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The population of Jernang rattan (*Daemonorops draco*) in Jebak Village, Batanghari District, Jambi Province, Indonesia

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ABSTRACT

*Sulasmi IS, Nisyawati, Purwanto Y, Fatimah S. 2012. The population of Jernang rattan (*Daemonorops draco*) in Jebak Village, Batanghari District, Jambi Province, Indonesia. Biodiversitas 13: 205-213.* Research of Rattan Jernang (*Daemonorops draco* Willd.) population in Jebak Village, Batanghari District, Jambi had never been done before. *Daemonorops draco* is a plant that produces sap called dragon blood. Dragon blood is very useful for the the lives of people of Anak Dalam Tribe in Jambi. This research used purposive random sampling method. All of data were analyzed descriptively. The results showed that beside *D. draco*, there were other six species of rattan in Jebak forest. The population of *D. draco* in Jebak forest was only 8 clumps, consisting of 82 individuals. *D. draco* had the smallest population among all rattan species. *Calamus javensis* had the highest population, namely 11 clumps, consisting of 197 individuals. The research location had air temperature of 20.2^0C-28.9^0C, relative humidity of 58%-68%, and pH of 4.60-4.81. In this location, there were 35 tree species (73 individuals) as supporting trees for *D. draco* to climb. The number of *D. draco*'s supporting trees and *D. draco* was not balanced, causing the death of *D. draco* in Jebak forest. Vegetation analyses showed that there were 51 tree species with diameter > 10 cm, consisting of 69 individuals. *Pithecolobium saman* had the highest importance value index (11) among all trees. There were also 33 tree species with diameter ≤ 10 cm, consisting of 60 individuals. *Pithecolobium saman* also had the highest importance value index (20) in this group. Based on the interview, it is showed that the population of *D. draco* in Jebak forest declined because of illegal logging and forest encroachment.

Key words: *Daemonorops draco*, supporting trees, dragon blood, forest encroachment, illegal logging.

INTRODUCTION

The word *Daemonorops* is derived from Greek, *daemo* and *rhops*; *daemo* means devil, and *rhops* means shrub (Mogea 1991). In Indonesia, the genus *Daemonorops* consist of many species, namely 84 species (Beccari 1911), 113 species (Dransfield and Manokaran 1994), 115 species (Rustiami et al. 2004). According to Rustiami et al. (2004), of the 115 species of *Daemonorops* found in Indonesia, 12 species produce sap, namely *D. acehensis*, *D. brachystachys*, *D. didymophylla*, *D. draco*, *D. dracuncula*, *D. dransfieldii*. *D. maculata*, *D. micracantha*, *D. rubra*, *D. sekundurensis*, *D. siberutensis*, and *D. uschdraweitiana.* In Jambi, 10 species of *Daemonorops* are found, namely, *D. brachystachys*, *D. didymophylla* (Beccari 1911), *D. dracuncula, D. dransfieldii, D. longipes* (Dransfield 1984), *D. palembanicus, D. singalamus, D. trichrous, D. draco* (Dransfield 1992), and *D. mattanensis* (Soemarna 2009). According to Heyne (1987), only five species of rattan produce high quality of sap, namely *D. didymophylla, D. draco, D. draconcellus, D. motleyi*, and *D. micracantha*. Of the five species, *D. draco* produces the best jernang sap, which has many uses, such as coloring agent (Beccari 1911), ingredient of cosmetics (Dali and Soemarna 1985), and medicines for diarrhea (Winarni et al. 2004), for wound (Harata et al. 2005), and ingredient of tooth paste (Purwanto et al. 2009). Not only producing jernang sap, *Daemonorops periacanthus*, found only in Japan, also produces edible sweet fruit (Beccari 1911).

Indonesia is the largest jernang sap exporter in the world. The demand of Indonesian jernang sap from China is 400 ton-500 ton per year (Januminro 2000; Soemarna 2009), but Indonesia can export only 27 ton per year, worth US$ 10,125,000 (Soemarna 2009). In addition to Sipintun and Lumbun Sigatal Villages, Jebak Village in Muara Tembesi Sub-District, Batanghari District, Jambi Province, also produces jernang sap as much as 300 kg per month (Jambi Forestry Office 2009).

Jebak Village has 15,830 ha of natural forest, but the forest is not utilized optimally because much of it has been damaged due to illegal logging and forest encroachment done by transmigrants coming mostly from Java and South Sumatra (Soemarna 2009; BKSDA Jambi 2010).

Forest degradation at an extent of 6,332 ha has caused the decline of population of supporting tree species on which the jernang rattan climb (BKSDA Jambi 2010), which in turn has caused the decline of jernang rattan population. As a result, the production of jernang sap has

declined (Soemarna 2009). The degree of negative impact of illegal logging and forest encroachment on the population of jernang rattan population had not been documented. The objective of this study was to estimate the population of jernang rattan (*Daemonorops draco* Willd.) in Jebak Village. The results of this study can be used to complete the data of rattan population in Batanghari District, Jambi Province, Indonesia and as the basis for the development of this species in Jebak Village.

