Ethnobotany of Maja Plants (Aegle marmelos L. Corr.) in Trowulan District, Mojokerto Regency, Indonesia

Lila Biar Rohmah *, Ruri Siti Resmisari, Widi M. Lutsfi Dwi Setyawan, Yuni Mahfirohtun Ni’mah

Department of Biology, Faculty of Science and Technology, State Islamic University of Maulana Malik Ibrahim Malang, Indonesia

ABSTRACT

Majapahit was a ancient Kingdom inJava inspired from Maja fruits, really taste bitter. Maja fruit is actually exist and foundin Trowulan, Mojokerto, where the Kingdom was located. Maja fruit contain a few substances, i.e Marmelosin (C_{13}H_{12}O_{3}) benefit which have beneficial properties. This study is aimed to determined finding of utilization the Maja plants (Aegle marmelos (L.) Corr.), parts of the plants used, manufacture formulas, and finding the conservation efforts. The study was applied in Majapahit area, Bejjong village and visiting of historical sites in Trowulan District, Mojokerto Regency, East Java. This study was within interviewing method semi structure of 25 respondents with key person elders area Majapahit in village of Bejjong. About 76% society understand the Maja Plants as symbol of Majapahit Kingdom. Parties which used from Maja plants are fruit shapes in around 92%. The conservations Maja apply is cultivate on specification places, it’s in the history sites Majapahit. The knowledge of benefit Maja Plants needs to increasing, because only small society were known of benefit the Maja Plants in Trowulan area, Mojokerto.

Keywords: Ethnobotany, maja plant (Aegle marmelos L. Corr.), trowulan, Majapahit

Introduction

Indonesia have abundances of the natural resource. It has various of useful plants among people and surrounding. The society have good ways to manufacture the natural resource, especially the resources have important score and discipline relations with a group society, like plants.

Biological science branch that learn about benefit of plants and have relates to human and or society group is ethnobotany. Like as Maja fruits (Aegle marmelos (L.) Corr.), that has high relations with the Javanese ancient Kingdom called Majapahit. Fatmawati [1] explains that the Majapahit inspired from Maja fruits, which has bitter taste found in the Trowulan area, Mojokerto, where the Kingdom was located.

The evidences of Maja fruits have high relation with Majapahit are estates that exist in Trowulan museum, which relief the Maja fruit exist of there. This matter proven there are benefits of Maja plants since ancientera. The Trowulan Museum under (Cultural Heritage Conservation Center) Mojokerto East Java, protection that has relict collection of Majapahit Kingdom [3].

Rismayani [2] stated that the Maja fruit contain a few substances are saponin and tanin. Substances saponin and tanin can be used as natural pesticides. Chavda [3] The maja fruit contains 9% tannin components, while the fruit skins reaching 20%. Maja fruit can be used are medicine, anti bacterial, and anti oxidant. Hariana [4] stated that the Maja fruit contain a few substances of one them are Marmelosin (C_{13}H_{12}O_{3}) which has benefits for treating snake bites. Beside the major contain, there are many contain as alkaloid,
flavonoid, polysaccharides, tannins, phenylpropanoid, terpenoids, and caumarins. It can be found in leaf extract. Especially for pesticides activity are d-limonene, ethyl-p-cumarate, and aegelin [5].

From it, explorations of societal into benefit Maja fruit succeed important to carry out looked by high relations between Maja fruit with the history are exist and minim the society’s knowledge into benefit Maja fruit. This study to knowing the benefit Maja plants in Trowulan District, parties maja plants used, the way of manufacturing Maja plants, and the effort conservation from around society.

