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Distribution and Abundance of Javan Primates in Gunung Sanggabuana,Karawang, West Java

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Abstract

Indonesia, as the country with the highest number of primate species in Asia, also holds the largest number of endemic primates, including five species on the island of Java. This study aimed to assess the distribution and abundance of primate species in Gunung Sanggabuana, Karawang, West Java, one of the closest tropical rainforests to Jakarta. Field surveys were conducted during the dry season (11–14 September 2023) by the Primate Student Team of Field Biology Study (SBL). Recce transects were used for primate censuses and fruit trails for recording fruit-bearing plant abundances along two paths: the tourist area and semi-tourist area. Results indicated three primate species were directly encountered: Javan langur (Trachypithecus mauritius), Surili (Presbytis comata), and Javan gibbon (Hylobates moloch). In the Kejayaan-Burahol trail, Javan langurs were observed at 1 group/km (1–5 individuals), Surili at 0.5 groups/km (4 individuals), and Javan gibbons at 1 group/km (4–6 individuals). The Cigentis-Cipiit trail yielded higher Javan langur abundance at 1.5 groups/km (5–8 individuals). The dominance of Javan langur was noted with a low value of 0.160. These findings provide insight into primate distribution and abundance, contributing to conservation efforts in Gunung Sanggabuana and other Javan rainforests.

Keyword : Abundance, distribution, javan primates, sanggabuana

INTRODUCTION

Indonesia has a high diversity of primate species and is also endemic. Indonesia ranks third in the world for the number of primates after Brazil and Madagascar, with a total of 64 primate species (Roos et al, 2014; Supriatna, 2022). Primates are a group of mammals that have the highest level of complexity, as they possess a larger brain volume compared to other animals (Rahmah et al, 2021). Primates are not only forest adornments but also play an important role in the forest ecosystem (Atmoko and

Agency, 2019). Primates can be classified into two time based on their activity: diurnal (active during the day) and nocturnal (active at night) (Supriatna and Wahyono, 2000). The presence of primates is crucial for maintaining the stability of the forest ecosystem because they can aid in the dispersal of fruit seeds that they consume, thereby helping in the spread of biodiversity and forest regeneration (Meijaard et al, 2005). The distribution of primates in Indonesia is extensive, ranging from Sumatra, Java, Borneo, Sulawesi, Bali, to Nusa Tenggara and its surroundings (Comanesi et al, 2017).

Indonesia, as an archipelagic country with vast and humid tropical rainforests, has broad-leaved vegetation and tall, dense trees that form a forest canopy (Rukmana, 1997). The primate life in the tropical rainforest type in Indonesia influences the high level of primate diversity. The influence of island size on local endemism is also very high, evidenced by the fact that 64 species of primates out of 233 species in the world are found in Indonesia, with 30% of them being endemic (Roos et al, 2014; Supriatna, 2022).

The International Union for Conservation of Nature (IUCN) categorizes the Javan Gibbon and Javan Surili as endangered species (Nijman, 2020). Meanwhile, the status of the Javan Langur is classified as vulnerable (Nijman et al., 2021). Additionally, the Javan Surili and Javan Langur are included in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) under Appendix II in 2016, while the Javan Gibbon is listed in Appendix I, which cannot be traded internationally (Nugroho et al., 2022). Based on its endemic nature, the government issued Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number P.106/Menlhk/setjen/KUM.1/12/2018 stating that the Javan Gibbon, Javan Surili, and Javan Langur are protected primate species. The government regulation aims to reduce the extinction of these primate species.

