

Feeding behavior and diet preferences of Sumatran orangutans (*Pongo abelii* Lesson 1827) at Soraya Research Station, Mount Leuser National Park, Indonesia

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Abstract. *Iqbar I, Safriana R, Fauziah F. 2024. Feeding behavior and diet preferences of Sumatran orangutans (Pongo abelii Lesson 1827) at Soraya Research Station, Mount Leuser National Park, Indonesia. Biodiversitas 25: 1788-1796.* The Sumatran orangutan (*Pongo abelii* Lesson 1827) is an exclusive and indigenous primate species inhabiting the forests of Sumatra. Unfortunately, the species is constantly threatened by habitat loss and depletion of food sources due to human activities such as deforestation for agriculture and plantations. This study was conducted at the Soraya Research Station in the Leuser Ecosystem Area (Mount Leuser National Park), Indonesia, from December 2021 to July 2022 to investigate the Sumatran orangutan's feeding behavior and diet preferences. Focal Animal Sampling was employed as the observation method, with data collected every 2 minutes. The parameters measured were eating behavior, body position during feeding, and type of food consumed. The sample included three orangutans: one adult male, one adult female, and one juvenile male. Behavioral observations were carried out for 18,000 minutes, namely 2,160 minutes for adult males, 7,920 minutes for adult females and 9,720 minutes for juvenile males. The study found that the total eating behavior was 6204 minutes, with chewing being the most frequent behavior observed. Orangutans were more likely to eat while hanging. The diet included 41 species from 20 families, and the orangutan's preferred food was cambium *damli* (*Streblus elongatus*) from the Moraceae family. This research describes the types of food eaten by orangutans and is expected to provide information for research station managers to ensure the availability of these plants.

Keywords: Diet preference, Leuser Ecosystem, Moraceae, *Pongo abelii*, *Streblus elongatus*

INTRODUCTION

Leuser Ecosystem Area (KEL) is a highly diverse forest in Sumatra; it is home to a diverse range of primate species, including the orangutan, the only great ape in Asia (Suhendra et al. 2020). Orangutans inhabit the tropical lowland rainforests in a semi-solitary and arboreal manner. Orangutans in Indonesia are divided into three species, namely the Bornean orangutan (*Pongo pygmaeus*), Tapanuli orangutan (*Pongo tapanuliensis*), and Sumatran orangutan (*Pongo abelii*) (Condro et al. 2021). The Sumatran orangutan has distinct differences in appearance, weight, habits, and facial structure compared to the other two species. The Sumatran orangutan is an endemic and unique species found in the forests of Sumatra (Wich et al. 2016). Sumatran orangutans can be recognized by their hair, which is thin, rounded, and has columns of dark pigment that are smooth and often broken at the midsection, usually clear near the tips and sometimes tipped black on the outside. Bornean orangutans have a more robust body compared to Sumatran orangutans. Kalimantan orangutans have larger throat sacs and are pendulous, while the Sumatran orangutan has a smaller one (Meijaard et al. 2001).

As an umbrella species, orangutans have a wide range of movement, and the presence and population density of orangutans can be used as an indicator of the health of a forest area. Orangutans play a vital role in the unique structure of the tropical rainforest ecosystem (Purwoko et al. 2022). However, they face threats to their habitat and diet sources due to human activities such as deforestation for agriculture and plantations. This is also because human growth and development are more rapid, so conflicts between humans and orangutans often occur. Internal factors that influence the orangutan's relatively large body size and slow movement make it easy for orangutans to be hunted (Prayogo et al. 2014). According to The International Union for Conservation of Nature (IUCN) in 2021, Sumatran orangutans are Critically Endangered. The presence of Sumatran orangutans is fragmented and dispersed into small groups in several areas, including the Soraya Research Station within the Leuser Ecosystem Area (Sloan et al. 2018). The Soraya Research Station, built by the Leuser Management Unit in 1994, is located within the Leuser Ecosystem Area but outside the Gunung Leuser National Park. Despite being a secondary forest, Soraya Research Station has a high diversity of plant species that can support orangutan populations (Andini et al. 2021).