**Material and Methods**

**Data Collection**

Trowulan district is strategic position which has good transportation access. Trowulan located West Mojokerto Regency, which are boundaries with Jombang Regency. The Trowulan has 3.704.320 Ha area, while the Trowulan village has 457.520 Ha areas. It has temperature 24-31 °C, and Trowulan topography 457,52 plain and the high place 45 Meter above sea level. Trowulan also has 1.872mm/year rainfall, and find types the very fruitfulness soil 28 Ha total, 23 fruitfulness soil Ha, and middle fruitfulness soil 12 Ha. The village areas according user are102.431 Ha public housing and farmers of field 87 Ha irrigation, field of technique half 120 Ha, rainfall field 16 Ha, and farming field 15 Ha totals.

**Respondents**

The respondents was including general society, village elders, and culture (historical sites) keeper. Respectively, were 25, 4, and 6 people.

**Respondents**

This study was descriptive exploration with survey method, semi structure of interview which proven directly of real plants in field studies.

**The Data Analysis**

The result of study is qualitative data form and quantitative data which analyzed use descriptively.

**Results and Discussion**

Based on the result of interview, the benefit of Maja plants is as historical value is symbol the Majapahit in Mojokerto area, as pesticide and natural insecticide, medicine of cancer and cardiovascular, beauty treatment (acne remover), hand creativity as flowers vas, and bioethanol (Table and Figure 1).

<table>
<thead>
<tr>
<th>No</th>
<th>Benefits</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Historical Value</td>
<td>76%</td>
</tr>
<tr>
<td>2</td>
<td>Medicine</td>
<td>24%</td>
</tr>
<tr>
<td>3</td>
<td>Beauty Treatment</td>
<td>4%</td>
</tr>
<tr>
<td>4</td>
<td>Handcraft</td>
<td>40%</td>
</tr>
<tr>
<td>5</td>
<td>Pesticide</td>
<td>32%</td>
</tr>
<tr>
<td>6</td>
<td>Bioethanol</td>
<td>4%</td>
</tr>
</tbody>
</table>

Except the table, the data percentage showed in stem diagram, as follow:

![Figure 1. Percentage the result of Maja Plants](image)

There are 76% totals of respondent stated Maja plants (*Aegle marmolos* L. Corr.) is symbol Mojokerto areas especially Trowulan district. It’s caused the history estate Majapahit kingdom in Trowulan district. Supported by explanation from journal written by Fatmawati [1] the Trowulan district includes Mojokerto area this identic with the Majapahit kingdom which ever glorious in the 13 to 16 century era. Majapahit itself taken from the word of Maja plants which bitter in taste, so it easier to be found. After saw the explanations above, in the reality one of respondent stated that area called ever calling on Majapahit.
Based on the data above, 24% benefit respondents understand the benefit of Maja plants as medicine of cardiovascular diseases, cancer, and uric acid. Moreover, the societies are afraid to consume it because it tastes bitter.

There are 40% respondent benefit understand the benefit of Maja plants as handcraft, but aren’t publication yet. In addition, Maja fruit can be utilized as handcraft in daily household needs, especially in Batik (traditional fabric of Indonesia) art handcraft.

About 23% from respondent know of Maja plants as natural pesticide. Kumar, et al [6] stated that Maja fruit this more effective or more good implementing as insecticide as well as plant-derived pesticide, which is better then as commoditize food material. Rismayani [2] stated Maja plants has increasing on mortalities insect as well as non-insect with spread to respiration organ on insect although pest called.

The benefit of Maja as insecticide or natural pesticide made into essential oil. It resulted by most dominant contents, that is Limonene (82.4%) [7]. In this matter the Limonene shared as toxic union. And 4% only from 25 respondents who are know of benefit Maja plants as acne remover and bioethanol. Started from un-express of society to extract the Maja fruit will has like alcohol material result. Its caused one of content the Maja fruit is Hydroalcoholic there are 80% Ethanol and 20% water [8].

A 24% from 25 respondents stated the implementation of Maja plants as medicine. Yadav and Chanotia [8] that Maja plants can use as traditional medicine material especial more use in Bangladesh and one of them anticancer activity. Anticancer has showed able to prevent cancer sell but uses in the high doses (400 mg/g).