MATERIALS AND METHODS

Study site

The field work was done from January to February 2011 in forest area belonging to Anak Dalam Tribe (Suku Anak Dalam) in Jebak Village, Muara Tembesi Sub-District, Batanghari District, Jambi Province. The location was selected based on the information that the Jebak forest is a habitat of jernang rattan (*Daemonorops draco*).

Sampling method

Sampling of data in the field was done using purposive random sampling method (Fachrul 2007; Simon 2007). Sampling plots were made only in the sites where *D. draco* was found. Within 25 hectares of research area, five 100m x 100m plots were made. Each plot was divided into 100 small plots measuring 10m x 10m each. Within 100 small plots, the number of jernang rattan and all species of rattan were counted and categorized according to their growth stages following Dransfield (1984), INTAG (1989), Kalima (1991) and Siswanto (1991): (i) Seedling: length of stem < 3 m, (ii) Juvenile: length of stem: 3-5 m, (iii) Semi mature: length of stem: 5-15 m, (iv), Mature: length of stem > 15 m.

Within 10m x 10m plots, the number of trees on which jernang rattan climbs was also counted. For vegetation analyses, two sizes of plots were made in one of the 100m x 100m plot, namely 10m x 10m plots and 20m x 20m plots, with a total area of 0.2 ha (20m x 100m). Trees with a diameter > 10 cm were counted in 20m x 20m plots, while trees with a diameter $\leq$ 10cm were counted in 10m x 10m plots. The data of trees were used as supporting data. The names of species and number of individual trees were recorded to determine the frequency and density of each species. Identification of trees was not done because the local and scientific names of trees had been given.

Data analyses

Importance value index was counted for each species using formula cited in Rugayah et al. (2004) and Simon (2007). From the importance value, dominance index was determined using the formula cited in Simon (2007), namely:

ID= Σ _ni/N_2

ID= dominance index for each tree species,

ni= importance value of each tree species,

N= total importance value indexes.

Criteria for Simpson dominance indexes were 0 < C < 0.5 = low dominance; 0.5 < C < 0.75 = medium dominance; 0.75 < C < 1 = high dominance

RESULTS AND DISCUSSION

Population of jernang rattan and others

According to Rustiami (2004), *Daemonorops draco* Willd. is also known as *Calamus draco* Willd. and *Daemonorops propinqua* Becc. The species has many local names in Indonesia, namely *rotan jernang* (Malay), *limbayung* (West Sumatra), *huar* (Dayak-Busang), *seronang* (Dayak-Penihing), *uhan* (Dayak-Kayan), *getih badak* (Sundanese), *getih warak* (Javanese). The jernang rattan is distributed in two islands, namely Sumatra (Jambi, Bengkulu, Riau Archipelago Provinces), and Kalimantan. The species grows in clumps in valleys and is commonly found in flood plain near rivers.

In Jambi, there were 10 species of *Daemonorops*, namely *D. brachystachys*, *D. didymophylla* (Beccari 1911), *D. dracuncula*, *D. dransfieldii*, *D. longipes* (Dransfield 1984), *D. palembanicus*, *D. singalamus*, *D. trichrous*, *D. draco* (Dransfield 1992), and *D. mattanensis* (Soemarna 2009). Currently only three species can be found in Jambi, namely *D. didymophylla*, *D. draco*, and *D. mattanensis*. The three species can be found in the Districts of Batanghari, Sarolangun, Tebo, and Tanjung Jabung (Soemarna 2009). Based on the information from the jernang sap seekers in Jebak Village, Malay people in Jambi know two jernang sap producing rattans, namely *rotan jernang* (*D. draco*) and *rotan kelukup* (*Daemonorops didymophylla*), while the people of Anak Dalam Tribe in Jebak Village call the two species *rotan jernang* (*D. draco*) and *rotan mengkarung*/*kelemunting* (*D. didymophylla*). The jernang rattan has longer panicles and high density of flower, darker fruit and more abundant, higher quality and more expensive sap than the kelemunting. The people of Anak Dalam Tribe in Jebak Village can easily distinguish jernang rattan from other rattans from the stems, leaves, fruits, and spines. Jernang rattan has diameter between 1cm to 3 cm, reddish green leaves, shinny black fruit, the skin being scaly when extracted. It has stem internodes between 15cm to 40 cm long, and the whole stem is covered by black spines which do not shed until old age. The number of stems in a clump is between 5 to 20 individuals, with the height between 8m to 15m.

According to jernang sap seekers, the cane of *D. draco* can be used to make household equipments. But the quality of cane is not good, so the people of Anak Dalam Tribe only infrequently use it. Figure 1. shows the differences between *jernang rattan* and *batang rattan*, young leaves of female jernang rattan, jernang rattan fruit. Jernang rattan can be easily distinguished from other rattan from its stem, leaves, and fruit. Jernang has many spines, light green or reddish green leaves and black fruit.

