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Phytochemical Analysis of the Feed of the Tapanuli Orangutan as a Continuing Conservation Effort

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Abstract

This study aims to determine the type of feed for the Tapanuli orangutan (Pongotapanuiliensis), and the phytochemical compounds contained in the diet of the Tapanuli orangutan (Pongotapanuiliensis). This research was conducted in the Batang Toru forest of South Tapanuli for sampling. This study used a line transect method with 4 transects I, II, III, IV) used to observe the diet of the Tapanuli orangutan, and the Physics Laboratory of the HKBP Nommensen Pematangsiantar University for phytochemical analysis. The results of this study obtained 11 types of nests HayunDolok (Syzygiumsp), Medang (Litseabrachystachys), Mayang (Palaquiumgutta), Laccatbodat (Shoreahopeifolia) and Hoteng (Quercusgemelliflora). Phytochemical compounds contained in orangutan feed are alkaloids, flavonoids, tannins and saponins.

Keywords: orangutan, feed, phytochemical

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INTRODUCTION

Orangutans are the only surviving species of Asian ape. This makes orangutans one of the protected animals both in terms of species and their habitat, which is getting closer to the limit of extinction. One of the new orangutan species discovered in 2017 is the tapanuli orangutan. The Tapanuli orangutan was previously considered the southernmost orangutan population of the Tapanuli orangutan. However, based on in-depth research by Indonesian and international research groups in the fields of genetics, morphology, ecology, and behavior, it turns out that the Tapanuli Orangutan is taxonomically closer to the Bornean Orangutan (Pongopygmaeus) so that must be separated into separate species. Research also indicates that the Tapanuli orangutan is the ancestor of these three great apes (Khoetiem et al., 2014). Orangutans are very slow reproductive: females have their first litter at 15 years of age, between 8 or 9 years of birth, and they are divided into several forest blocks that are currently separated. So reconnecting these populations will be very important for preservation and to avoid inbreeding. This small population size means that the Tapanuli Orangutan is the rarest and most threatened species of great ape in the world. This typical Tapanuli species is very susceptible to disturbance so that all its remaining habitat needs to be protected, currently there are around 800 tapanili orangutans.

Orangutans are often used as a symbol as "umbrella species" which has the meaning of balancing the ecosystem. Orangutan sustainability affects the balance of the ecosystem in the forest. Even though there are laws and institutions that are responsible for protecting the

existence of orangutans, the orangutan population continues to decline as a result of various problems such as poaching, illegal orangutan trade, illegal logging of trees that become orangutan habitat (Muin, 2007). The Batang Toru Ecosystem, which is also called HaranganTapanuli, with a total area of around 150,000 ha is located in the three Tapanuli Districts, North Tapanuli Province. Of this area, nearly 142,000 ha is primary forest, which appears dark green in satellite imagery on the map. The rest is degraded areas that need to be rehabilitated as well as building corridors between separate forest blocks. Approximately 61.0% of primary forest is found in North Tapanuli Regency, 29.7% in South Tapanuli, and 9.3% in Central Tapanuli.

Various efforts have been made to preserve orangutans. One way is to restore a new habitat suitable for orangutan needs, orangutan habitat generally lies in trees. Trees are one of the most important components for orangutans, they can be used as a place to build their feeds in canopy. Orangutans build at least one nest per day. Orangutans make use of leaves, twigs, and lianas in constructing their feeds, so identification of the composition of the orangutan nest is necessary. To find out the factors that influence orangutans in making feeds, information on thestandardization of orangutans in compiling feeds will be obtained (Kuswanda, 2013). Orangutan feeds contain different chemical compounds so that they have potential as medicine. This requires scientific proof because each medicinal plant contains different secondary metabolite compounds. Secondary metabolite compounds are biologically active compounds to help protect plants against predators and other damage that does not directly benefit growth.

It is important to know the content of these compounds to estimate their usefulness. How to find out secondary metabolite compounds can be tested with a phytochemical screening test. Phytochemical screening is an approach method that can be used to reveal the presence of secondary metabolites from plants. Secondary metabolite compounds tested in this study are alkaloids, tannins, flavonoids, phenolic, saponins. Previous research conducted by Rahmi, et al stated that there were 15 types of food provided, and watermelon was the most abundant. favorites as well as 17 types of food that can be obtained from nature such as Ficus sp. NS most favorite. The specific purpose of this study was to determine secondary metabolite compounds in trees that are often used as nesting sites for Tapanuli orangutans in Sipirok Tapanuli Selatan. This research has never been done, the test for secondary metabolite compounds is usually in the Tapanuli orangutan feed. The urgency of this research is that the Tapanuli orangutan is a new species of orangutan that has just been discovered, so that new research is needed to support the survival of the Tapanuli orangutan.