Behavior includes various activities and actions that Sumatran orangutan perform in their natural habitat (John et al. 2020). Orangutans spend most of their time feeding, moving, relocating, and resting (Sutekad et al. 2022). There are many things that can be observed when Sumatran orangutans eat, including their body position and what they eat. The body position when orangutans eat is hanging, lying, sitting, and standing (Hadad et al. 2017). Orangutans are *frugivorous* primates, which are animals whose main food is fruit. Sumatran orangutans vary greatly in their food choices. Generally, orangutans eat fruit, but there are also other types of food that orangutans eat, like young leaves, seeds, epiphytes, lianas, and tree bark (Mahyana et al. 2023). Orangutan eating behavior varies in each region and is influenced by habitat type, season, age, and sex (Rodman 1999). There are various types of trees that orangutans feed on and one of the orangutans' food preferences is *Ficus* spp. The type of plant that orangutans most often consume is banyan (Benjamin fig tree) (0.50%) (Zuhra et al. 2009).

Previous studies on Sumatran orangutan feeding behavior have been conducted at the Ketambe, Suq Balimbing Research Station in the Gunung Leuser National Park and at the Bukit Lawang Ecotourism site in the Gunung Leuser National Park (Hardus et al. 2012; Onrizal and Auliah 2019; Sutekad et al. 2022). These studies show differences in feeding behavior influenced by habitat type, season, vegetation, age, and sex (Taylor 2006). However, research has not been conducted on the feeding behavior and diet preferences of Sumatran orangutans at the Soraya Research Station within the Leuser Ecosystem Area. Considering that eating behavior is closely related to dietary preferences, studying Sumatran orangutans' eating behavior and dietary preferences at the Soraya Research Station, Leuser Ecosystem Area, Aceh, Indonesia is necessary.

MATERIALS AND METHODS

Study area

This research was conducted at the Soraya Research Station in the Leuser Ecosystem Area (KEL) (Mount Leuser National Park), Sultan Daulat Subdistrict, Subulussalam City, Aceh Province, Indonesia (Figure 1). The Soraya Research Station is located in the Lowland Tropical Rain Forest area within the Leuser Ecosystem Area. Sumatran orangutans in this location are distributed naturally. Orangutans living in the Soraya Station area have been recorded individually by Station officers based on the morphological characteristics of each individual. Researchers are required to carry out habituation and species recognition for 1-2 days to get to know each individual orangutan first.

Procedures

Sampling method

The study utilized the Focal Animal Sampling method (Bosholn and Anciães 2018). This method involved observing behavior by following and studying orangutans from waking up in the morning at 6.00 AM until they make their sleeping nest in the evening at 6.00 PM. Data were collected on a single individual observed every two minutes as a sample unit. Orangutan diet preference data was collected by observing the diet being consumed and recording the type of food derived from plants, animals and bee honey. Edible plant parts include young leaves, fruit, bark, flowers, and pith. The observed orangutans were categorized into cohorts of infants, juveniles, adolescents, adults, and the elderly (John et al. 2020).

Data collection for feeding behavior

Data collected for feeding behavior included probing, picking, and chewing (Sutekad et al. 2022). These feeding behaviors were observed and recorded. Description of each behavior can be seen in the ethogram in Table 1.

