Characteristics Identification Gambier (Uncaria Gambier Roxb) As Leather Tanning Agent

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Abstract
Gambier (Uncaria Gambier Roxb) as leather tanning assisting agent needs to be identified in order to obtain active agent characteristic information clearly so it can ease manufacturing formulation/recipe for tanning process which fits with the characteristic of finished leather. Gambier used as a sample consist of five types, two types of imported products used in the industrial processing of leather with code A (liquid) and B (powder), and 3 Gambier local products with C code (block), D (cylinder), E (cylinder). Gambier is tested using SNI 06-6051-1999 about vegetable tanning agents test and the results are compared with SNI 01-3391-2000 about Gambier. Gambier Characteristics which need to be identified are water content, total extract, total soluble, non-tannin, tannin, and pH level. The result of all 5 samples for Gambier tanning levels test does not comply Gambier SNI 01-3391-2000 standard. For water content, only Gambier A that does not qualify because of its liquid form, while the insoluble substances of Gambier B do not meet the requirements. Nevertheless, all Gambier can still be used as a pre-tanning, tanning or re-tanning agent according to finished leather articles, except Gambier A that only for the re-tanning agent.

Keywords: Gambier; characteristic; leather tannage

INTRODUCTION
Nowadays in leather processing, the implementation of clean and environmental friendly technology can’t be avoided. The usage of mineral tanning agent (chrome tanning agents) in the leather processing industry should be minimized as much as possible because it allegedly contains B3 in its liquid waste. Another alternative is to substitute mineral tanning agent with other tanning agent, for example vegetable tanning agent which is more environmental friendly such as Gambier. In line with its substitution, tanning agent usage should certainly consider the quality of the finished leather. Vegetable tanning agent (Gambier) in tanning industry can be used not only as a main tanning agent but also can be used as pre-tanning as well as re-tanning agent.

Gambier (Uncaria Gambier Roxb) is a woodbine from Rubiaceae family. It’s a kind of hawthorn which climbed a tree by a trunk containing wood substance. The girth of old stems of Gambier plant measured reaches 18 inches [1]. Gambier is a kind of dried sap derived from extracts of squeezed leaves and twigs of plants with the same name (Uncaria Gambier Roxb.) [8]. The main element that is very important in Gambier are catechins and catechu tannic acid [1]. In Indonesia, Gambier generally used for chewing, ink, etc. The more important use of Gambier is as a tanner and dyes. Gambier also contains catechins, a natural ingredient that are antioxidants. The chemical structure of catechins are as follows [7]:
Fig. 1: The chemical structure of catechins
(2R,3S)-2-(3,4-dihydroxyphenyl)-3,4-dihydro-2H-chromene-3,5,7-trio

Tanning is a process on the skin by immersion/rotate the drum with a solvent of tanning agent to transform raw skin becomes tanned leather for solidified properties of the skin [2]. Tanning is the process to change the skin which is volatile perishable into stable condition. [4].

Gambier as a vegetable tanning agent from the group of Pyrocatechol or condensable tanning agents (catechol) with a molecular weight of 520 [6]. Tannins are substances that can transform raw hides becomes a leather. Usually Tannin is a component of polyphenols found in plants that were able to precipitate proteins, include protein in the skin. Furthermore, it said that the phenolic components which soluble in water is having a molecular weight between 500 - 3000, phenolic reaction may precipitate alkanoid, gelatin or other proteins [11].

Given the leather treatment process is a very complex process with a high level of difficulty, it is necessary to assure the content information (characteristics) of the alternative tanning agents (Gambier). Uncertainty on the quality/character of the local Gambier in the market made tanners feel hard to choose or decide local Gambier as an alternative tanning agents, so that the tanners prefer imported Gambier which have clear description of its characteristics. The obscurity content/character of Gambier will make the formulation/recipe in the leather tanning process difficult, controlling leather tanning process as well as maintaining the quality of finished leather products consistently. Based on the above, the purpose of this study were, first to investigate the characteristics of the content of Gambier such as water content, total extract, total solute soluble, non tannin, tannin, pH of Gambier, and the second gives information for Gambier producers to prepare specific Gambier for leather process industry.

MATERIALS AND METHODS
The research method is laboratory research, the materials used are five types of Gambier which 2 types of imported products used in the industrial processing of leather with code A (liquid) and B (powder), and 3 local products Gambier with C code (block), D (cylinder), E (cylinder). Gambier character identified (%) by the SNI 06-6051-1999 test methods about vegetable tanning agents test for water content, content of total extract, total soluble, non tannin, tannin and pH. Test results data compared with SNI 01-3391-2000 about Gambier.

RESULTS AND DISCUSSION
Vegetable tanning (VT) ingredient is a very heterogeneous extract. Not only contains vegetable tanning agents (tannins) but also contain non-tannin very diverse agents depends on the type of tanning agents [12]. From the test results/characteristics Gambier identification (%) for water content, total extract, total soluble, non tannin, tannin content and pH from 5 types of Gambier the result is in the table below:
Table 1: The test results characteristics gambier

<table>
<thead>
<tr>
<th>VT code</th>
<th>Water content (%)</th>
<th>Total extract (%)</th>
<th>Total soluble (%)</th>
<th>Non tannin (%)</th>
<th>Tannin (%)</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>53,72</td>
<td>37,38</td>
<td>34,76</td>
<td>13,24</td>
<td>21,52</td>
<td>4,26</td>
</tr>
<tr>
<td>B</td>
<td>7,6</td>
<td>94,92</td>
<td>74,63</td>
<td>30,25</td>
<td>44,38</td>
<td>3,67</td>
</tr>
<tr>
<td>C</td>
<td>11,8</td>
<td>82,04</td>
<td>75,89</td>
<td>27,29</td>
<td>48,6</td>
<td>4,13</td>
</tr>
<tr>
<td>D</td>
<td>15,27</td>
<td>79,84</td>
<td>70,68</td>
<td>25,43</td>
<td>45,25</td>
<td>4,37</td>
</tr>
<tr>
<td>E</td>
<td>12,98</td>
<td>78,1</td>
<td>65,42</td>
<td>26,65</td>
<td>38,76</td>
<td>3,4</td>
</tr>
</tbody>
</table>

In leather processing industry, availability of vegetable tanning agents in powder or solid form gives higher profit than in block or cylinder form, which can be used directly and immediately, can manage at desired viscosity, easy to mix and energy efficient.