According to Rustiami (2004) and Winarni et al. (2004), the characteristics distinguishing *D. draco* from other *Daemonorops* are the followings: Its height is 8m-15m, the length of internodes 20 cm; the breadth of sheath 30mm; the length of leaf 3m, the length of cirrus 100 cm, petiole10 cm; diameter of stem 10mm-30mm. The leaves have sheath circling the stem. The fruit skin is scaly like salacca's fruit. The spines are arranged in a structure called the knee (Figure 1).

Figure 1.A. Stem of jernang rattan, B. Stem of *batang rattan* (*Calamus*), C. Seedlings, D. Young leaves of female jernang rattan, E. Jernang rattan fruit.

The differences between female and male jernang rattan can be seen from the bracts, young leaves, flower, internodes, and number of individuals in a clump (Table 1).

Daemonorops draco is a dioecious plant. Female flowers and male flowers are produced in different rattan clumps. *D. draco* starts producing fruit at the age of two years, but it starts producing jernang sap when it is 5 years old (Winarni et al. 2004). A clump of *D. draco* generally consists of 5-20 individuals (BKSDA Jambi 2010).

Based on the report from the Forestry Office of Jambi Province in 2009, the population of jernang rattan in Jambi is relatively small, as shown in detail in Table 2. Table 2 shows that the smallest population in nature is found in Batanghari District, which is 40 clumps, because since 1990, illegal logging and forest encroachment in Jebak Village, Batanghari District has been the largest among all districts (BKSDA Jambi 2010). Therefore, in 2008 two people from Anak Dalam Tribe started planting 40 clumps of rattan under the guidance of Forestry Office of Batanghari District (Jambi Forest Office 2009). However, only 25 clumps survive, because the other 15 clumps were consumed by pigs. According to jernang rattan farmers, since November 2011, the planted jernang rattans have produced sap as much as 30 kg.

The results of our study showed that the population of jernang rattan in Anak Dalam Tribe forest area in Jebak Village has declined. Our study only found 8 clumps of jernang rattan consisting of 82 individuals (stems). Table 2 shows that the population in nature has declined from 40 clumps/ha in 2009 to 8 clumps in 25 ha in 2011. The decline of rattan population is caused by illegal logging and forest encroachment done by transmigrants and other outside communities. According to Anak Dalam Tribe, the damage due to illegal logging and forest encroachment in 2011 was 60% from the total of 15.830 ha of forest belonging to the tribe. Transporting timber in the forest is done using skid road made of timber. Many jernang rattans die because there are not enough supporting trees to climb.

Table 1. The differences between female jernang rattan and male jernang rattan

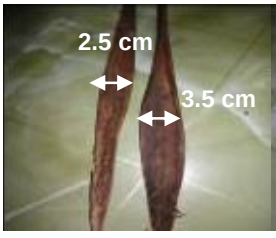
Distinguishing factors	Female jernang rattan	Male jernang rattan
Young leaves' color	Reddish green	Green
		
Internodes	15 cm-20 cm	35 cm-40 cm
		
Bracts	Large	Small
		
Number of individuals in a clump	5-20 individuals	3-5 individuals
		

Table 2. The population of naturally growing jernang rattan and planted jernang rattan in Jambi Province based on the Forestry Ofiice report and on research data in 2011.

District	Population in nature per hectare	Plantation	Research data
Batanghari	40 clumps	In 2008, plantation was started in jebak Village, consisting of 40 clumps.	8 clumps
Sarolangun	53 clumps	In 2006, plantation was started in Sipintun and Lumban Sigatal villages, consisting of 500 clumps. Rattans were planted in rubber plantation at the extent of 10 ha.	8 clumps
Tebo	71 clumps	Plantation has not been done.	8 clumps
Tanjung Jabung	69 clumps	Plantation has not been done.	8 clumps

Figure 2. Pictures of forest encroachment in Jebak Village: A= encroachment; B= skid road to facilitate timber transportation, C= jernang rattan died because there was no supporting tree, D= forest fire; E-G = conversion of forest into oil palm plantation; F. indicates an area inside Anak Dalam Tribe forest being encroached.

After the death of jernang rattan, people burn the forest to clear the land for oil palm plantation, 2-3 months later (Figure 2). The information was in agreement with the data from BKSDA Jambi (2010) stating that the forest damage in 2009 was 40% of 15.830 hectare, resulting in the decline of trees on which the jernang rattan climb. The damage of forest can be seen from the conversion of forest into oil palm plantation.

Since 1990, the encroachment of forest has grown out of control because of lack of supervision from the government and because of unclearness of the boundary between the forest area and the villages around the area. The encroachment is done not only by transmigrants, but also by several oil palm plantation companies in the surrounding areas. (The companies are PT. Asiatic Persada in the west, PT. Tunjuk Langit Sejahtera and Batanghari Sawit Persada in the north, and PT. Nan Riang in the east of the forest area).

