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Conservation and Local Knowledge of *Daemonorops* spp. in Bukit Duabelas National Park, Jambi, Indonesia

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Abstract: The genus of *Daemonorops* spp. belong to the Arecaceae family consists of 115 species with only 12 species produce red-colored sap/resin; traditionally known as jernang. Resin is used for coloring and medicinal purposes. Jernang population in Jambi province can be found in Bukit Duabelas National Park (TNBD). Jernang resins are the source of livelihood for indigenous people, who live in the area of TNBD. The purpose of this research is to see the pattern in harvesting jernang, local genius (by conservation effort) and the knowledge about the use of the resins of jernang in TNBD by *Anak Dalam* Ethnic and local people of Jambi. Data information is obtained through interviews (semi-structured and participative observation). The data were analyzed qualitatively. Qualitative data includes the species, how to harvest dragon's blood palm, and the local genius in preserving dragon's blood palm. Based on the results of the research, we found known that: (1) The harvesting pattern of *Anak Dalam* Ethnic Tribe who inhabits the buffer zone of the park and the park area in harvesting the jernang is more sustainable and supports the conservation rules than the one by the local community of Jambi. (2). *Anak Dalam* Ethnic has their local genius to protect the parent tree of jernang within the enactment of customary sanctions for people who log jernang's tree. (3) The traditional function of jernang's red resin is also included to treat the wound, toothache, and to assist the birth process.

Keywords: Dragon's blood palm; Conservation; Local knowledge; Bukit Duabelas National Park.

1. Introduction

The species of *Daemonorops* spp. belong to the genus *Daemonorops*, family Arecaceae or Palmae. The genus *Daemonorops* has the second most common species after Calamus. The genus *Daemonorops* in Indonesia consists of 113 species [1] and 115 species [2]. From 115 species, 12 species produce red-colored sap, traditionally known as jernang. The type of jernang that produces the best red resin is *Daemonorops draco*, which has many functions including coloring and medicinal purposes [3] [4] [5] [6]. Traditionally the resin of jernang is used as the medicine for treating the wound, dental medication, and postpartum medicine [7].

According to Sari et al. [8] jernang has many benefits for ecological, economic, medical, and industrial uses. Ecologically, jernang plays a role in preserving the forest because jernang, including rattan vines, its growth requires the propagation of trees. Rattan jernang prefers the habitat of the river edge so it is useful to maintain the condition of the land around the river's border.

Resin jernang from Indonesia is exported to countries such as China, Hong Kong and Singapore. According to China's trade attache, they need 400 tons to 500 tons per year [9] [10], but Indonesia can export only 27 tons per year [10]. The collector's price of the resin powder was about Rp. 30,000 (about US \$ 3) per kg and Rp. 650,000 (about US \$ 70) per kg (pers. Com). The price of resin jernang in the local market in 2011 ranged from Rp. 700,000, - up to Rp. 900,000, - / kg [11] In the year 2014 - 2017 the selling price of latex at the local level is quite high around Rp. 2,500,000 - Rp. 3,000,000 depending on the level of purity.

Jernang population in Jambi province can be found in secondary forests, conservation areas such as the rubber plantation area and the National Park. The Jernang resin is a source of livelihood for the indigenous people who live in Bukit Tigapuluh National Park of Jambi and Riau Provinces, Indonesia [12]. Besides, jernang is also one of the source incomes for the local people in Jambi who live around the forest. There are many Suku Anak Dalam tribes live within the area of Bukit Duabelas National Park (TNBD). TNBD is a wandering area of the indigenous people, Suku Anak Dalam (Orang Rimba), who lives in this area for generations.

In 2000, Bukit Duabelas National Park (TNBD) has been established as one of the lowland tropical rain forest area in Jambi Province. Administratively, the park belongs to 4 districts: Sarolangun, Bungo, Tebo and Batanghari. This National Park area is a very important water supply area for Batanghari River. In the area of TNBD, there are many rivers and streams whose water comes from the area. This ecosystem condition is particularly suitable for *Daemonorops* spp. to grow.