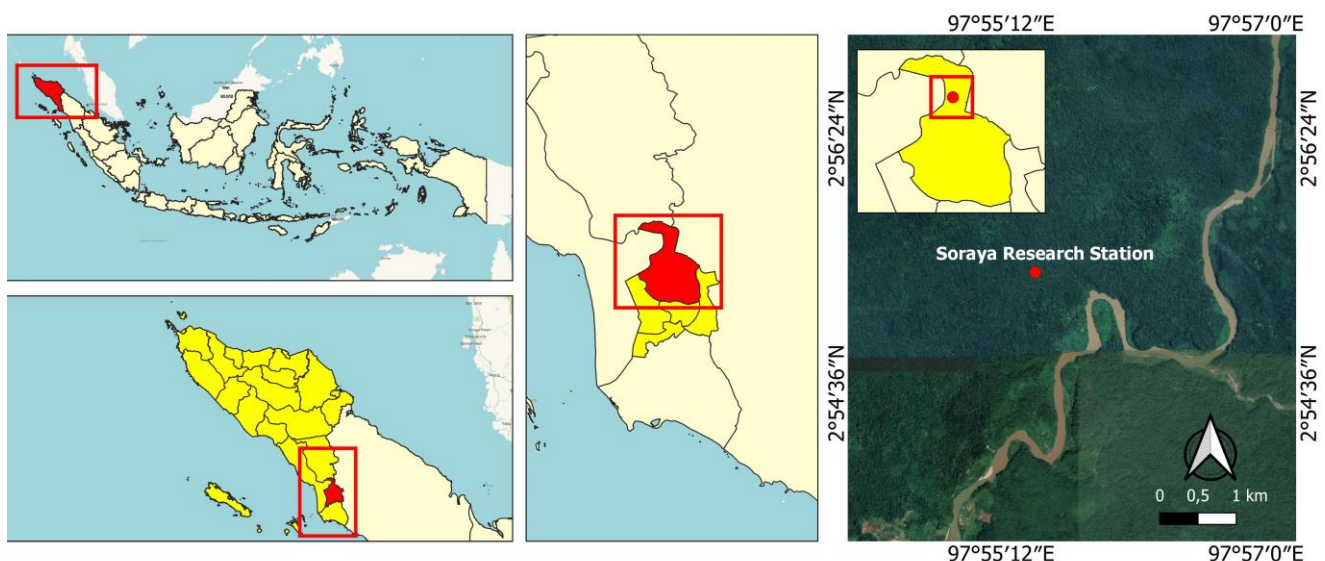


Figure 1. The location of Soraya Research Station in the Leuser Ecosystem Area, Sub-district of Sultan Daulat, Subulussalam City, Aceh Province, Indonesia

Data collection for body position during feeding

Data collection for body position during feeding included body positions such as hanging, sitting, and standing (Kamaluddin et al. 2019). These body positions during feeding were observed and recorded. Description of each behavior can be seen in the ethogram in Table 2.

Data collection for diet type

Data collection for diet type was conducted by recording the type and species of diet consumed by the orangutan. For unknown diet species, a herbarium was made as follows (Zaitunah et al. 2021). (i) The dried herbarium was used for plant parts with low moisture content that was easy to dry, such as leaves; making a dried herbarium involved taking a 40 cm long plant sample and placing it on a newspaper. It was then sprayed with 70% alcohol to wet the newspaper and pressed for a day. The specimen was then put into a plastic bag with the newspaper and sprayed with alcohol again to prevent fungal growth during fieldwork. The specimen was then placed in an oven at 60°C for 48 hours (adjusted for plant thickness and moisture content) to dry it out. (ii) The wet herbarium was used for plant parts with high moisture content that was difficult to dry, such as fruits and insects. A sample bottle was prepared, and the specimen was placed inside to form a wet herbarium. Next, 70% alcohol was poured into the bottle until the specimen was submerged, and the bottle was sealed to prevent the alcohol from evaporating so that the specimen remained well preserved.

Data collection for diet preference

Data collection for diet preference was conducted by recording the plant parts consumed by the orangutan, such as young leaves, fruits, cambium, flowers, and the soft core of young stems (Bastian et al. 2010).

RESULTS AND DISCUSSION

Observing result

During the study, five orangutans were observed, consisting of three adult males, one juvenile male, and one

adult female. However, two adult males disappeared from the research location during the observations. The missing orangutan is thought to have left for another forest location outside the research area. Thus, only three individuals were observed at the research location, namely one adult male, one adult female, and one juvenile male (Figure 2).

Feeding behavior

The observation results indicated that the time allocation for feeding behavior in adult females, juvenile males and adult males show a difference (Figure 3). The total of eating behaviors was 6204 minutes. The time allocation for feeding behavior in adult females observed for 3,134 minutes showed that chewing behavior had the highest allocation of time, totaling 2,029 minutes or 64.74% of the total activity time. Extracting behavior had a time allocation of 564 minutes or 18.00% of the total activity time. Picking behavior had a time allocation of 433 minutes or 13.82% of the activity time (Figure 4). The lowest time allocation was spent on probing behavior, totaling 108 minutes or 3.45% of the overall activity time. The time allocation for feeding behavior in juvenile males was observed for 2,490 minutes, ranked from highest to lowest, and chewing for 1386 minutes or 55.66% of the total activity time. The time allocation for extracting was 557 minutes or 22.37% of the total activity time while, picking behavior was observed for 418 minutes or 16.79% of the activity time. The lowest time allocation was for probing, 129 minutes or 5.18% of the total activity.