According to the people of Anak Dalam Tribe, before 1990, they could easily get the sap because the population density of jernang rattan was still high. Within less than 6 hours, they could collect jernang rattan fruit as much as 60

kg-180 kg per family. That amount was collected from 3-6 clumps of jernang rattan. After 1990, they could collect jernang fruit only 3 kg-20 kg per day, taken from 1 clump of jernang rattan. In 2010, the population of jernang rattan in Jebak Village was 15-30 clumps, but in 2011, only 8 clumps left, consisting of 82 individuals. The composition of growth stages of the 83 individuals are given in Figure 3. Figure 3 shows that the number of seedlings was much higher than the mature individuals, so the production of jernang sap was low. But, the abundant seedlings also ensure the sustainability of jernang rattan in the future if illegal logging and forest encroachment is stopped, so the number of supporting trees on which rattan climb is sufficient.

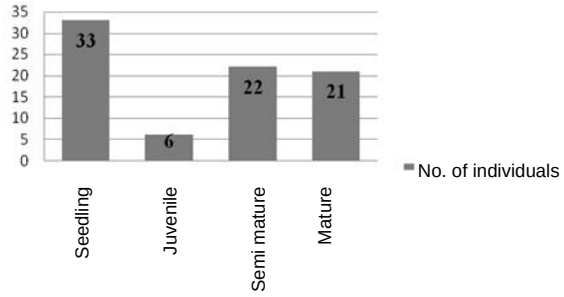


Figure 3. The number of jernang rattan individuals at different growth stages in Jebak Village in 2011.

The complete data of the number of individuals of jernang rattan is given in Table 3. In plot 1, a clump of young female rattan (5 individuals) was found. One clump died in plot 4 because there was no supporting tree to climb. In plot 11, a clump of female rattan was found (5 seedlings and 5 semi mature individuals). Two clumps died in plots 13 and 16. In plot 21 a clump of semi mature male jernang rattan was found (3 individual), and clump died in plot 24.In plot 31 a clump of female jernang rattan was found (3 individuals of seedling, 3 individuals of juvenile, and 7 individuals of semi mature rattan). In plot 35 a clump of semi mature male jernang rattan was found (5 individuals), and a clump died in plot 38. In plot 41 a clump of female rattan was found (5 individuals of seedlings, 3 individuals of juvenile, 2 individuals of semi mature, and 10 individual of mature rattan). In plot 43 a clump of female jernang rattan was found (10 individuals of seedlings, 4 individuals of semi mature and 7 individuals of mature rattan). In plot 45 a clump of rattan died. In plot 47 a clump of female jernang rattan was found (5 individuals of seedlings, and 4 individuals of mature rattan). In plot 50 a clump of rattan died. Table 3 shows that jernang rattan population was distributed widely in each plot.

Overall, there were 2 clumps of male jernang rattan (8 individuals), 6 clumps of female jernang rattan (74 individuals) (Figure 4), and 7 clumps of jernang rattan died. Because the number of female and male rattans was not equal and their locations were separated widely, natural reproduction of jernang rattan did not occur easily. To overcome this constraint, artificial pollination has been conducted.

Table 3. Number of individuals of jernang rattan in Jebak Village

Plot nos	Jernang rattan population (ind.)			
	Seedlings	Juvenile	Semi mature	Mature
1	5	-	-	-
2	-	-	-	-
3	-	-	-	-
4†	-	-	-	-
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-
11	5	-	5	-
12	-	-	-	-
13†	-	-	-	-
14	-	-	-	-
15	-	-	-	-
16†	-	-	-	-
17	-	-	-	-
18	-	-	-	-
19	-	-	-	-
20	-	-	-	-
21♂	-	-	3	-
22	-	-	-	-
23	-	-	-	-
24†	-	-	-	-
25	-	-	-	-
26	-	-	-	-
27	-	-	-	-
28	-	-	-	-
29	-	-	-	-
30	-	-	-	-
31	3	3	7	-
32	-	-	-	-
33	-	-	-	-
34	-	-	-	-
35♂	-	-	5	-
36	-	-	-	-
37	-	-	-	-
38†	-	-	-	-
39	-	-	-	-
40	-	-	-	-
41	5	3	2	10
42	-	-	-	-
43	10	-	4 (†)	7
44	-	-	-	-
45†	-	-	-	-
46	-	-	-	-
47	5	-	-	4
48	-	-	-	-
49	-	-	-	-
50†	-	-	-	-
Total	33	6	22	21

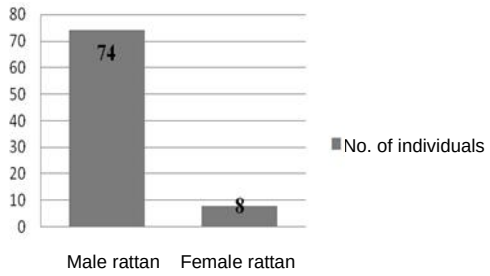


Figure 4. Comparison of number of female and male individuals of jernang rattan in 2011

The comparison of population between jernang rattan and other rattans in Jebak Village is presented in Table 4. The detailed information of rattan population in Jebak Village is given in Table 5.