In addition to its use, the information obtained from respondents through interviews semi structure related to the parts of plants actually used and manufacturing formula. These two sets of data presented in the form of a table (table 2) and explained clearly through a graph (figure 2).

### Table 2. Part of Utilizing and manufacturing formula

<table>
<thead>
<tr>
<th>Used Part</th>
<th>(%)</th>
<th>Steps to Used (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root</td>
<td>4%</td>
<td>Extracted 24%</td>
</tr>
<tr>
<td>Bark of Stem</td>
<td>8%</td>
<td>Boiled 12%</td>
</tr>
<tr>
<td>Leave</td>
<td>8%</td>
<td>Cut 20%</td>
</tr>
<tr>
<td>Fruit</td>
<td>92%</td>
<td>Planted 76%</td>
</tr>
<tr>
<td>All Part of Plants</td>
<td>84%</td>
<td>Dried 40%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fermented 8%</td>
</tr>
</tbody>
</table>

The result percentage showed into stem diagram, as follow

![Figure 2. Percentage of the manufacturing formula on parties from Maja plants (Aegle marmelos L. Corr.)](image1)

![Figure 3. Percentage of the manufacturing formula on parties from Maja plants (Aegle marmelos L. Corr.)](image2)
Based on the data above, part of the maja plant that was most expressed by 25 respondents was the fruit. The fruits are more over to utilize because it easier taken and difficult to putrid. According Atul N, et al [9] Maja Fruit contains Torpedeo, Marmelocin, and alcoholic are more in leaf parties. But only 8% respondent who explained the benefit of Maja plants with leaves utilizing.

There was about 4% respondent explained of the root has benefit. This quite surprising due to there was not much respondents aware to the benefit of Maja Root Fruit. 84% stated that the use of Maja intact plants was caused by Maja plants as historical value of majapahit.

There 76% from 25 respondent stated the manufactures with gardening formula in specification place This is important due to it has high relation with Maja plants as historical value of symbol majapahit, so the conservation effort does in every place sites in Trowulan district. The general societies have not specification gardening effort these plants. This explanation supported by Vinolia [10] recommend to culturing this plant as an effort to plant conservation and attract the tourist. The efforts of society to conserve Maja Plants is planted in sites. The data which presents allowed at many different sites can be seen from (table 3.) (figure 4).

Table 3. Totals of Maja plants (Aegle marmelos L. Corr.) On sites in Trowulan district

<table>
<thead>
<tr>
<th>Location</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brahu Temple</td>
<td>7 Trees</td>
</tr>
<tr>
<td>Trowulan Museum</td>
<td>83 Trees</td>
</tr>
<tr>
<td>Gentong Temple</td>
<td>8 Trees</td>
</tr>
<tr>
<td>Bajang Ratu Temple</td>
<td>28 Trees</td>
</tr>
<tr>
<td>Tikus Temple</td>
<td>3 Trees</td>
</tr>
</tbody>
</table>

Figure 4. Totals Maja plants (Aegle marmelos L. Corr.) which finds in Trowulan sites district

Figure 4 and table 3 above show of total the Maja plants on sites nearly on Trowulan district Mojokertoregency. The Maja plants are moreover finds in Trowulan museum. The Trowulan Museum under Cultural Heritage Conservation Center Mojokerto protection that has relict collection of Majapahit Kingdom [1]. The result more visitors come and effort to conservation of Maja plants realted with this area.

Conclusion

The Maja plants (Aegle marmelos (L.) Corr.) could be utilized as pesticide or plant-derived insecticide, Batik production, cardiovascular medicine, dermatologic medicine, and moreover as historical value of Majapahit. Most people don’t have knowledge about the use of maja plants. The most widely used part of the maja plant is fruits. But there are utilized roots, leaves, and bark of stem. The manufacture formula of Maja plants have more types like boiled, extracted, fermentated, and cultured in specific area. The conservation effort is improving gardening effort of Maja plant conservation in the Trowulan District.

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References