Gunung Sanggabuana is a natural forest area with a land status as Production Forest, located in Tegalwaru District, Karawang Regency at altitude 1,291 meters above sea level. Gunung Sanggabuana position under four regencies: Karawang (north), Purwakarta (east), Cianjur (south), and Bogor. Karawang Regency has several natural attractions, such as waterfalls found along the Sanggabuana hiking trail. The distinctive waterfall tourist attractions in Karawang Regency include Curug Cigentis, Curug Bandug, and Curug Santri. In addition to its natural tourism, this area is also known for its cultural tourism. There are archaeological sites from the Tarumanegara kingdom in the northern coastal area of Karawang Regency (Riyadi, 2018). The presence of primates in the Sanggabuana area may be threatened by increasing human activities, such as tourism, as well as the growing human population around the Sanggabuana area. The primate population is greatly influenced by the condition of its habitat, including food sources and living spaces; excessive exploitation of tourism activities may impact primate behavior and affect their ecological functions (Basalamah et al, 2010). According to research by Basalamah et al (2010), on several tourist trails, the primate population tends to be lower compared to non- tourist trails.

In the Sangabuana area, there are five species of primates that have been identified at Gunung Sanggabuana, namely the Javan Gibbon or owa jawa (*Hylobates moloch*), Long-tailed Macaque or monyet ekor panjang (*Macaca fascicularis*), Javan Langur or lutung jawa (*Trachypithecus mauritius*), Javan Slow Loris or kukang jawa (*Nycticebus javanicus*), and Javan Surili or surili (*Presbytis comata*). Information regarding the primate species found around the hiking trails of Gunung Sanggabuana is still limited, making it important to conduct research on the distribution and population of primates in the surrounding hiking routes to obtain current and accurate data that can serve as an effort for conservation and information for visitors to Gunung Sanggabuana.

METHOD

Time and location

The research conducted in 4 observation days (11-14 September, 2023), at tourist area of Kejayaan-Burahol (2 km forest climbing trail) and Cigentis-Cipiit (0.4 km tourist trail; 1.6 km non-tourist trail), Gunung Sanggabuana, Mekarbuana Village, Tegalwaru District, Karawang Regency, West Java.

Figure 1. Observation trails of the primate team (Cigentis-Cipiit and Kejayaan-Burahol) in Gunung sanggabuana Karawang, West Java.

(A) **(B)**

Figure 2. Primate observation trails (A. Cigentis-Cipiit and B. Kejayaan-Burahol) at Gunung Sanggabuana,Karawang, West Java.

Data Collection

We used Recces method for data collection. This method involves observers walking along established (local) trails and recording the necessary data. Recces was conducted alternately on two diurnal primate observation trails, each 2 km long simultaneously, with two repetitions over four days of observation. As for diurnal primates, data collection was carried out in the morning to afternoon from 6 AM to 2 PM. The information we collected during encounter is primate species, number of individuals per group, distribution, reactions of the observers and vice versa, as well as the behavior of primates upon encounter were recorded (Altman, 1974; Basalamah et al., 2010).

As for activity we recorded: movement activity is the activity performed by

primates to change locations without engaging in other activities. Foraging activity involves selecting, taking, and putting food into the mouth. The types of food consumed by primates include fruits, leaves, tree bark, twigs, and insects (Supriatna, 2006). Social activity refers to the interaction between individuals or other groups, while resting is an activity where no action is being taken, such as sitting, standing, lying down, and sleeping (Hidayatullah et al., 2021).

We also record primates vocalizations (morning calls) during simultaneously observation. In addition a brief habitat quality assessment conducted using fruit trail method. Data collection for the fruit trail by recording the types and numbers of fruiting plants along the transect (trail), based on encounters with fresh fruit along the trails. The parameters observed were fruit type (fleshy or woody) and fruit ripeness (Buij et al., 2002; van Schaik et al., 1995).