Table 4. Population of rattan in Jebak Village.

Local names	Scientific names	p clumps	p Ind
Rotan lilin	*Calamus javensis* Bl.	11	197
Rotan semambu	*Calamus scipionum* Lour.	9	178
Sego air	*Calamus axillaris* Becc.	9	103
Rotan getah	*Daemonorops melanochaetes* Bl.	10	102
Rotan dahan	*Calamus flagellaris* Burr.	8	95
Rotan manau	*Calamus manan* Miq.	8	93
Rotan jernang	*Daemonorops draco* Willd.	8	82

Table 5. Population of rattan in Jebak Village in 2011

Number of individuals	Rotan jernang	Sego air	Rotan dahan	Rotan getah	Rotan manau	Rotan lilin	Rotan semambu
Seedlings	33	21	20	23	14	24	24
Juvenile	6	20	30	24	18	41	39
Semi mature	22	35	16	23	35	63	44
Mature	21	27	29	32	26	69	71
Total	82	103	95	102	93	197	178

It can be seen in Table 4 that jernang rattan had the smallest number of individuals. This may be due to illegal logging and forest encroachment which result in the shrink of jernang rattan habitat. Meanwhile, the populations of *rotan lilin (Calamus javensis*) and *rotan semambu* (*Calamus scipionum)* were relatively large because, according to the community, these two species have low economic value. The canes from these species have low quality because they are easily broken. Of the 7 species above, beside jernang rattan, *rotan manau (Calamus manan)* also has high economic value. The cane of *rotan manau* has the highest quality among all the species and it is flexible, so it can be easily made into desirable forms (Soemarna 2009).

Habitat of jernang rattan in Jebak Village

The results showed that in 2011 the forest in Jebak Village had been damaged by illegal logging and encroachment, so the vegetation was sparse. The relatively open vegetation caused the relatively wide range of air temperature, 20.2^0C-28.9^0C, and low relative humidity, 58%-68% (Table 6).

The sparse vegetation results in low transpiration, so the water vapor is little, and consequently the humidity is low. Bernatzky (1978) said that water vapor in the air from evapotranspiration affects air humidity. Table 7 shows that in 2005-2009 the range of air temperature was not wide and the relative humidity was high, 80%-87%. These phenomena indicated that the vegetation in that period was dense, so the water vapor from transpiration was large; therefore, the humidity was high.

Table 6. Air temperature, relative humidity, soil pH in Jebak Village, during research period in 2011.

Day/date	Plot no.	Parameters measured: Temp. (^{0}C)	Relative humidity (%)	Soil pH
Monday/3-1-2011	1	23.1	65	4.71
Wed./5-1-2011	2	24.2	64	4.71
Thurs./6-1-2011	5	25.1	63	4.70
Wed./12-1-2011	6	25.1	63	4.71
Thurs./13-1-2011	10	26.0	60	4.74
Sat/15-1-2011	11	25.9	60	4.75
Tuesday/18-1-2011	15	26.8	59	4.70
Thurs./20-1-2011	20	27.0	59	4.61
Monday/24-1-2011	21	27.0	59	4.61
Tuesday/25-1-2011	25	27.5	59	4.64
Thurs/27-1-2011	30	28.6	58	4.61
Wed./2-2-2011	31	28.6	58	4.60
Sat./5-2-2011	33	28.5	58	4.62
Tuesday/8-2-2011	35	28.9	58	4.62
Wed/9-2-2011	37	28.9	58	4.62
Thurs/10-2-2011	40	23.0	66	4.68
Sat./12-2-2011	41	22.9	66	4.68
Monday/14-2-2011	43	22.9	66	4.77
Thurs./17-2-2011	47	20.2	68	4.81
Monday/21-2-2011	50	21	68	4.81

The soil in Jebak village is acidic (pH 4,60-4,81) and belongs to yellow red podzolic soil type (Soemarna 2009). The village has an altitude of 20 m above sea level with annual rainfall of 1500-2296 mm (BPS 2010).

Table 7. The average temperature, relative humidity and rainfall in Jebak Village in 2005-2009 (BPS 2006-2010)

Month	Air temperature (^{o}C)	Relative humidity (%)	Rainfall (mm)
January	25.9	86	126
February	25.4	87	243
March	25.9	85	207
April	26.4	84	167
May	27.5	80	137
June	27.3	81	129
July	26.9	83	70
August	26.8	82	123
September	27.4	81	139
October	26.9	83	157
November	26.6	84	245
December	26.5	85	254

Jernang rattan is an endemic species of Sumatra (Soemarna 2009). In Jebak Village jernang rattan is found mostly in dry flood plain. According to Soemarna (2009), jernang rattan grows in acidic yellow red podzolic soil, with pH of 4-6, in lowland, with annual rainfall of 1000-2300 mm, air temperature of 24-32^{o}C, and relative humidity of 60-85%. Plantation of jernang rattan will produce the best result if it is done in its natural habitat. The forest area in Jebak village is suitable for the development of jernang rattan.

