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Distribution of wanga plant (*Piga fettaelata*) in South Sulawesi

Syamsiah*, St. Fatmah Hiola, Nani Kurnia, Yusminah Hala

Universitas Negeri Makassar, South Sulawesi, Indonesia

*syamsiah.msi@gmail.com

Abstract. This study aims to determine the distribution of wanga plants (*Piga fettaelata*) in South Sulawesi. This data is very important as a baseline for conservation or protection of these species to avoid extinction. The method used is an exploration method by exploring the forest and mountainous areas in South Sulawesi, namely the Latimojong mountain area in Enrekang Regency, in Tana Toraja Regency, and in North Toraja Regency. The results showed that the Wanga plants in South Sulawesi were spread in nature in groups with a rather specific habitat that is near water sources, around small rivers, plantations, open fields found on the slopes of hills or former shifting cultivation that get light direct sun, and forest edge. This plant thrives in humid mountainous areas at an altitude of 788 to 1,540 m asl, with an average temperature between 20°C to 25°C.

1. Introduction

Pigafetta is a genus of areca nut family (Arecaceae) whose distribution is closely related with the Wallacea line. Pigafetta is found to the east of the Wallacea line starting from Sulawesi, Maluku Islands and Halmahera. Baker & Dransfield (2006) reported that Pigafetta is spread in Sulawesi to New Guinea, while in New Guinea itself it is recorded only in the Southwest area, and it is not found in Papua New Guinea (PNG). It is further explained that Pigafetta grows well in open places at an altitude of 500-1500 m above sea level, and in carrying out ecological functions as forest ecosystems constituent, it usually dominates its place of growth in forests or mountains.

Pigafetta consists of 2 species, namely *Pigafetta filaris* (white wanga palm) and *Pigafetta elata* (black wanga palm). The former is spread from Maluku to New Guinea, and the latter is spread across Sulawesi, including South Sulawesi. Based on the characteristics of the two species, *P. elata* is described as the endemic palm of Sulawesi (Dransfield, *et al.*, 2006). Endemic plants are plants that are only spread in a particular area and are not found in other regions. Thus, endemic plants are the wealth of a particular area that needs to be conserved. Given its status as an endemic plant whose existence is limited to certain habitats and environmental conditions, it is highly likely to experience rapid degradation in nature. In order to avoid this, a comprehensive data about the endemic plant is needed, particularly the data of its distribution in nature.

Information about the distribution of *P. elata* in Sulawesi's forest areas, especially in South Sulawesi, is still limited. However, many people already use these plants for various purposes. The utilization of this plant requires sufficient knowledge and understanding in order to avoid exploitation of the natural resources. Besides the use of *P. elata* for various purposes, there are also another factors which can threaten the existence of the endemic plant in nature, including deforestation, shifting cultivation patterns and land clearing by the community, all of which cause problems in nature. As a result, plant's habitat is increasingly threatened. Thus, it will lead to a gradual extinction. If this is not

anticipated from the beginning, it is likely that the endemic species will experience degradation in nature which will end in extinction.

15 Data of the distribution of *P. elata* in South Sulawesi is still unavailable. Besides that, there is no data from the International Union for the Conservation of Nature and Natural Resources (IUCN) regarding the conservation status of *P. elata*. Therefore, this research is considered as an important endeavor to provide sufficient information about *P. elata* distribution which is needed as a basis for policy making of *P. elata* conservation in the future.

2. Methods

The research is a descriptive research which utilized an exploration method by exploring the forest and mountainous areas in South Sulawesi, namely the Latimojong mountain area in Enrekang Regency, TanaToraja Regency, and North Toraja Regency. Exploration is carried out by recording data on temperature, altitude above sea level, habitat, and distribution of *P. elata* at the study sites.

3. Result and Discussion

Based on the results of the study, including information gathered from the community at the research location and relevant literatures, it was revealed that *P. elata* is spread in five districts in South Sulawesi, namely Enrekang, TanaToraja, Toraja Utara, Luwu, and North Luwu. However, based on field conditions and several limiting factors, the research data collection is limited to only three regency, namely Enrekang Regency, TanaToraja Regency, and North Toraja Regency. Research on the distribution of *P. elata* that has been carried out in several forest and mountainous areas in the three districts is presented in Table 1 and Table 2.

Table 1. Ecological and distribution data of *P. elata* in Latimojong Area in Enrekang Regency

No	Location	Total Species	Ecological data			
			Coordinate	Elevation (m asl)	Temperature	Habitat
1	Mount Rantelemo	1	S 03° 26' 03,8" E 119° 58' 29,4"	1193	21°C	Around small river
2	Rantelemo	1	S 03° 26' 02,1" E 119° 59' 21,4"	1195	21°C	Hill
3	Angin-angin Village	4	S 03° 24' 45,5" E 119° 57' 30,6"	1504	20°C	Mountain near a small river
4	Tirowali Village	1	S 03° 24' 17,7" E 119° 57' 13,1"	1540	20°C	roadside
5	Perbatasan Bone-bone	5	S 03° 24' 11,8" E 119° 57' 06,8"	1510	20°C	Hill near a garden
6	Perbatasan Bone-bone	9	S 03° 24' 09,6" E 119° 57' 05,4"	1502	20°C	Small river
7	Perbatasan Bone-bone	10	S 03° 23' 52,6" E 119° 57' 10,8"	1443	21°C	mountain
8	Pendoketan	1	S 03° 23' 33,1" E 119° 56' 51,3"	1275	23°C	Rice field side
9	Pendoketan	3		1270	23°C	Bukit Pendoketan
10	Kota Bone-bone	2		1255	24°C	Near a river
11	Kota bone-bone	2		1250	24°C	Near a river
12	Salongge'	2		1200	25°C	roadside