Data Analysis

Data analysis conducted to determine the abundance of primate populations, primate distribution, the proportion of primate reactions and their behavior upon encounter and the abundance of plants bearing fruit.

a) Abundance Index

The abundance of primate species is calculated by summing the total primates observed along the transect line divided by the length of the transect (km):

$$\mathbf{D} = \frac{N}{L}$$

Description :

D = Abundance index
N = Number of primates observed along the transect line
L = Length of the transect (Km)

b) Dominance index

The dominance index is used to determine the presence of dominance of certain species within a community. The Simpson dominance index (Krebs, 1989) is used, with the equation:

$$\mathbf{Di} = \sum\left(\frac{N}{L}\right)^2$$

Description :

D = Value of the Simpson dominance index
Ni = Number of individuals of species i
N = Total number of individuals

The Simpson index has the range: $0,0 < D \leq 0,5$ = Low dominance
$0,5 < D \leq 0,75$ = Moderate dominance
$0,75 < D < 1$ = High dominance

c) Proportion of Primate Reactions

The proportion of primate reactions is calculated based on the frequency of types of primate reactions (staying still, moving away, or approaching) observed during direct encounters with the observer. The calculation used is:

$$\% = \frac{ni}{N} X\ 100$$

Description :
% = Proportion (%)
Ni = Number of one type of reaction
N = Total number of reaction types

d) Proportion of Primate Behavior

The proportion of primate behavior is calculated based on the frequency of types of primate behavior (resting, moving, eating, etc.) observed during direct encounters with the observer. The calculation used is:

$$\% = \frac{ni}{N} X\ 100$$

Description:
% = Proportion (%)
Ni = Number of one type of behavior
N = Total number of behavior types

e) Abundance of Fruiting Plants

The abundance of fruiting plants is calculated by summing the total fruiting plants based on fruit type (fleshy or woody) and maturity level (unripe, half-ripe, and ripe) observed along the transect line divided by the length of the transect (km). The formula used is:

$$D = \frac{N}{L}$$

Description :
D = Abundance index
N = Number of fruit plants observed along the transect line
L = Length of the transect (Km)

RESULT

Abundance

During the survey we had direct encountered with only three species of primates namely javan langur (*Trachypithecus mauritius*), surili (*Presbytis comata*), and javan gibbon (*Hylobates moloch*). However, we did not encountered long-tailed macaque directly, but, another bidoversity team find them in Cigentis tourist area. In Cigentis-Cipiit trail we only encountered javan langur with group abundance 1.5 group/km (5-8 individuals). We observed more groups at non-tourist trail than in tourist trail. While in Kejayaan-Burahol trail we encountered three primate species each with their abundance: javan langur 1group/km (3-5 individuals), surili 0.5 group/km (4 individuals) and javan gibbon 1 group/km (2-3 individuals) (see Figure 3).

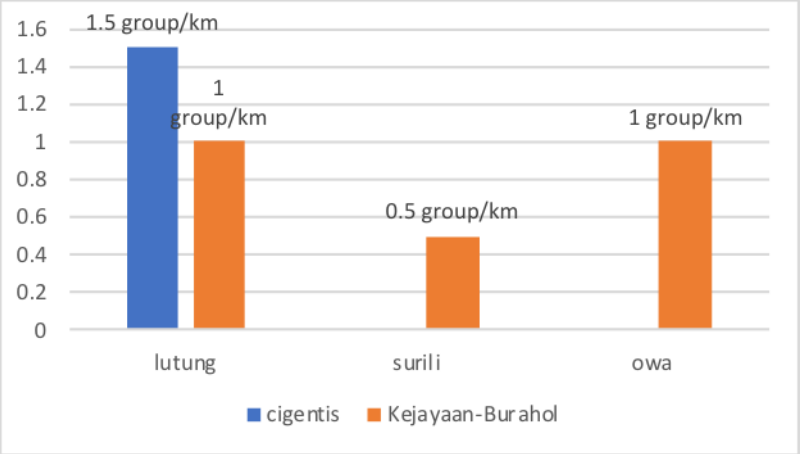

Figure 3. The abundance of Primate Species in Cigentis-Cipiit and Kejayaan-Burahol Trails

Each encounter with primates in each group has varying individual sizes. The differences in individual sizes among groups may be influenced by habitat environmental conditions and animal behavior, however, one significant factor affecting the size of primate groups is food abundance (Atmoko, 2012).