The time allocation of feeding behavior in adult male individuals was observed for 580 minutes, with the allocation of time ranked from high to low, being chewing for 346 minutes or 59.66% of the total activity time. The time allocation for extracting was 169 minutes or 29.14% of the total activity time, while picking took 50 minutes or 8.62% of the activity time. The lowest time allocation was for probing, 15 minutes or 2.59% of the total activity time. Table 3. shows that adult male, adult female, and juvenile male individuals spend more time chewing than searching, extracting, and picking. This is because orangutans chew their diet multiple times before swallowing, resulting in a higher allocation of time for chewing.

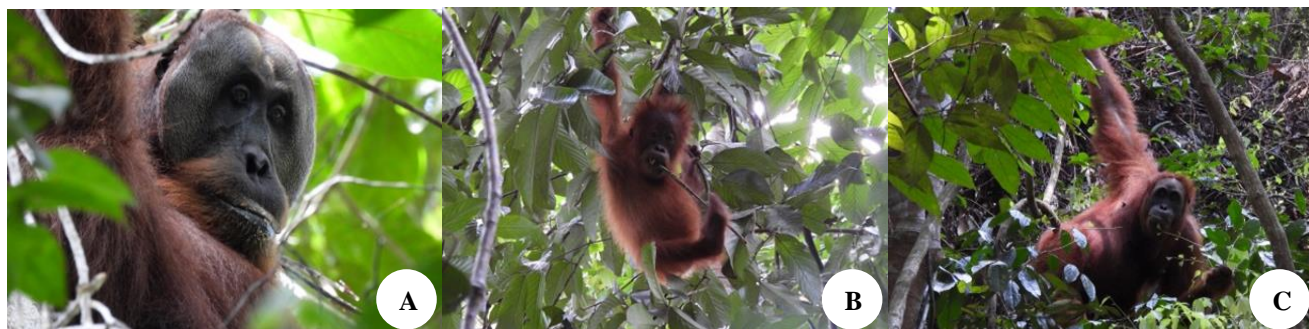


Figure 2. The result of Sumatran orangutans (*Pongo abelii*) individuals was observed at Soraya Research Station, Leuser Ecosystem Area, Aceh, Indonesia. A. Adult male individual, B. Juvenile male, and adult female

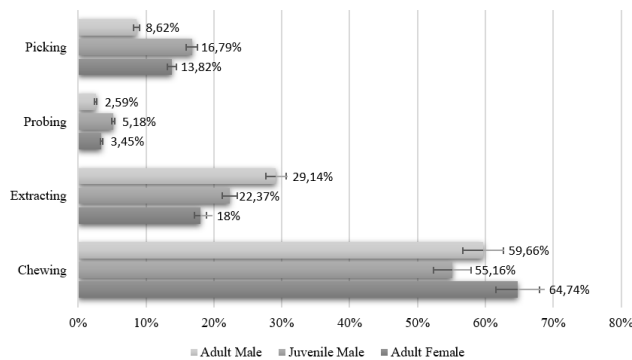


Figure 3. Time allocation (in minutes) for feeding behavior of adult males, juvenile males, and adult females at Soraya Research Station, Leuser Ecosystem Area, Aceh, Indonesia

Table 1. Ethogram of all behavior observed in this study

Behavior	Description
Probing	Physically exploring or examining
Picking	Take hold of and remove like fruits, leaf, flowers
Extracting	Open food using their hands or teeth
Chewing	Crushing food mechanically using teeth in the oral cavity

Table 2. Ethogram of all body positions during feeding observed in this study

Behavior	Description
Hanging	Hands holding a branch and both legs dangling or one hand holding a branch and one leg placed on the branch to support the body
Sitting	The body position can be said to be sitting when both legs do not support the body
Standing	The standing position is characterized by both feet placed on a branch to support the body and one hand holding the branch to balance the body position, while the other hand takes food

Body position during feeding

The observation results indicate that the allocation of body position during feeding in adult females, juvenile males and adult males show a difference (Figure 5). The body positions of Sumatran orangutans that have been observed consist of standing, sitting and hanging (Figure 6). The allocation of body position during feeding in adult females, which was observed for 3134 minutes, was ranked

from the highest to the lowest as hanging position for 1,592 minutes or 50.80% of the total activity time. The time allocation for the sitting position was 1,326 minutes or 42.31% of the total activity time. The time allocation for the standing position was 216 minutes or 6.89% of the activity time.