According to the Natural Resources Conservation Agency of Jambi [13] there has been a reduction of the forest about 6,332 ha. This condition affected the population of the trees where the vines of jernang creep down, and also be the primary cause of the degradation of jernang population. Therefore conservation areas such as Bukit Duabelas National Park are one of the area that is safe for jernang. In this case, some studies on the conservation and local knowledge of local communities of Jambi and Suku Anak Dalam that inhabit the buffer zone of the park need to be done in the effort to preserve this plant.

The purpose of this research is to see the pattern in harvesting jernang, local genius (by conservation effort) and the knowledge about the utilization of jernang resin in the area of Bukit Duabelas National Park by Suku Anak Dalam and local people of Jambi.

2. Material & Methodology

2.1. Study Area

Our study site was located at the buffer zone around the area of Bukit Duabelas National Park in Jambi Province, Indonesia, which was located at E. $102^{\circ} 29' - 102^{\circ} 49'$ and S. $01^{\circ} 44' - 01^{\circ} 58'$.

2.2. Interviews and Data Collection

The information about harvesting patterns and local genius of *Daemonorops* spp. plants was obtained through interviews (semi-structured and participative observation). Interviews were conducted with every jernang seekers who came from local communities around the park, Suku Anak Dalam in the buffer zone TNBD and Suku Anak Dalam who inhabit TNBD area. The guidelines to conduct the interviews were modified from Martin [14] and Idu et al. [15].

2.3. Data Analysis

The data were analyzed qualitatively. Qualitative data include species, how to harvest dragon's blood palm, and local wisdom in preserving dragon's blood palm.

3. Results and Discussion

3.1. Harvest Method

The harvesting method of jernang in the buffer zone of Bukit Duabelas National Park (TNBD) by Suku Anak Dalam which inhabit the buffer zone and the park area is very different with the one by Jambi's people who live in the buffer zone. Jernang is categorized as a shrub daemon plant because all the stems are thorny, the tip of the leaf has hooks, and the stalks of the fruits are also thorny. This condition makes jernang cannot be climbed. Therefore, the local people of Jambi throw away the prickly bark of jernang with a machete. Then they pull the jars by holding the shelled part of the stem until they can pick up the fruit (Figure 1). This harvesting method is not good, because it could break jernang's shafts and stems. If the stems are broken, the tree will die.



Figure 1. Jernang's Harvest Method by local community of Jambi

The harvesting pattern conducted by the local community of Jambi has neglected the importance of sustainability. This one crucial factor has decreased the production of the sap of jernang. According to [16], one of the causes of the declining potential of jernang resin is caused by unsustainable production patterns.

On the contrary, Suku Anak Dalam who inhabits the buffer zone of the park and the park area are harvesting jernang in a more sustainable way. They made hooks made of wooden branches and tied with rattan as a tool to take the fruit off of the tree (Figure 2a.). Because jernang was used as the climbing rattan, the general stem of jernang was already high enough when they entered its production period and were difficult to reach. Therefore, Suku Anak Dalam would climb the nearby tree to harvest jernang fruit (Figure 2b), then jernang fruit would be connected with the wooden branch they have prepared. This harvesting method will not damage the stem of jernang. The similar report conducted by [4] who stated that fruit harvesting by the Suku Anak Dalam (Jambi) is conducted by climbing the nearer trees. The sustainable harvesting pattern is also carried out by the Talang Mamak tribe who inhabits the buffer zone area of Bukit Tigapuluh National Park (TNBT) [17].



