Jurnal Ilmiah Biologi Eksperimen dan Keanekaragaman Hayati (J-BEKH)

Volume 10, Issue 2, November 2023

Identification of Animals that Have the Potential as Seed Dispersers in the West Lampung Biodiversity Park

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Article History
Received: May 13, 2023
Accepted: October 5, 2023
Published: November 1, 2023

Abstract

West Lampung Biodiversity Park is a biodiversity conservation area established in 2015. The purpose of establishing a biodiversity park is to provide a reserve area, both in-situ and/or ex-situ, for local biological resources, especially plants whose structure and composition can support the existence and sustainability of animal diversity. One group of animals that has an important role in the sustainability of flora biodiversity is seed disperser. This research was conducted to find out the current biodiversity status of animals having potential as seed dispersers. The research was carried out in September–November 2021 using interview and observation methods. The data was analyzed descriptively. The results show that in the West Lampung Biodiversity Park, 10 types of animals have the potential to spread seeds, consisting of 4 members of the aves class and 6 members of the mammal class. There are 4 types of fruit spread by Aves and 17 types of seeds spread by Mammals

Keywords: biodiversity park, west lampung, seed dispersal, seeds disperser animals

How to Cite: D. R. Putri, M. Kanedi, Priyambodo, and R. Agustrina, "Identification of Animals that Have the Potential as Seed Dispersers in the West Lampung Biodiversity Park," *Jurnal Ilmiah Biologi Eksperimen Dan Keanekaragaman Hayati (J-BEKH)*, vol. 10, no. 2. pp 9-15, 2023, doi:

INTRODUCTION

The Biodiversity Park, which in Indonesia is called the Taman Kehati, is an area that has in-situ and ex-situ conservation functions. In the perspective of legislation in Indonesia, a biodiversity park (Taman Kehati) is defined as a reserved area for local biological natural resources outside the forest area that has the function of in-situ and/or ex-situ conservation, especially for plants whose pollination and/or dispersal of seeds must be assisted by animals with the structure and composition of the vegetation able to support the preservation of pollinators and seed disperser animals [1].

West Lampung Biodiversity Park was established to conserve various local or endemic plant species in West Lampung that have a high or very high level of threat to their sustainability. One of the roles of animals in this ecosystem is as seed dispersers. Seed dispersal is an important stage in the process of spreading plant seeds from the parent tree to new locations. The process of dispersal of plant seeds carried out by animals plays an important role in the

ISSN 2338-4344
eISSN 2686-200X

maintenance and development of forest ecosystems. Effective movement of plant seeds helps the existence of plants in the ecosystem. Seed dispersal is important to avoid competition between the parent plant and its offspring, besides that the seeds can spread to grow in new, wider places [2].

This study was conducted as an effort to find out the existing diversity of disperser animals at West Lampung Biodiversity Park after being established for more than 5 years.

METHODS

Study Area

West Lampung Biodiversity Park is located on the shores of Danau Ranau near a mountain called Gunung Seminung at an altitude of 560 to 780 m above sea level. Before being designated as a conservation area in 2015, this 15-hectare park was designated by the authority of West Lampung Regency as a tourist resort in 2009. Plants in this park are a mixture of various types of plants ranging from ornamental plants, horticulture, plantations, and fruits, to trees.

Sampling methods

The research was performed from September to November 2021. Data collection was carried out using two methods, namely interviews and sampling. Interviews were conducted at the beginning of the research by interviewing local residents to collect information related to the flora and fauna in the study area. Meanwhile, sampling was carried out twice every day, in the morning between 08:00 and 11:00 and between 4:00 and 6:00 p.m. Sampling was carried out on transect lines by making direct and indirect observations of the presence of animals and food waste left by animals.

