, third and third tube control, NaOH is added, concentrated H₂SO₄, and concentrated Mg-HCl powder. The color of each tube compared to the control tube, if there is a change in color then positif contain flavonoids (Gafur, et al, 2013).

b. Identification of polyphenol compounds

As much as 5 ml of herbal drinks add 5 ml of hot water, stirred and left to reach room temperature, add 3-4 drops of 10% NaCl solution given a drop of FeCl₃ solution occurs a change in color to blue green to black, indicating the presence of polyphenol compounds.

c. Identification of tannins

Bidara leaves herbal drinks are taken 1-2 mL of water, added 2 drops of a solution of FeCl₃ solution, the emergence of blackish blue color shows the presence of tanin compound error and if it is
blackish green indicates the presence of catechol tannin compounds.

Testing the antioxidant activity of the DPPH method

Test solutions with various concentrations/variations of boiling time of 4 mL are added 1 mL of DPPH reagent solution in the input in the shaken vial, cover fial with aluminum foil. The mixture is incubated for 30 minutes in a dark place at room temperature. then read the absorption of activity at a range of wavelengths \( \lambda = 510-520 \text{ nm} \) with blank ethanol (Edhisambada, 2011).

Organoleptic test

The hedonic test of the selected formula was carried out on panelists as many as 20 people who were asked to taste bidara leaf herbal samples with old boiling variations of 5, 10, 20 and 30 minutes and among each sample tasting were required to consume drinking water as a neutralizer, then the panelists were asked to fill out questionnaires, the level of people's preference for drinks with five levels with provisions that include: a) very like being given a score of 5; b) like to be given a score of 4; c) quite like being given a score of 3; d) less like being given a score of 2; e) do not like to be given a score of 1 (Bambang, 2003).

Data analysis

Data from the measurement of antioxidant activity obtained were analyzed using Anova (Analysis Of Variants) to see whether there was an effect of boiling time on antioxidant activity, if ANOVA results were obtained there were significant differences in the HSD-Tukey test (Gordon and Gordon, 1994) while the results data Organoleptic testing uses tabulated hedonic methods and is presented in the form of bar charts.

RESULTS AND DISCUSSION

Making bidara herbal drinks is done based on previous research by (Blegur, F 2017) the results of the antioxidant activity of bidara leaves in the form of instant powder products obtained by the leaves of bidara 200g show antioxidant activity is classified as strong with IC50 value \( 89.745 \pm 6.760 \). This research was carried out in two stages, namely the first stage of making
bidara leaf herbal drink (Ziziphus mauritiana Lamk) with the duration of 5, 10, 20 and 30 minutes. The second stage is testing the quality of the product including: identification of nutritious substances, organoleptic tests (odor, taste and aroma), and testing of antioxidant activity using the DPPH (1,1-diphenyl-2-picrylhydrazyl) method.

**Qualitative Identification of Bidara Leaves Herbal Drinks**

Identification of chemical components in bidara leaf herbal drinks needs to be done to find out whether a chemical that is thought to have the potential as an antioxidant is still contained in the preparation of herbal drinks. The results of the identification can be seen in the table below:

**Table 3.1 Identification of Active Substances of Bidara Leaves Herbal Drinks**

<table>
<thead>
<tr>
<th>Compound</th>
<th>Reactor</th>
<th>Reference</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flavonoids</td>
<td>Extract 0.1 g + NaOH</td>
<td>color change (Gafur, dkk, 2013)</td>
<td>color changes from light green to reddish green +</td>
</tr>
<tr>
<td></td>
<td>Extrac 0.1 g + H$_2$SO$_4$</td>
<td>color change (Gafur, dkk, 2013)</td>
<td>color changes from light green to blackish brown +</td>
</tr>
<tr>
<td>polyphenols</td>
<td>Extrac 0.3 g + 10 mL aquadest + NaCl + FeCl$_3$</td>
<td>color change</td>
<td>color changes from green to blackish green +</td>
</tr>
<tr>
<td>Tannin</td>
<td>c 0.1 g + FeCl$_3$</td>
<td>color change from Green-Blue (Harbone, 1987)</td>
<td>Color changes from light green to dark green +</td>
</tr>
</tbody>
</table>

(Source: Research Primary Data, 2018)

The results of qualitative identification of bidara leaf herbal drinks showed the presence of flavonoids, polyphenols and tannins characterized by a change in color when added by reagents and these compounds have antioxidant properties.

**Organoleptic Test**

Bidara herbal beverage products with a long variation of boiling 5, 10, 20 and 30 minutes each of 50 ml were given to 20 panelists to taste it, to the panelists were given a questionnaire and asked to give their opinions about bidara leaf
herbal drinks by filling in the questionnaire provided. Analysis of the results of organoleptic tests in whole from color, aroma and taste based on the hedonic test included the likes category because it obtained an average value above 4.

![Figure 1 Organoleptic test results of bidara leaf herbal drinks](image)

Determination of the quality of food in general is very dependent on several factors including taste, color, texture, and nutritional value. The entire data presented in Figure 1 shows that the panelists' preference for aroma with 30 minutes of boiling time is the highest. The aroma of food can be an indicator of the delicacy of a food. Aroma is produced by volatile compounds found in food. Scents can arise naturally or because of processing, such as roasting, roasting and other processes (Barcarolo, et al., 1996). Consumers will be interested in trying out a food seen from the color and aroma that is caused so it is tempting to try it.

**Antioxidant Activity Test Results of Bidara Leaf Herbal Drinks**

The results of antioxidant analysis of leaf herbal medicine with
bidara using the DPPH method presented in Figure 2, are learned that the longer boiling, the greater the IC50 value means that the antioxidant activity gets smaller. The highest antioxidant activity was found in herbal drink samples with a boiling time of 5 minutes with an IC value of an average of 133.85 ± 3.081 while the lowest was in a boiling time of 30 minutes with an IC50 value of 200.63 ± 10,047.

![Graph showing IC50 values](image)

**Figure 2 IC50 Value Bar Diagram**
Bidara Leaf Herbal Drink

The results of the analysis of the influence of boiling time on antioxidant activity showed a significant difference in $p < 0.05$. Tukey test to see the differences between each treatment. pointing out there were significant differences between boiling time 5, 20, and 30 while the boiling time between 5 and 10 minutes was not significantly different. Antioxidant activity is influenced by the treatment of heating, the longer the heating there will be a decrease in anathetic activity caused by the acceleration of oxidation of antioxidants contained in an ingredient. According to Kusuma (2006), heating can accelerate oxidation of antioxidants so that the active components found in natural materials are degraded. With the oxidation of natural ingredients can result in a decrease in antioxidant activity (Landy, 2013)

**CONCLUSION**

Organoleptic test of bidara herbal drink with boiling time of 5, 10, 20 and 30 minutes from the assessment of aroma, color, and taste included in the category of likes. The highest antioxidant activity in bidara herbal drink with 5 minutes of boiling time was 133.85 ±3.081 and the lowest was 30 minutes for boiling time of 200.63 ±10,047. Antioxidant activity decreases/weakens with increasing duration of boiling process of bidara leaf herbal drinks.
ACKNOWLEDGEMENT

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REFERENCES