Among the three directly observed primate species, the dominant one along the observation trail is javan langur (*Trachypithecus mauritius*) with a value of 0.160, although this value signifies low dominance according to the Simpson dominance index (see Figure 4).

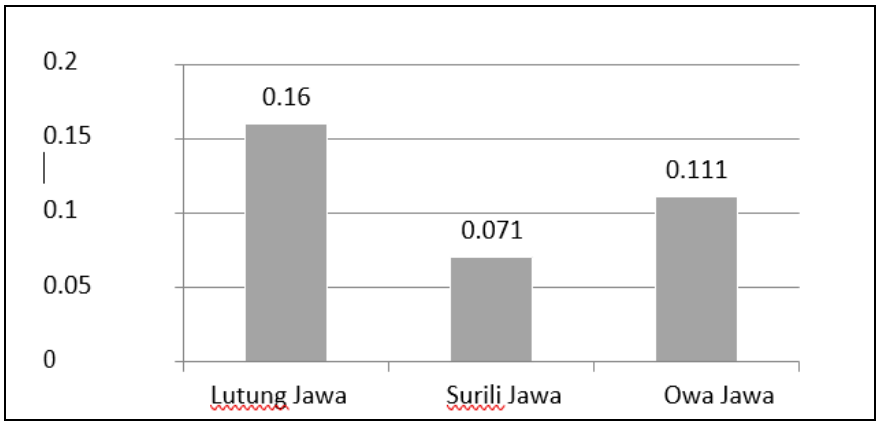

Figure 4. Dominance Value of Primate Species in the Kejayaan-Burahol Trail

Distribution

The distribution of primates is categorized into several patterns: random, aggregative, and uniform. These patterns are strategies for individuals and groups within wildlife populations (Alikodra, 1990). The distribution pattern of primates in Gunung Sanggabuana area shows as aggregative distribution type, which naturally indicates a species tendency to group and the diversity of habitats throughout the research area (see Figure 5).

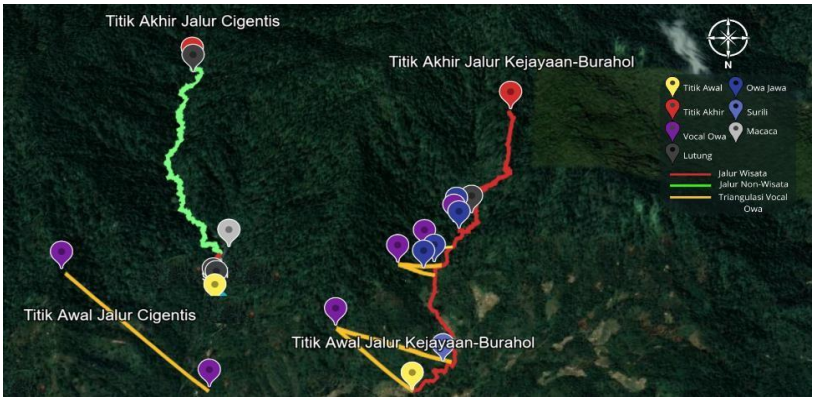

Figure 5. Primates distribution in the Cigentis and Kejayaan-Burahol trails.

The distribution of primates along the Kejayaan-Burahol Trail and the Cigentis Trail was conducted not only through direct encounters but also through indirect encounters using listening their vocalization (morning calls) of javan gibbon. A total of 3 groups of javan gibbons were identified based on vocalizations along the Kejayaan-Burahol trail from the eastern direction of the observation trail ridge. Based on vocalization in Cigentis trail, we indicated one group from the southeast direction of the observation trail.