Figure 2. Method of Harvesting Jernang By Suku Anak Dalam in Bukit Duabelas National Park, Jambi

There is no authority of the jernang trees in TNBD area. The one who find the first will be the owner of the tree. As the result, when the seeker finds a fruitful jernang tree, they will immediately harvest it even though the fruit is not yet ready. They do this because they are afraid if the others seekers will find out the fruit afterwards. As a result, the chance of the fruit to grow old and produce seeds is very slight. In the end, the population of jernang in TNBD area has decreased due to the harvest pattern of jernang on the young fruit that reduces the opportunity of the fruit to reproduce. The same method is also conducted by the people of Bukit Mangkekal, Desa Gedung Sako, in Kaur Regency, Bengkulu Province. The main principle of harvesting rattan is the one who sees it first will be the one who harvests it [8].

3.2. Jernang Conservative Effort in Bukit Duabelas National Park

The harvesting pattern conducted by Suku Anak Dalam, is one of the conservative forms to protect the parent of jernang trees. This harvesting method is not legally written, but local people respect and obey the unwritten regulation that has been applied from time to time [4] [6] [10] [18] [19].

Jernang plant is highly protected by the people of the park, especially by Suku Anak Dalam (SAD). If there is a cutting stem and is known by the SAD then the subjected person will get his customary

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punishment to pay fine about 400 pieces of long cloth or about 20 million paid to Temenggung (the chief of the SAD). This is one of the efforts to protect the native plants from illegal logging. Customary punishments are also carried out by the Talang Mamak tribe for jernang stem loggers. The difference is in the form of the penalties imposed. In Talang Mamak tribe the customary fines against the jungle cutter are about one kg of gum, which is paid directly to the person who captures at the time of the falling event. If at that time the loggers do not have the money, the fine is brought home and the fine form also changes. Fines at home is in the form of rice 10 kg, a goat and 120.000 rupiah, and they have to pay it to the tribe chief (Patih) [17].

The customary punishments imposed by these two indigenous people demonstrate that there are some conservation efforts in preventing jernang sustainability. Here, we can see that the indigenous people are more prudent in treating jernang plants for the sustainability and the future development of the species. However, there are no customary punishments made by the local community of Jambi as an effort to protect jernang vegetation.

The conservation of jernang is also done by Balai Besar Bukit Duabelas National Park by making a demonstration plot. However, only one clumps of jernang found in the demonstration plot. The mother tree in the demonstration plot is a potential one used as the seeds source. Therefore, the parent tree must be protected by building fences, so that the jernang fruit will not be taken by Suku Anak Dalam who lives around the National Park. Due to the increasing scarcity of this plant, Bukit Duabelas National Park Office has planted many seedling jernang around the demonstration plot.

3.3. Local Knowledge and the Function of Jernang Resin

Traditionally the local Jambi community who lives in the buffer zone of TNBD uses red resin from the jernang fruit to treat the wounds. They applied it by mixing the water and the red resin and applied them to the injured area. It is quite similar with the function of resin they use as a toothache medicine. As for the additional purpose, by adding water, the red resin is also used to assist the delivery process by injection. This method has become the traditional way of the community in delivering birth in TNBD. The method is usually applied to the first child. Furthermore, Asra [17] reported that the people of Sepintun and Karang Mendapo in Sarolangun, Jambi, utilize the sap/resin red of jernang as the wound medicine, dental pain medication and as the pilis (affixed to forehead) for new mothers, and for coloring Rattan basket to make it more durable.

Besides, some variants of jernang plants such as *D. didymophylla* Beccari and *D. draco* Blume are also used to make handicrafts in Sumatera and Kalimantan [20]. People in Sepintun (Jambi) use old male stem to make rattan baskets. In order to make the rattan basket to be more durable, they colored it with the sap of jernang [17]. While the female stem is usually not utilized because the female stem can produce more sap of jernang.

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4. Conclusion

Based on the research results, it can be concluded that the harvesting pattern of Suku Anak Dalam who inhabited the buffer zone of the park and the park area is more sustainable and supports the conservation rules compared with the harvesting method by the local community of Jambi. Suku Anak Dalam has their local genius to protect jernang parent tree with the enactment of customary punishment for the loggers of jernang. Jernang red resin is used to treat wounds, toothache medicine, and to help the birth process.

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