The allocation of body position during feeding behavior of the juvenile male individual, observed for 2490 minutes, was predominantly hanging position with 2142 minutes or 86.02% of the total activity time. Sitting positions had an allocation of 192 minutes or 7.71% of the total activity time, while standing positions had an allocation of 156 minutes or 6.27%. Meanwhile, the allocation of time in body position during feeding of adult male individuals is 580 minutes. The highest time allocation was observed in the sitting position, which was 448 minutes or 77.24% of the total activity time. The hanging position was observed for 104 minutes, or 17.93% of the total activity time, and the standing position for 28 minutes or 4.83% of the activity time, respectively.

Table 4 shows that adult female and juvenile male individuals have a higher allocation of time in the hanging position while feeding. The hanging position makes it easier for orangutans to move from one branch to another when taking a diet. On the other hand, adult male individuals spend more time sitting while feeding due to their heavy body weight, which prevents them from hanging. Additionally, adult males have a unique behavior of collecting diet in their hands, then bringing it to a branch that can be sat on and eating in a seated position.



Figure 4. Fruit-picking behavior in Sumatran orangutans at Soraya Research Station, Leuser Ecosystem Area, Aceh, Indonesia

Table 3. Time allocation of Sumatran orangutan feeding behavior in Soraya Research Station

Individual	Day Observed	Feeding behavior (minutes)				Total (minutes)	Total observations time (minute) Probing
		Probing	Picking	Extracting	Chewing		
Adult female	11	108	433	564	2,029	3,134	7,920
Juvenile male	11	129	418	557	1,386	2,490	7,920
Adult male	3	15	50	169	346	580	2,160
Total		252	901	1,290	3,761	6,204	18,000



Figure 6. Body position during feeding behavior of Sumatran orangutan (*Pongo abelii*) at Soraya Research Station, Leuser Ecosystem Area, Aceh, Indonesia. A. Sitting; B. Hanging

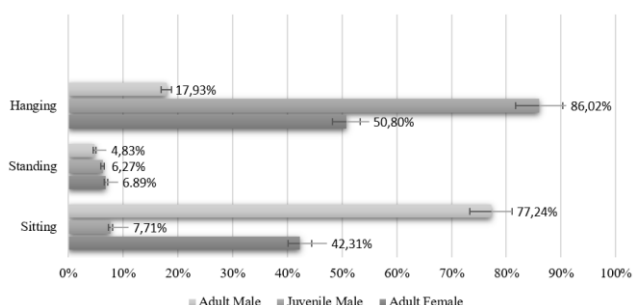


Figure 5. Time allocation (in minutes) of body position during feeding behavior of adult males, juvenile males, and adult females at Soraya Research Station, Leuser Ecosystem Area, Aceh, Indonesia

Diet preference

Table 5 presents the preferences consumed by the orangutans, including fruits, cambium, leaves, roots, flowers, insects, and honey. The diet consists of 41 items, 37 of which are plants and 4 of which are animals. These items are classified into 20 families, 39 of which are identified and 2 others that are only locally identified (unknown scientific names). The identified families include Moraceae (7 species), Fabaceae (5 species), Termitidae (3 species), Euphorbiaceae (2 species), Meliaceae (2 species), Pandanaceae (2 species), Anacardiaceae (2 species), Arecaceae (2 species), Malvaceae (2 species), Annonaceae (2 species), Apidae, Apocynaceae, Aspleniaceae, Celastraceae, Connaraceae, Cucurbitaceae, Dipterocarpaceae, Elaeocarpaceae, Myrtaceae, and Polypodiaceae, each with one species. The higher consumption rate of cambium compared to fruits in the Sumatran orangutan's diet at Soraya Research Station is shown in Table 4.

Overall, this study showed that the total time spent on feeding behavior by Sumatran orangutans (*Pongo abelii*) was 6,204 minutes, with adult females allocating the most time (3,134 minutes) followed by juvenile males (2,490 minutes) and adult males (580 minutes) (Table 6.). Chewing was found to be the most time-consuming activity during feeding. Adult females and juvenile males preferred

a suspended body position during feeding, while adult males preferred a sitting position. The preferred diet of Sumatran orangutans was cambium damli (*Streblus elongatus*) from the Moraceae family, out of the 41 types of diet consumed by 20 different families.