Behavior

Diurnal primate groups (*Hylobates moloch*, *Trachypithecus mauritius*, *Presbytis comata*) generally begin their activities before sunrise and stop before sunset. They start the activities with movement and foraging, they used resting and sleeping during daytime, and continue with other activities until the evening (Haidar, 2023). During encountered, we also observed their activities, in Kejayaan-Burahol trail most of the time the primates busy on feeding (53.85%), but also moving (38.46%). Meanwhile, in Cigentis trail, feeding behavior was the least activity (20%) (see Figure 6).

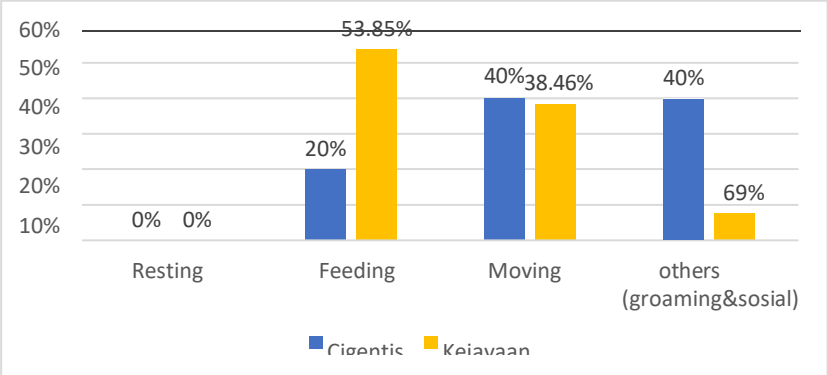

Figure 6. Proportion of primate activities during encounters.

Based on observations, the primates' responses to the presence of observers in each area varied. In Kejayaan-Burahol trail, the primates showed a 100% still response when seeing the observer, while in the Cigentis trail, the still response was only 25%, most of the time they simply avoiding or move away (75%) (see Figure 7).

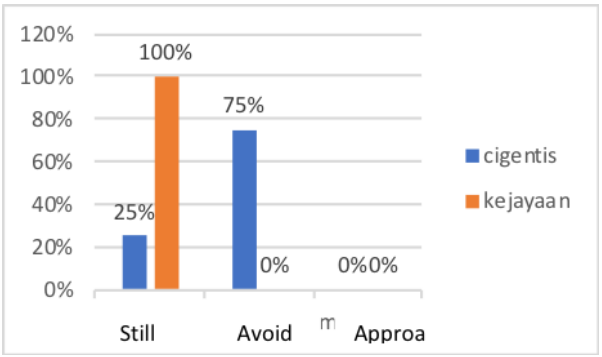

Figure 7. Proportion of primate responses to the presence of observers.

Fruit trail

During observation, we found most of trees bearing fruits along trail belong to *Moraceae* family. Generally, *Moraceae* distributed in lowland forests, tropical rainforests, and sometimes in temperate forests. We identified 8 species of *Ficus* sp. (*Ficus glomentara*, *Ficus fistulosa*, *Ficus variegate*, *Ficus pandana*, etc) fruiting which belong to *Moraceae* family both in Kejayaan-Burahol and Cigentis trails.

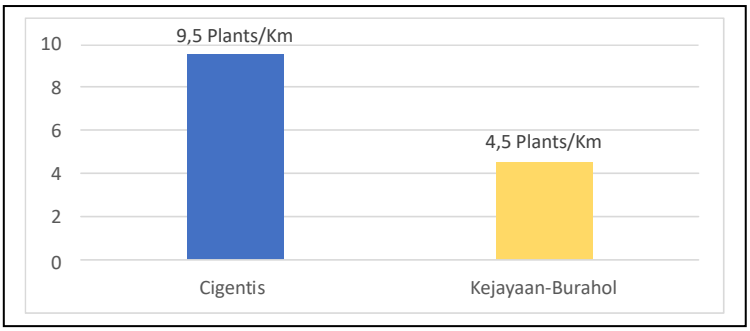

Figure 8. The index of fruit-bearing plants.