Figure 5. Forest encroachment results in the death of jernang rattan because there is no supporting tree.

Species diversity of jernang rattan supporting trees

Jernang rattan is a liana. Its life depends on the supporting tree on which it climbs. If the population of supporting trees declines due to forest degradation, the population jernang rattan will decline too (Figure 5.).

In Jebak Village, jernang rattan is usually found climbing 7 species of trees, namely *keranji*, *berangan*, *duku*, *durian*, *meranti bunga*, *kayu tahi*, and *sekentut*. These 7 species were frequently found in sampling plots. However, their population has declined due to forest degradation. The comparison of the number of individuals of jernang rattan and the supporting trees is presented in Table 8. Study on jernang rattan supporting trees had not been conducted.

It can be seen from Table 8 that all tree species can become jernang rattan supporting trees. According to Mogea (2002), Jasni et al. (2007) and Soemarna (2009), all tree species in forest can become supporting trees for jernang rattan to climb. However, since the number of supporting trees is not balanced with the number of jernang rattan individuals (82), the possibility of jernang rattan to die is high because of the lack of supporting trees. Table 8 also shows that some tree species were clustered in one location, while other species were distributed in several locations. The results of this study showed that to grow optimally, each individual jernang rattan needed 4 supporting trees. This result is in agreement with the statement of Soemarna (2009) that each jernang rattan needs 4 supporting trees. If there is no supporting tree or the number of supporting trees is small, then jernang rattan will not survive.

Diversity of tree species

The trees found in the study area were divided into two groups, those with stem diameter > 10 cm (Table 9) and

Table 8. Jernang rattan supporting trees in jebak Village.

Local names	Scientific names	No. of ind.	Plot nos
Keranji	*Dialium platysepalum* Backer	4	1, 11, 31, 47
Berangan	*Quercus elmeri* Merr.	4	21, 31, 41
Kelat	*Eugenia* sp. Verdc.	4	11, 41
Medang api	*Adinandra dumosa* Jack	4	21, 41
Duku	*Lansium domesticum* Corr.	3	31, 41, 47
Durian	*Durio zibethinus* Murr.	3	11, 31, 43
Meranti bunga	*Shorea teysmanniana* Bl.	3	31,41,43
Kayu tahi	*Celtis wightii* Planch.	3	1, 31, 47
Sekentut	*Saprosma arboreum* Blume	3	21, 31,43
Berangan babi	*Castanopsis inermis* Lindl	3	31, 43
Siluk	*Gironniera subaequalis* Planch.	3	31, 41
Tempinis	*Sloetia elongata* Kds.	2	21,43
Kempas	*Koompassia malaccensis* Maing.	2	31, 35
Kayu arang	*Diospyros pilosanthera* Blanco	2	35, 41
Jelutung	*Dyera costulata* Miq	2	11, 43
Kepayang	*Pangium edule* Reinw.	2	21, 35
Trembesi	*Pithecolobium saman* Jacq.	2	1, 47
Kedondong	*Spondias cytherea* Forst	2	35, 47
Jengkol	*Pithecellobium lobatum* Benth	2	31, 35
Petai	*Parkia speciosa* Hassk	2	31, 47
Ambacang	*Mangifera foetida* Lour.	2	1
Medang	*Litsea* sp. Lam.	2	35
Cempedak	*Artocarpus champeden* Lour.	2	47
Simpur rawang	*Dillenia indica* L.	1	47
Medang serai	*Cinnamomum parthenoxylon* Jack	1	11
Rambutan	*Nephelium lappaceum* L.	1	1
Mahang	*Macaranga hypoleuca* Rechb.	1	1
Brumbung	*Adina minutiflora* Val.	1	31
Kabau	*Archidendron bulbalium* Jack	1	21
Tempunek	*Artocarpus rigida* Blume	1	11
Kayu batu	*Rhodamnia* sp.	1	35
Kelat jambu	*Eugenia densiflora* Blume	1	31
Kayu terap	*Artocarpus elastic* Willd.	1	35
Tampui	*Baccaurea crassifolia* J. J. Sm.	1	35
Merpayang	*Scaphium macropodum*	1	47
Rotan jernang	*Daemonorops draco* Willd. (82 ind.)		
	Total	73	

those with diameter ≤ 10 cm (Table 10). All tree species had been identified by Forestry Office of Batanghari District, so tree identification was not done in this study.

Table 9 shows that the species of trees found abundantly in the study site were, among others, *trembesi. pinang*, and *sungkai*. The abundance of those tree species indicates that those species have high adaptation capability, so they grow fast in Jebak forest area. Ecologically, those species have positive role for jernang rattan population because those trees can become supporting trees for jernang rattan.

It can be seen from Table 10 that tree species with stem diameter ≤ 10 cm which had the highest importance value index (20) was *trembesi*. (rain tree) That species was found in highest number of individuals among all trees in the ecosystem. *Keranji* and *sekentut* had the same IVI, which was 10. The relatively large differences in IVI are caused by forest degradation which lead to the decline of plant population, which in turn affects dominance value in ecosystem. According to Irawan (2002, 2003), the low IVI of several species in Jebak forest was due to the low population caused by illegal logging. While Peluso (1992) stated that the decline of population of a species is due to over exploitation of that species.