13	Awo	8	S 03°23'30,4" E 119°56'09,2"	1155	25°C	Rice field side
14	Awo	4		1050	25°C	Rice field side

Table 2. Ecological and distribution data of *P. elata* in Mountain area of TanaToraja and North Toraja

No	Location	TotalSpecies	Ecological data			Habitat
			Coordinate	Elevation (m asl)	Temperature	
1	Mebali	1 (young plant)	S 03° 09'25,2" E 119° 53'20,8"	972	20-25°C	roadside
2	Mebali	1		972	20-25°C	roadside
3	Ke'peVillage km 8	10		972	20-25°C	garden
4	Km 5 Makale	4		973	20-25°C	roadside
5	Km 3 Makale	2		973	20-25°C	roadside
6	Km 9 Rantepao	1		790	20-25°C	roadside
7	Ke'teKesu	3	S 02°59'42,7" E119°54'37,1"	788	20-25°C	roadside

Distribution condition of *P. elata* in research location is presented in Figure 1, Figure 2, and Figure 3.



Figure 1. *P. elata* in Latimojong Village (Photo: Syamsiah, 2016)



Figure 2. *P. elata* di Bone-bone Village (Photo: Siti Fatmah Hiola, 2016)



Figure 3. *P. elata* in Tana Toraja (Photo: Syamsiah, 2016)

The study of *P. elata* distribution that have been carried out in three regencies in South Sulawesi, shows that these plants are spread in uneven groups and are very limited in certain locations. For example, in Kabupaten Enrekang, *P. elata* are only found in the Latimojong Mountains area in Baraka District and Buntu Batu Districts which consist of several villages. Not all villages in the two districts are the location of *P. elata* distribution. *P. elata* are not found in villages with the altitude of below 1000 m above sea level.

Topographic factors greatly affect plant life which includes altitude and land shape. The Latimojong mountain area is at an altitude of 700 to 3680 m above sea level with a sharp slope, while the *P. elata* based on the locations explored, only found at an altitude of 788 to 1540 m above sea level. The height of the place is related to the thermometric gradient, in which the higher the place the lower the temperature. This can be seen from the results of temperature measurements in the area where the average daytime temperature ranges from 20-25°C at an altitude of 1000-1540 m above sea level in the Latimojong mountain region. Whereas in the Tana Toraja region, *P. elata* is found at an altitude of 788-1000 m above sea level. It is in line with the study result of Pitopang *et al.*, (2011) that the plants were found in the range of 600 - 1700 m above sea level in Lore Lindu National Park.

The result of analysis on *P. elata* existence and distribution in the Latimojong mountainous region, Tana Toraja, and North Toraja, along with the information gathered from the local community, it was revealed that *P. elata* is already in a rare condition and is only found in certain places. This condition is likely caused by the nature of the plant itself, as the seed takes longer period of time to germinate. Besides that, *P. elata* are dioecious plants. Thus, for pollination to take place, it needs wind and / or insect assistance, but if the location of the plants are quite far, a successful pollination is unlikely to occur.

Another possible cause of the spread and rare conditions of *P. elata* in the study area is due to the community, especially in the Latimojong area, which generally utilize the mountain forests to be an agricultural land (currently, most of the Latimojong mountainous area is converted into clove and coffee plantations). Another possible cause for this condition is that the people in Enrekang Regency do not use these plants directly. Thus, there is no reason or motivation for them to maintain *P. elata*, let alone to cultivate them.

The utilization of *P. elata* by the people in the Latimojong mountain region is very different from the people in Tana Toraja and North Toraja Regencies, as the two districts are the regions with the highest utilization of *P. elata* for Toraja tribal pole, namely 'Alang Sura / granary'. The utilization of *P. elata* stems for the Alang Sura pole immediately cut off the plants, which mainly relies on wild *P. elata* that grows naturally in the forest or mountains. The use of plants by collecting directly from natural forests can threaten plant populations. This is likely to be the cause of the decreasing size of *P. elata* population in nature. Muharso (2000) explained that excessive exploitation of wild plants would exceed the ability of plant regeneration. Thus, without accompanying cultivation efforts, it would finally disrupt the plants sustainability.

The results of the research on the distribution of *P. elata* in three districts in South Sulawesi showed that the existence of *P. elata* in nature is very limited. It is evident from the discovery of only two plants at the research sites. Thus, it provides a strong reason for a good conservation strategy of *P. elata* from the community as well as from the government. as well as from the local government.

4. Conclusion

Wild *P. elata* in South Sulawesi are distributed in groups, but are generally uneven, with rather specific habitats which are near with water sources, around small rivers, plantations, open lands located on hillsides, or former shifting cultivation that gets direct sunlight, and forest edge areas. This plant grows well in humid mountainous areas, at an altitude of 788 to 1,540 m above sea level, with an average temperature between 20°C to 25°C. The existence of *P. elata* in nature is very apprehensive, since there were only two plants found in the research location. Thus, it provides a strong basis to urge that *P. elata* in South Sulawesi requires a good conservation strategy, either from the society or from the local government,

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