Based on data analysis, the index of plant bearing fruits in Kejayaan-Burahol trail is 4.5 plants/km, much lower than in Cigentis trail (9.5 plants/km). Both are very low index, this probably due to long dry season, as we could see hardly any stream has water.

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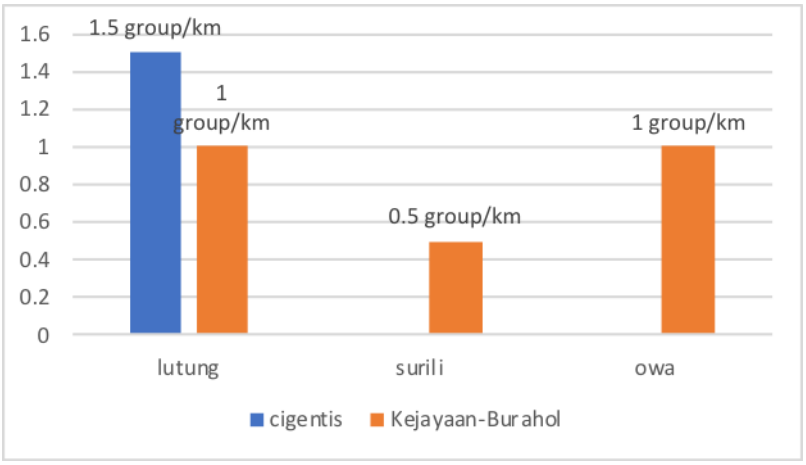

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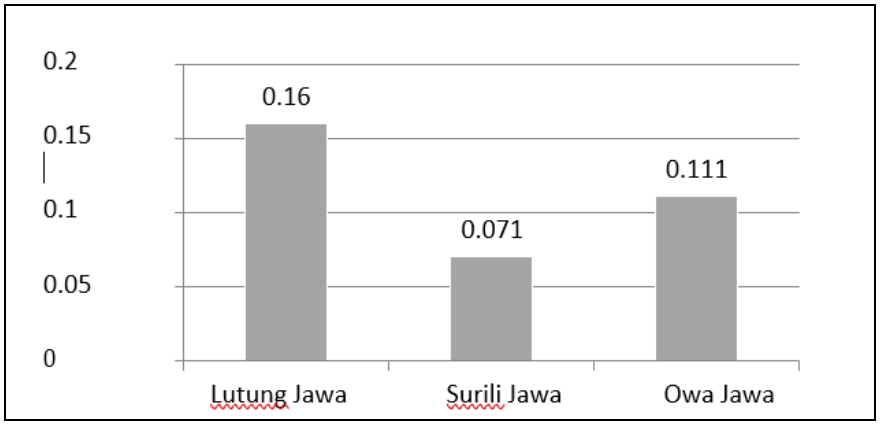

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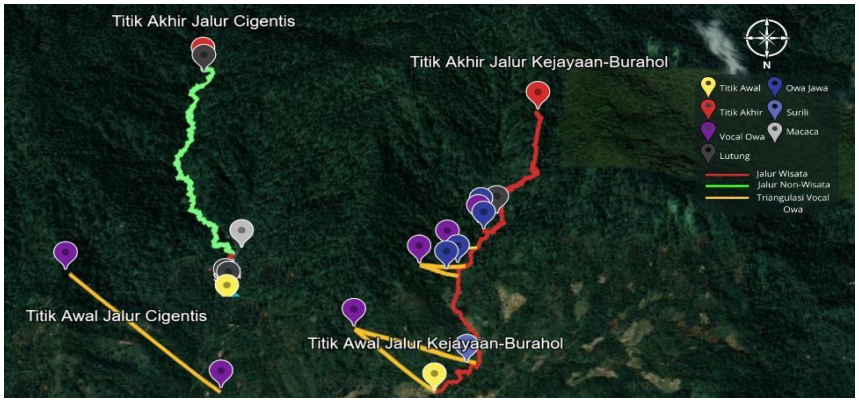