In general, the dominance of *trembesi* (rain tree) among all tree species population was categorized as low. The dominance indexes of *trembesi* for tree with diameter > 10 cm, and ≤ 10 cm were low, namely 0.00123 and ≤ 10cm were 0.00018, respectively. This is in accordance with the criteria of Simpson Dominance Index, namely $0 < C \leq 0.5$ = low dominance; $0.5 < C \leq 0.75$ = medium dominance; $0.75 < C \leq 1.00$ = high dominance.

Table 9. Importance value index (IVI), number of individuals (n), density (n/ ha), and dominance index (DI) of trees with stem diameter > 10 cm

Local names	Scientific names	IVI	n	n/ha	DI
Trembesi	*Pithecolobium saman* Jacq.	11	2	10	0.00123
Keranji	*Dialium platysepalum* Backer	9	2	10	0.0009
Punak	*Tetramerista glabra* Miq.	8.8	2	10	0.00086
Jelutung	*Dyera costulata* Miq.	8.8	2	10	0.00086
Mahang	*Macaranga hypoleuca* Rechb.	8.5	2	10	0.00081
Manggis	*Garcinia mangostana* L.	8.4	2	10	0.00079
Kayu batu	*Rhodamnia* sp.	8.1	2	10	0.00072
Balam	*Palaquium* sp. R. Br.	7.9	2	10	0.00069
Kayu arang	*Diospyros pilosanthera* Blanco	7.6	2	10	0.00065
Gaharu	*Aquilaria malaccensis* Oken	7.5	2	10	0.00062
Kelat jambu	*Eugenia densiflora* Blume	7.5	2	10	0.00062
Kayu terap	*Artocarpus elastic* Willd.	7.4	2	10	0.0006
Medang	*Litsea* sp. Lam.	7.3	2	10	0.00059
Medang kuning	*Pimelodendron* sp. Hassk.	7.3	2	10	0.00059
Mahang gajah	*Macaranga gigantean* Reichb.	7.1	2	10	0.00056
Merpayang	*Scaphium macropodum* (Miq.) Beumee ex Heine	7	2	10	0.00055
Pasak bumi	*Eurycoma longifolia* Jack	6.5	2	10	0.00047
Duku	*Lansium domesticum* Corr.	6.2	1	5	0.00043
Cempedak	*Artocarpus champeden* Lour.	6.1	1	5	0.00041
Durian	*Durio zibethinus* Murr.	6	1	5	0.00039
Sungkai	*Peronema canescens* Jack	5.7	2	10	0.00037
Kedondong	*Spondias cyntherea* Forst	5.6	1	5	0.00034
Kabau	*Archidendron bubalinum* Jack	5.6	1	5	0.00034
Kempas	*Koompassia malaccensis* Maing.	5.3	1	5	0.00031
Siluk	*Gironniera subaequalis* Planch.	5.2	1	5	0.0003
Medang serai	*Cinnamomum parthenoxylon* Jack	5.2	1	5	0.0003
Kayu tahi	*Celtis wightii* Planch.	5.1	1	5	0.00029
Berangan	*Quercus elmeri* Merr.	5.1	1	5	0.00029
Simpur rawang	*Dillenia indica* L.	5.1	1	5	0.00029
Jengkol	*Pithecellobium lobatum* Benth	5	1	5	0.00028
Petaling	*Ochanostachys amentacea* Mast.	4.9	1	5	0.00026
Medang api	*Adinandra dumosa* Jack	4.9	1	5	0.00026
Kepayang	*Pangium edule* Reinw.	4.9	1	5	0.00026
Meranti bunga	*Shorea teysmanniana* Bl.	4.8	1	5	0.00025
Medang kelor	*Litsea teysmanni* Miq.	4.8	1	5	0.00025
Sekentut	*Saprosma arboreum* Blume	4.7	1	5	0.00024
Merawan	*Hopea mengarawan* Miq.	4.7	1	5	0.00024
Ambacang	*Mangifera foetida* Lour.	4.7	1	5	0.00024
Keruing	*Dipterocarpus hasseltii* Blume	4.6	1	5	0.00023
Kelat	*Eugenia* sp. Verdc.	4.6	1	5	0.00023
Kemang	*Mangifera kemanga* Blume	4.6	1	5	0.00023
Mangga	*Mangifera indica* L.	4.6	1	5	0.00023
Tempinis	*Sloetia elongate* Kds.	4.5	1	5	0.00022
Berangan babi	*Castanopsis inermis* Lindl.	4.5	1	5	0.00022
Bulian	*Eusideroxylon zwageri* T. et B.	4.5	1	5	0.00022
Tempunek	*Artocarpus rigida* Blume	4.1	1	5	0.00019
Karet	*Hevea brasiliensis* Muell. Arg.	4.1	1	5	0.00018
Brumbung	*Adina minutiflora* Val.	4.1	1	5	0.00018
Petai	*Parkia speciosa* Hassk.	3.9	1	5	0.00017
Rambutan	*Nephelium lappaceum* L.	3.8	1	5	0.00016
Tampui	*Baccaurea crassifolia* J. J. Sm.	3.8	1	5	0.00016
Total		300	69	345	