Discussion

The observation of orangutans began with the habituation process to ensure that the presence of researchers did not affect the orangutan's activities. The habituation process took two days and was marked by the absence of kiss squeak behavior from the orangutans. This is done so that behavioral observations can run according to the provisions of behavioral data collection. Orangutans tend to feel disturbed by the presence of humans, and they move quickly, so their behavior cannot be observed. Habituation is the fading of frequently given responses, resulting in reduced fear and eventually ignoring human observation. This process allowed the observers to observe the orangutans (Brubaker-Wittman et al. 2021) closely.

The orangutans were observed for 12 hours per day, with 3 days allocated to the adult male, 11 days for the adult female, and the juvenile male observed simultaneously. Differences in observation time were due to the orangutans' disappearance during the observation period before reaching the desired target time. The total time spent observing the three orangutans' feeding behavior was 6,204 minutes (103.4 hours). The observation began by waking up in the morning and making a sleeping nest in the evening.

Weather conditions influenced the sleeping time of orangutans at Soraya Research Station. When the environment was cloudy or rainy, orangutans would wake up later in the morning and make their sleeping nest earlier than when the weather was clear. Weather is one of many factors that determine factor in orangutan activity (Sutekad et al. 2022). When the weather is cloudy or rainy in the morning, orangutans stay in their nests longer. Similarly, when the moonlight was bright at night, orangutans would leave their sleeping nests to search for diets around the nest tree (Marshall et al. 2021).

Table 4. Time allocation of Sumatran orangutan feeding behavior in Soraya Research Station, Leuser Ecosystem Area, Aceh, Indonesia

Individual	Day Observed	Feeding behavior (minutes)				Total (minutes)	Total observations time (minute) Sitting
		Sitting	Standing	Hanging	Lying down		
Adult female	11	1,326	216	1,592	0	3,134	7,920
Juvenile male	11	192	156	2,142	0	2,490	7,920
Adult male	3	448	28	104	0	580	2,160
Total	252	1,966	400	3,838	0	6,204	18,000

Table 5. The diet preference of Sumatran orangutans (*Pongo abelii*) at Soraya Research Station, Leuser Ecosystem Area, Aceh, Indonesia

Local name	Species	Family	Diet preference
Damli	<i>Streblus elongates</i>	Moraceae	Cambium
Terap	<i>Artocarpus elasticus</i>	Moraceae	Cambium and leaves
Jengkol	<i>Archidendron</i> sp.	Fabaceae	Leaves
Rotan	<i>Calamus</i> sp.	Arecaceae	Fruits and roots
Akar rangut jalang	<i>Acacia pennata</i>	Fabaceae	Leaves and cambium
Akar susu	<i>Alyxia stellate</i>	Apocynaceae	Fruits
Mangga hutan	<i>Semecarpus longifolius</i>	Anacardiaceae	Fruits
Cempedak air	<i>Artocarpus integer</i>	Moraceae	Cambium
Kabo	<i>Archidendron bubalinum</i>	Fabaceae	Leaves
Meranti putih	<i>Shorea agamii</i> sp.	Dipterocarpaceae	Cambium
Stur padi	<i>Aglaia korthalsii</i>	Meliaceae	Fruits
Pakis sarang burung	<i>Asplenium nidus</i>	Aspleniaceae	Leaves
Pakis ekor tokek	<i>Aglaomorpha sparsisora</i>	Polypodiaceae	Leaves
Asam bobi	<i>Artocarpus dadah</i>	Moraceae	Fruits
Akar melinjo	<i>Rourea minor</i>	Connaraceae	Fruits
Mancang	<i>Mangifera foetida</i>	Anacardiaceae	Fruits
Kayu karet	<i>Elateriospermum tapos</i>	Euphorbiaceae	Fruits
Meranti Peutimah	<i>Lophopetalum javanicum</i>	Celastraceae	Cambium
Gelinggang merak besar	<i>Dysoxylum binectariferum</i>	Meliaceae	Fruits
Jambu	<i>Syzygium</i> sp.	Myrtaceae	Fruits
Cempedak rawan	<i>Artocarpus kemando</i>	Moraceae	Fruits
Durian cangkuk	<i>Durio</i> sp.	Malvaceae	Fruits
Akar entap	<i>Fissistigma kentia</i>	Annonaceae	Cambium
Akar tombang	<i>Freycinetia insigma</i>	Pandanaceae	Leaves
Aren	<i>Arenga pinnata</i>	Arecaceae	Roots
Kayu siron	<i>Pentace curtisii</i>	Malvaceae	Fruits
Resak Gunung	<i>Elaeocarpus griffithii</i>	Elaeocarpaceae	Fruits
Akar mungkur			Cambium
Akar pandan	<i>Freycinetia sumatrana</i>	Pandanaceae	Leaves
Gompol kambing	<i>Mezzettia parviflora</i>	Annonaceae	Fruits
Akar yo ate	<i>Mucuna</i> sp.	Fabaceae	Fruits
Rambung kusim	<i>Ficus coronate</i>	Moraceae	Fruits
Akar tapak kambing	<i>Phanera stipularis</i>	Fabaceae	Cambium
Akar Bambu			Roots
Tampu licin	<i>Macaranga</i> sp.	Euphorbiaceae	Fruits
Akar markisah	<i>Cucumis javanicus</i>	Cucurbitaceae	Fruits
Gala-gala rube	<i>Ficus shwarzii</i>	Moraceae	Cambium
Rayap	<i>Hospitalitermes hospitalis</i>	Termitidae	Termite
Rayap	<i>Microcerotermes crassus</i>	Termitidae	Termite
Rayap	<i>Microcerotermes serrula</i>	Termitidae	Termite
Madu kelulut	<i>Plebeia</i> sp.	Apidae	Stingless bee