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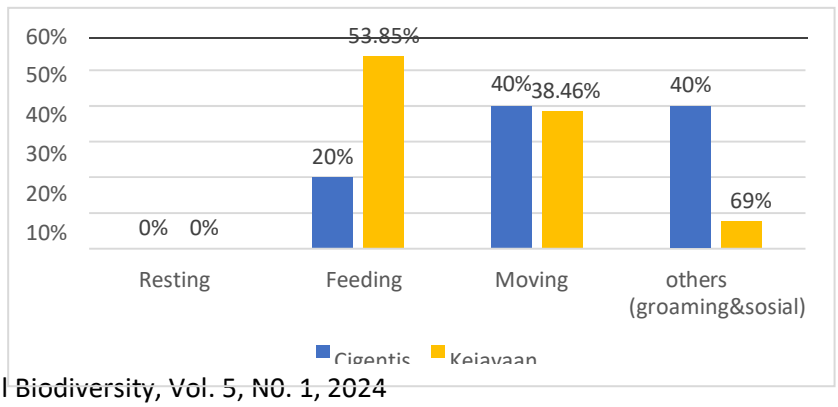

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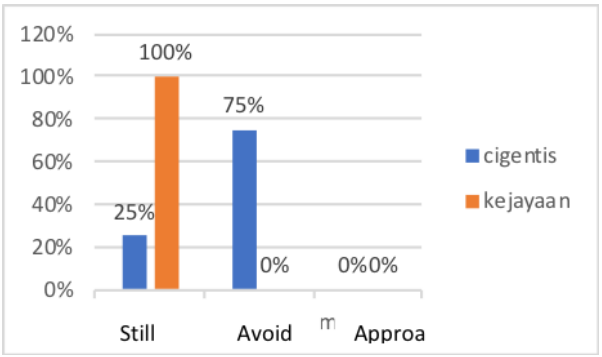

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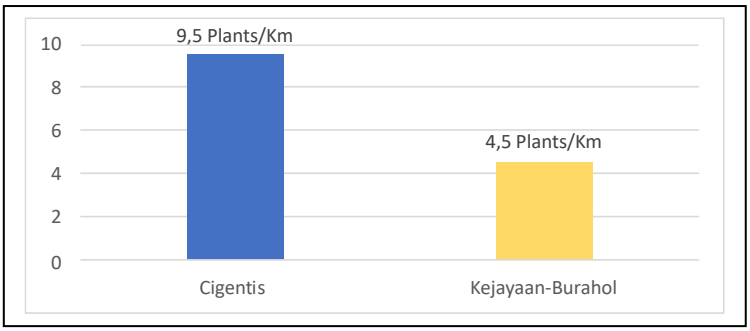

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CONCLUSION

1. The primate species encountered directly are surili (*Presbytis comata*), lutung jawa

(*Trachypithecus mauritius*), while owa jawa (*Hylobates moloch*) encountered both directly and un-directly (vocalization).

2. Kejayaan-Burahol has higher primate diversity (surili, owa jawa and lutung jawa) as well as primates species abundance compared to Cigentis trail. Lutung jawa become dominant in the frequency of sighting compare to other primates.
3. Most behavior of primates while encountered in Kejayaan trail is feeding behavior (53.85%), while in Cigentis trail is moving, socializing, and grooming (40%). These related with their first response to observer, while in Kejayaan-Burahol trail most of them just still and continue their activity, but in Cigentis trail they avoiding or move away.
4. The index value of plant bearing fruits in both areas are low, this probably due to long dry season;
5. The chance to encounter primates in Gunung Sanggabuana area this probably not simply related with only habitat quality, but also to other reason i.e. primates habituation or time visitors/tourists using the trail.

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