Water content is one of the most important characteristics in Gambier because water can affect texture, quality and lasting power of Gambier, high water content of Gambier make mold and mildew are easy to breed, causing changes in Gambier [9]. In accordance with SNI 01-3391-2000 maximum water content for best quality Gambier is 14%, while for the second quality is 16% maximum. The water content Gambier characteristics test results of Table 1 can be described as illustrate in figure 2.

Fig. 2: The water content in Gambier

Gambier A is in liquid form so it has very high water content. In its description Gambier A is an retanning agent that can help improve the flatness of color and improve the filling touch of leather. From the four Gambier B, C and E have water content less than 14% while D water content is more than 14% but less than 16%.

Vegetable tanning ingredient is a very heterogeneous extract. Not only contains tannins but also contain varies non-tannin which depends on the type of tanning agents. Non-tannin substances contain sugar, gallic acid, mineral salts and other organic acids. Non-tannin substances do not have the ability to tan the skin, but the nature and the amount have important effect on the physics and chemistry character in finished leather.

Non-tannin substances that distributed in the skin will give a handle (filling touch) that is soft and full on leather. The low proportion of tannin and non tannins is 1: 3 would give soften effect on finished leather [12]. The Gambier characteristics particular to the levels of tannin and non tannins test results from Table 1 data. comparison of proportions known as illustrate in figure 3.
Gambier has been used as one herb chewing betel nut for long ago. Gambier also used as an astringent, antiseptic, stomach medicine, cosmetics and mixing ingredients, breweries raw water purifier, giving a bitter taste to beer, and tanning agents. For medicine ingredients, West Germany importers requires catechins Gambier levels at 40-60%, and the pharmaceutical company Ciba Geigy requires minimum of 60.5% catechins levels. For leather tanning, leather processing company Cuirplastek R. Bisset and Cie demands tannin content of 40% [3]. Gambier for tanning industry has tannin content around 40% (36%-51%) for blocks type (extract-solid) and around 50% (48%-55%) for cubes type (extract-solid) [5]. Gambier known as catechu, which is derived from catechol derivatives phloroglucinol with dry tannin content around 35%-45%, tanning process will produce a soft leather [4].

Based on SNI 01-3391-2000 Gambier quality requirements in Indonesia for the first level quality contains at least 60% of catechins and second level quality contains at least 50% of catechins, then all the test samples are not qualified with the requirements of SNI 01-3391-2000 because all test samples have Gambier tannin content of less than 50% (different parameter). From the data above when compared with the requirements of Gambier in tanning industry then Gambier with code B, C, D, E can be used as the main tanning agent. Gambier A with low tannin content can only be used as a retanning agent. In accordance with their description is an agent Gambier A retanning agent for nappa shoes, garments, leather goods, upholstery and automotive articles.

Dissolved substances levels are total extract level less by total solvent extract. Gambier insoluble levels data from Table 1 it can be seen as in figure 4 below:

Based on SNI 01-3391-2000 about Gambier insoluble agents level quality requirements maximum of 7% of first quality and second quality maximum of 10%. From Figure 4, known
that Gambier A, C and D meet SNI 01-3391-2000 standards. Insoluble agent is very related to the processing of transforming Gambier extracts become Gambier with various shapes and qualities. The high insoluble substances in Gambier B (imports) caused auxiliaries agent helps improve the quality of the leather. Dirt source on traditional Gambier generally comes from the ground floor (land), the compression area, sump gum, combustion ash and drying area. Aside from the production process, high levels of water-insoluble agents are also caused by the presence of other intentional added as ballast in Gambier [9]. Insoluble agents in local Gambier in tanning process will degrade the skin quality and make it look like have on set of nicks due to friction and uneven skin color happens.

Tanning may occur in quite wide pH interval, but the bond between tanning substances and the skin occurs in certain pH and varies depends on the use of tanning substance. In normal pH area in vegetable tanning, a decrease in pH value will cause a rise in linked power of vegetable tanning agents [10]. According to research results in 5 types of Gambier by the acidity degrees (pH) can be seen as in Figure 5 below:

![Fig. 5: The acidity degree of (pH) Gambier](image)

Acidity degree (pH) characters of tanning agents should be informed to prospective users of tanning agents, this is very important for preparation conditioning of the skin and tanning agent management in the process. Acidity degree similarity between tanning agent and skin make vegetable tanning agents can be completely distributed to the cross section of the skin so the leather produced with the desired quality. Acidity degree differences in skin with it tanning agent that is too high will cause piply grain or case hardening that would degrade the quality of leather.

CONCLUSIONS
From the characteristics identification of Gambier as auxiliary agents skin treatment process test result can be concluded that:
1. Gambier B, C, D, E can be used as pretanning, main tanning and retanning agent. Gambir A can only be used as a retanning agent
2. Information consistency about content / characteristics such as water content, tannins, non tannins, total extract, total soluble and pH in Gambier for tanneries from the manufacturer are very important for tanners that the management, allocation and consistent quality control of leather.

REFERENCES