Table 6. Feeding time allocation for diet preference of Sumatran orangutans in Soraya Research Station, Leuser Ecosystem Area, Aceh, Indonesia

Individuals	Day observed	Diet preferences (minutes)						Individuals
		Fruits	Cambium	Roots	Leaves	Termite	Honey	
Adult female	11	942	1,716	66	372	38	0	3,134
Juvenile male	11	702	1,462	40	258	28	0	2,490
Adult male	3	0	344	12	216	0	8	580
Total		1,644	3,522	118	846	66	8	6,204

Orangutans habitually defecate and urinate when they leave their sleeping nests before searching for diets. Orangutans hang onto branches when defecating and urinating. The branches are tested for their durability by pulling and bending them. The three orangutans' feeding behavior consisted of four categories: searching, picking, extracting, and chewing.

Adult female orangutans spend less time exploring (probing) than juvenile male orangutans because they can easily reach their diet with their large and high body support. It was observed that the adult female gave a diet to her juvenile male because the location of the diet was difficult for the juvenile male to reach. Based on the observation, the adult female also gave diet mouth-to-mouth to the juvenile male. The juvenile male extended his hand to his mother to take the diet she was eating, and sometimes, the diet was already peeled by his mother and given to the juvenile male (Schuppli et al. 2021).

This study's findings suggest that orangutans engage in various feeding behaviors such as probing, picking, extracting, and chewing. Probing involves using both hands to search for diet among leaves and on tree trunks. Observations show that orangutans pause from other activities to locate diet during probing; picking entails the collection of fruits, leaves, or insects on feeding trees. Orangutans use different methods to pick their diet depending on their size and location. For instance, they pull large fruits like *Artocarpus dadah*, pull branches for small fruits like *Ficus coronata*, break small branches for fruits like *Korthalsia echinometra*, and break branches to access cambium for plants like *Streblus elongatus*. Extracting involves opening the diet with both hands or teeth. Orangutans use different techniques to extract various types of diet, such as peeling the skin of fruits and removing the flesh, skin, or seed, depending on the diet types. They also peel or bite the bark of trees to access the cambium or directly bite the bark. Chewing involves the movement of the mouth to crush the diet before swallowing. Orangutans exhibit unique chewing behaviors when consuming certain diets, such as *Korthalsia echinometra* and *Acacia pennata*, where they extract and chew the diet before spitting out the liquid and foam.

The observations revealed three distinct body positions adopted by the primates: sitting, hanging, and standing. Notably, none of the observed individuals were found to be in a lying position while feeding. The sitting position was characterized by the primate not supporting its weight on both legs; the hanging position was identified by one arm gripping a branch while both legs were hanging or with one leg resting on the branch for support; and the standing position was identified by both legs supporting the weight on the branch and one arm gripping the branch to maintain balance while the other arm grasped food (Roth et al. 2020).