CONCLUSION AND RECOMENDATION

The population of jernang rattan in Jebak forest in 2011 was 8 clumps, consisting of 82 individuals. The life or jernang rattan depends highly on the supporting trees on which jernang rattan climbs. All trees can become supporting trees for jernang rattan. There were 35 species of supporting trees, consisting of 73 individuals in Jebak forest. The tree species in Jebak Village on which jernang rattan usually climbed were *berangan* (*Quercus elmeri*), *duku* (*Lansium domesticum*), *durian* (*Durio zibethinus*), *kelat* (*Eugenia* sp.), *kempas* (*Koompassia malaccensis*), *keranji* (*Dialium platysepalum*), *mahang* (*Macaranga hypoleuca*), and *rambutan* (*Nephelium lappaceum*). The population of jernang rattan (*D. draco*) was only 82 individuals, smaller than other rattan such as *rotan lilin* (*Calamus javanensis*) 197 individuals, *rotan semambu* (*C. scipionum*) 178 individuals, *sego air* als (*C. axillaris*) 103 individual, *rotan getah* (*D. melanochaetes*) 102 individuals, *rotan dahan* (*C.*

flagellaris) 95 individuals, and *rotan manau* (*C. manan*) 93 individuals.

To protect the forest from the increasing forest encroachment, serious efforts from the government are needed, such as increasing forest rangers that are brave and firm in enforcing the law to the encroachers. Further research is needed to estimate the population of jernang rattan in other district, because the population in Batanghari District is critical.

Table 10. Importance value index (IVI), number of individuals (n), density (n/ ha), and dominance index (DI) of trees with stem diameter ≤ 10 cm.

Local names	Scientific names	IVI	n	n/ha	DI
Trembesi	*Pithecolobium saman* Jacq.	20	4	20	0.00018
Pinang	*Areca catechu* L.	20	4	20	0.00018
Sungkai	*Peronema canescens* Jack	16	3	15	0.00010
Balam	*Palaquium* sp. R. Br.	16	3	15	0.00010
Mahang	*Macaranga hypoleuca* Rechb.	15	3	15	0.00010
Berangan babi	*Castanopsis inermis* Lindl.	15	3	15	0.00010
Medang	*Litsea* sp. Lam.	12	3	15	0.00010
Brumbung	*Adina minutiflora* Val.	11	2	10	0.00004
Keranji	*Dialium platysepalum* Backer	10	2	10	0.00004
Sekentut	*Saprosma arboreum* Blume	10	2	10	0.00004
Medang kuning	*Pimelodendron* sp. Hassk.	10	2	10	0.00004
Medang serai	*Cinnamomum parthenoxylon* Jack	10	2	10	0.00004
Tempinis	*Sloetia elongate* Kds.	10	2	10	0.00004
Kayu terap	*Artocarpus elastic* Willd.	10	2	10	0.00004
Rambutan	*Nephelium lappaceum* L.	10	2	10	0.00004
Kayu arang	*Diospyros pilosanthera* Blanco	9.9	2	10	0.00004
Punak	*Tetramerista glabra* Miq.	8.9	2	10	0.00004
Simpur rawang	*Dillenia indica* L.	8.2	2	10	0.00004
Kayu tahi	*Celtis wightii* Planch.	5.3	1	5	0.00001
Petaling	*Ochanostachys amentacea* Mast.	5.3	1	5	0.00001
Kelat	*Eugenia* sp. Verdc.	5.3	1	5	0.00001
Kemang	*Mangifera kemanga* Blume	5.3	1	5	0.00001
Karet	*Hevea brasiliensis* Muell.Arg.	5.3	1	5	0.00001
Kelat jambu	*Eugenia densiflora* Blume	5.3	1	5	0.00001
Kabau	*Archidendron bulbalium* Jack	5.3	1	5	0.00001
Tempunek	*Artocarpus rigida* Blume	5.3	1	5	0.00001
Tampui	*Baccaurea crassifolia* J. J. Sm.	5.3	1	5	0.00001
Cempedak	*Artocarpus champeden* Lour.	5.3	1	5	0.00001
Kacang-kacang	*Strombosia javanica* Blume	5	1	5	0.00001
Bulian	*Eusideroxylon zwageri* T. et B.	5	1	5	0.00001
Merpayang	*Scaphium macropodum* (Miq.) Beumee ex Heine	5	1	5	0.00001
Medang kelor	*Litsea teysmanni* Miq.	4.7	1	5	0.00001
Mangga	*Mangifera indica* L.	4.7	1	5	0.00001
Total		300	60	300	

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