RESULTS AND DISCUSSION

The Park Profile

West Lampung Biodiversity Park (Figure 1) has a good type of vegetation, surrounded by the TNBBS (South Bukit Barisan National Park) area where the vegetation consists of bushes and jungle. In the park, there are many types of trees, 6 of which are classified as rare tree species. These trees were deliberately planted to maintain the existence of these plants. These trees include the pulai tree (*Alstonia schoolaris*), gandaria (*Bouea gandaria*), *Callophyllum* sp., jelutung (*Dyera costulat*a), merawan (*Hopeamanga-rawan*), and medang (*Litsea* sp). Several spots in the West Lampung Biodiversity Park area are planted with fruit plants such as banana (Musa sp.), papaya (*Carica papaya*), and mango (*Mangifera indica*).

Figure 1. Profil Taman Keanekaragaman Hayati, Lampung Barat

Apart from being surrounded by hills, West Lampung Kehati Park is also adjacent to Lake Ranau, this situation adds to the beauty of Kehati Park which can attract people to visit. Facilities available to visitors include hotels located at the top of the park.

Seeds Disperser Animals: Aves Group

In this research, several animals were found that have the potential to disperse seeds, namely the aves class and mammals. Potential seed dispersers of the Aves group are listed in Table 1.

Table 1. Aves species that have potential as seed dispersers found in West Lampung Biodiversity Park

No	Vernacular name	Latin name	Family	Type of feed
1	Cucak Kutilang	*Pycnonotusaurigaster*	Pycnonotidae	1. Banana (*Musa* L.) 2. Mindi (*Milia azedarach* L.) 3. Papaya (*Caricapapaya* L.)
2	Kutilang Emas	*Pycnonotusmelanicterus*.	Pycnonotidae	1. Banana (*Musa* L.) 2. Mindi (*Milia azedarach* L.) 3. Papaya (*Caricapapaya* L.)
3	Perkutut Jawa	*Geopeliastriata*	Columbidae	1. Grass seeds
4	Cucak Keling	*Aplonispanaya*	Sturnidae	1. Banana (*Musa* L.) 2. Mindi (*Milia azedarach* L.) 3. Papaya (*Caricapapaya* L.)

Four species of aves have the potential to spread seeds in the West Lampung Biodiversity Park. Three types of birds have the same food, namely the cucak kutilang (*Pycnonotus aurigaster,* presented in Figure 2), the gold finch (*Pycnonotus melanicterus*), and the cucak keling (*Aplonis panaya*). The three types of Aves are known to eat papaya, banana, and mindi (Figure 3).

Figure 2. Cucak kutilang (*Pycnonotus aurigaster*) Found in West kampung Biodiversity Park.

Figure 3. Mindi fruits (*Melia azedarach* L.) that is consumed by three types of birds in the West Lampung Biodiversity Park namely *Pycnonotus aurigaster, Pycnonotus melanicterus* and *Aplonis panaya*.

Of the four types of potential seed-dispersing birds, only *Pycnonotus aurigaster* is most often found. Furthermore, of the four types of seed/fruit-eating birds, only the perkutut Jawa (*Geopelia striata*) has the potential to spread grass family plants. The perkutut Jawa also more common to be found when the weather is sunny.

Cucak kutilang tends to use open trees with a canopy that is not too dense. Likewise for kutilang mas. These two types of birds often act together in perching and sheltering. Trees that are often used as places for activities generally have sturdy branches for perching and avoiding attacks from predators. In this research, it was found that cucak kutilang and kutilang mas often carry out activities in the gintung trees that grow near Lake Ranau. Many cucak are actively perching and looking for food in the morning between 07:00 and 09:00. From 10:00 to 12:00 this bird prefers to sunbathe, sing, and look for a mating partner. The birds that researchers often encounter, namely cucak, prefer small mindi fruit. This is because the small mindi fruit has a sweet taste. Apart from that, the small mindi tree has lots of twigs and branches, so the cucak kutilang birds often carry out activities on the tree.

Apart from having an important role in the existence of birds, the mindi plant (Melia azedarach L.) also has beneficial value for society. This plant is used by the community as a diuretic, laxative, and so on. The phytochemical content in mindi leaves is parasite alkaloids, routine flavonoids, bitter substances, saponins, tannins, steroids and kaempferol. Small mindi is often planted on the side of the road as a protective tree, sometimes growing wild in coastal areas. This fast-growing tree originating from China can be found from the lowlands to the mountains with an altitude of 1,100 m above sea level. This multi-branched tree has dark brown bark, with a height of up to 4 meters.