The orangutan diet comprises fruits, cambium, leaves, roots, flowers, insects, and honey. Their diet consists of 41 types of diet, comprising 37 plant species and 4 animal species. Therefore, the plants consumed by orangutans account for 34% of the total plant species in the Soraya Research Station. The total number of plant species at the

Soraya Research Station is 108 (Iqbar 2015). The most commonly consumed diet type belongs to the Moraceae family, with the cambium layer being the most frequently consumed part. This observation was made during a non-fruiting season; hence, the number of fruits observed was limited.

The observation shows a high level of consumption of cambium compared to the fruit diet preference; this is different from Santosa et al. (2012), who state that the highest diet type is fruits compared to other types of diet. Orangutans prefer cambium because the plants are not in the fruiting season. According to Leuser Conservation Forum data in 2021, the fruiting season at the Soraya Research Station began in May and ended in August, while this study was conducted from mid-January to mid-April. However, there were some fruiting plants, such as *Artocarpus dadah*, *Calamus* sp., some liana fruits, and *Ficus coronata*.

Diet can be considered a preference if orangutans are seen frequently visiting or even searching for trees of that diet type. Based on this statement, the preferred diet of orangutans is the cambium of damli (*Streblus elongatus*) from the Moraceae family. This is because all three orangutan individuals consume *Streblus elongatus* daily, and each orangutan can visit 5-10 *Streblus elongatus* trees daily. The selection of damli cambium over other plant cambiums is because damli cambium is non-gummy, watery, slightly bitter, and can be chewed and swallowed without throwing away the sap or residues from the cambium (Tandang et al. 2017). The most preferred fruit is the Moraceae family's sour fruit (*Artocarpus dadah*). *Artocarpus dadah* is the plant with the most fruit during the study period, with a slightly sour and gummy taste, making orangutans often visit this diet tree (Mahyana et al. 2023).

Based on observations, adult female and juvenile male individuals will return for three consecutive days to the location with fruiting diet trees. At the same time, gibbons (*Hylobates albibarbis*) and siamangs (*Symphalangus syndactylus*) were also observed at the location, indicating competition for fruiting diet trees. The adult male individual was also seen visiting this location, but the fruit was gone, so during the three-day observation period, the adult male individual did not eat fruit at all. Therefore, orangutans eat termites and honey to fulfill their nutrition (Hamad et al. 2014). The leaves preferred by orangutans are *Artocarpus elasticus* from the Moraceae family, while the roots preferred are *Calamus* sp. from the Arecaceae family. The insects eaten by orangutans are termites from the Termitidae family with *Hospitalitermes hospitalis*, *Microcerotermes crassus*, and *Microcerotermes serrula* species. In addition, orangutans also eat stingless bee honey, *Plebeia* sp from the Apidae family.

The research findings indicate the behavior of orangutans when drinking. Orangutans obtain water from tree crevices that are filled with rainwater. The drinking behavior of orangutans involves approaching their mouths to the tree crevices and directing the water into their mouths using their hands. Orangutans do not need to descend trees to drink, as they can obtain water collected in branch cavities (Ashbury et al. 2015). Drinking behavior is

characterized by short time allocation, and not all orangutans drink daily, as they can obtain water from tall plants with high water content. During the dry season and the absence of fruiting season, orangutans can obtain water from lianas by extracting the bark, chewing, and swallowing the water while discarding the waste from the bark (Sharma et al. 2016).

Overall, orangutan feeding behavior and body positions were observed for 6,204 minutes at the Soraya research station. Orangutans exhibited four categories of feeding behavior: searching, picking, extracting, and chewing. Their diet consists of fruits, cambium, leaves, roots, flowers, insects, and honey, with the most commonly consumed diet type being the cambium layer. Three distinct body positions were identified during feeding: sitting, hanging, and standing. Observations suggest that orangutans prefer cambium over fruit when the plants are not in the fruiting season. The adult female orangutan was observed giving a diet mouth-to-mouth to the juvenile male. Orangutans defecate and urinate before searching for diets. The weather influences orangutan activity, with orangutans staying longer in their nests in cloudy or rainy weather.

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