Seeds Disperser Animals: Mammals Group

There are six types of mammals identified as potential seed dispersers in the West Lampung Biodiversity Park based on the type of food they eat. The six types of potential mammals as seed dispersers are presented in Table 2.

Table 2. Mammal species that have potential as seed dispersers are found in West Lampung Biodiversity Park

No	Vernacular name	Latin name	Family	Type of feed
1.	Codot	*Pteropodidae* sp.	Pteropodidae	1. Water apple (*Syzygium aqueum*) 2. Mindi fruit (*Melia azedarach* L.) 3. Papaya (*Carica papaya*) 4. Wild Palm (*Pinanga coronata*) 5. Banyan fruit (*Ficus benjamina*) 6. Longan fruit (*Dimocarpus longan*)
2.	Bajing Kelapa	*Callosciurus notatus*	Sciuridae	1. Mindi fruit (*Melia azedarach* L.) 2. Candlenut fruit (*Aleurites moluccanus*) 3. Manggo (*Mangifera indica*) 4. Papaya (*Carica papaya*)
3.	Monyet ekor panjang	*Macaca fasciculris*	Cercopithecidae	1. Wild kedondong fruit (*Spondias pinnata*) 2. Kedondong fruit (*Spondias dulcis*) 3. Gintung fruit (*Bischofia javanica*) 4. Medang fruit (*Litsea brachystachia* Boerl) 5. Harum Manis mango (*Mangifera indica* L.) 6. Kuweni mango (*Mangifera odorata*) 7. Avocado (*Persea americana*) 8. Banyan fruit (*Ficus benjamina*) 9. Banana (*Musa*) 10. Papaya (*Caricapapaya*)
4.	Beruk	*Macaca lacepede*	Cercopithecidae	1. Mango (*Mangifera*) 2. Avocado (*Persea americana*)

No	Vernacular name	Latin name	Family	Type of feed
				4. Banana (*Musa*) 5. Papaya (*Carica papaya*)
5.	Kekah	*Presbytis femoralisbatuana*	Cercopithecidae	1. Mango (*Mangifera*) 2. Banana (*Musa*) 3. Petai (*Parkia speciosa*) 4. Avocado (*Persea americana*) 5. Papaya (*Carica papaya*)
6.	Lutung	*Trachypithecus pileatus*	Cercopithecidae	1. Avocado (*Persea americana*) 2. Mango (*Mangifera*) 3. Petai (*Parkia speciosa*) 4. Banan (*Musa*) 5. Papaya (*Carica papaya*)

In this study, mammals that have the potential to spread seeds are based on the type of plant fruit they eat. The types of plants eaten are mostly fruit from cultivated plants that are deliberately planted in the West Lampung Biodiversity Park, such as bananas, avocados, mangoes, and papayas. That is why the majority (80%) of mammals that have the potential to be seed dispersers are found in parts of the biodiversity garden where fruit plants are planted. Based on the variety of fruit consumed, long-tailed monkeys are the type of mammal (Order Primates, presented in Figure 4) with the most potential as seed dispersers. This animal consumes 11 types of plant fruit such as wild kedondong, kedondong, gintung fruit, medang fruit, arum manis mango, kuweni mango, avocado, banyan fruit, banana and papaya.

Figure 4. Long tail monkey (*Macaca fascicularis*) the most potential seeds disperser mammal in West Lampung Biodiversity Park

Long-tail maccaca are known to favor fleshy fruits. The eating behavior of long-tailed monkeys is very typical, namely by peeling the skin of the fruit using their teeth, then biting off the flesh and eating it. But most (95%) long-tailed monkeys do not finish their food, especially seeds. Due to this, a lot of fruit fell or was thrown to the ground. One example of fruit and seeds left over from eating by long-tailed monkeys that fell to the ground in the West Lampung Biodiversity Park is the mango (Figure 5).

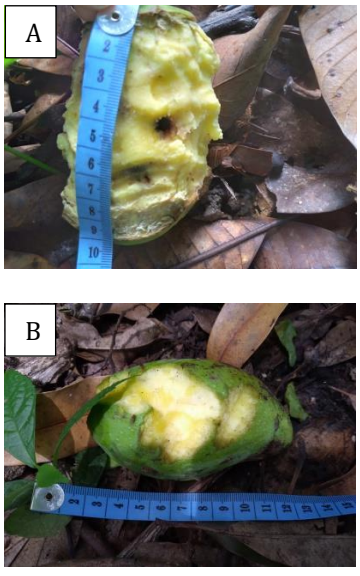

Figure 5. Mango fruit and seeds left over from eating by long-tailed monkeys. a) Kuweni mango (*Mangifera odorata*); b) Harum manis mango (*Mangifera indica* L.)

Apart from mangoes, which long-tailed monkeys like as food, there are medang fruit (*Litsea brachystachia* Boerl). Medang fruit (Figure 6) is a type of plant that is relatively rare. The medang fruit trees were deliberately planted in the West Lampung Biodiversity Park so that their sustainability was maintained, in addition to providing a food source for the animals in the park.

Figure 6. Medang fruits (*Litsea brachystachia* Boerl), a potential food for long tail monkey

Another factor that determines whether a type of plant fruit is liked or not is its level of ripeness. Most animals like ripe fruit because of the high sugar and water content in the fruit. Animals usually do not like food that is composed of ingredients that are difficult to digest, such as or contain secondary metabolites such as tannins and phenolics, which bind nutrients and contain toxins [3].

Apart from monkeys, other mammals that have an important role in spreading seeds because their main diet is fruit are bats (Order Pteroptera). Apart from being a seed disperser, another ecological role of bats is to help pollinate flowers and control insects [4]. Codot, the local name of small bats found in this study, leaves a lot of leftover food on the ground in the form of fleshy fruit or seeds of fruit plants. Bats usually eat the fleshy part of the fruit, the relatively hard seeds are usually left behind. It could also be a plant that has small seeds and when the bat eats the seeds, the plant spreads through feces when the bat defecates.

Conservational Status of the Seed Disperser Animals

Based on a review of the laws and regulations regarding animal conservation in the IUCN and the Regulations of the Minister of Environment and Forestry of the Republic of Indonesia No.P.20/MENLHK/SETJEN/KUM.1/6/2018 and CITES it is revealed that all types of animals that have the potential to disperse seeds in the West Lampung Biodiversity Park have a certain conservation status as shown in Table 3.

Tablel 3. Conservation status of animals that have potential as seeds disperser in West Lampung Biodiversity Park

No	Species name	Conservation Status		
		IUCN	CITES	P.20/MENLHK/SETJEN/KUM.1/6/2018
1.	Cucak Kutilang(*Pycnonotus aurigaster*)	LC	-	-
2.	Kutilang emas (*Pycnonotus* (F) Boie.)	LC	-	-
3.	Perkutut Jawa (*Geopelia striata*)	LC	-	-
4.	Cucak keling (*Aplonis panaya*)	LC	-	-
5.	Codot (*Pteropodidae* sp.)	LC	-	-
6.	Bajing Kelapa (*Callosciurus notatus*)	LC	-	-
7.	Monyet ekor panjang (*Macaca fasciculris*)	VU	II	-
8.	Beruk (*Macaca lacepede*)	VU	II	-
9.	Kekah (*Presbytis femoralisbatuana*)	VU	II	-
10.	Lutung (*Trachypithecus pileatus*)	VU	II	-

Note: LC = *Leas Concern* VU = *Vulnerable*

CONCLUSSION

There are 10 species of animals that have the potential to disperse seeds in the West Lampung Biodiversity Park, consisting of 4 species each from the Aves group and 6 species from the Mammalia group. There are 4 types of plant seeds that have the potential to be spread by the Aves group and 17 types of plant seeds that have the potential to be spread by the Mammalia group.

ACKNOWLEDGEMENT

The author would like to thank all parties who have assisted in research activities and writing this paper, especially the leadership and staff of the West Lampung Environmental Service who have facilitated this research.

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