METHOD

Place and Time of Research

Batang Toru Forest (HBT) has an area of about 136,000 ha and is divided into two blocks, namely the East block and the West block. Administratively, Batang Toru Forest is located in North Tapanuli, Tapanuli Tengah, and South Tapanuli Regencies, while geographically it is between 98o53 '- 99o 26' East Longitude and 02o 03 '- 01o 27' North Latitude. The Batang Toru Block Barat Forest Area has an altitude ranging from 50 masl to 1875 masl. The lowest point is on the Sihaporas River (near the city of Sibolga), and the highest point is at DolokLubuk Raya in the southern part of the Batang Toru Forest Area. Slope between 16% and more than 60%, the terrain in the area is dominated by hilly and mountainous topography. The soil in the Batang Toru Forest is considered sensitive to erosion. This research was conducted at the Phyisics Laboratory of the HKBP Nommensen University Pematangsiantar, Pematangsiantar City, North Sumatra Province.

Research Tools and Materials

The tools and materials used in this research are: Binocular Binocular Bushnell Powerview FOV 205 FT, Sony Digital Camera, 25 m long rope, meter, GPS (Global

Positioning System), Compass. The materials used in this research are: Tapanuli orangutan nest leaves from Batang Toru Forest. Other ingredients are 1 water, 95% ethanol, sodium chloride, chloroform, ammonia, sulfuric acid, hydrochloric acid, anhydrous acetic acid, ether, Mayer, Dragendorf and Wagner reagents. The tools used in this research were pyrex glasses, analytical balance, dropper, funnel, petri dish, filter paper, 5 watt light bulb, magnifying glass, stirring rod, test tube, test tube rack, aluminum foil and plastic spoon.

Work procedures

1. Using line transects (straight line transects) for observation. The data were collected by making line transects of 4 transects with observation points (Transects I, II, III, IV).
2. There is 1 line transect line with a radius of 900 m field distance to the specified point, with a right and left 50 m width. Each transect will be observed by walking slowly while observing each tree to see the nest.
3. After the nest is found, the way to take samples of the plants that make up the orangutan nest from the top of the tree is to climb the nest tree, then take the parts of the plant which are used as the compiler for the Tapanuli orangutan nest (Pongoabelii). After the sample is obtained, it is put in plastic packing.

Taking samples of orangutan feeds in the field and making simplicia. The nest sample was taken from the whole leaves straight from the nest tree. Samples were taken to the camp to make simplicia:

1. The leaves are cleaned with a cotton swab soaked in 90% technical alcohol
2. After cleaning, the leaves are dried in direct sunlight and if there is no sunshine, use an oven with a temperature of 50^0C for 1-2 days.
3. The material that has been dry is then mashed in a blender and sieved with a size of 60 mesh
4. The finished simplicia powder can be directly checked for chemical content or stored in a closed container and labeled.

Laboratory

The phytochemical compounds tested were alkaloids, saponins, tannins, flavonoids. These four compounds were tested because one of the functions of these four compounds is that they can be useful as drugs. The phytochemical test is carried out in two ways, namely.

Alkaloid test

A total of 500 mg of simplicia powder is put into a 100 mL beaker and 10 mL of distilled water is added and brought to a boil. Then the filtrate is taken, two drops of the filtrate are put into a drop plate, then two drops of H2SO4 2 N and two drops of Mayer reagent are added and to strengthen it is also tested with Dragendroff reagent in the same way. The sample will contain alkaloids if there is a white to yellow precipitate with mayer reagent and will be orange when using Dragendroff reagent.

Saponin Test

A total of 500 mg of simplicia powder is put into a test tube, then 10 mL of hot water are added and chilled. Once cool, shake vigorously for 20 seconds. Observing the foam that arises, if the foam does not disappear when 1 drop of 2 N HCL is added, the sample contains saponins.

Tannin Test

A total of 500 mg of simplicia powder was put into a 100 mL beaker and 10 mL of aquadestilata were added. Then boiled until boiling and then filtered. The filtrate is taken a few drops and then added 4 drops of 10% NaCl and 4 drops of 5% FeCl3 then observing the color change that occurs when it forms.

Flavonoid Test

A total of 500 mg of simplicia powder was put into a 100 mL beaker and 10 mL of distilled water was added and boiled then the filtrate was taken. Three drops of the filtrate are then added with 1 drop of FeCl3 1%. The positive results from the addition of this reagent produce green, red, purple, black, and blue colors. Furthermore, to strengthen the test also carried out in the same way using concentrated H2SO4 solution and the results will be positive if a red color is formed.

RESULTS AND DISCUSSION

Tapanuli Orangutan Nest Composing Plants

Making feeds is one of the daily habits of orangutans. The nest in question is a resting place for orangutans after carrying out their daily activities (Muin, 2007). Daily activities are all orangutan activities that take place since leaving the nest to sleep in the morning and ending until they re-enter the nest to spend the night (Van Schaik, 2006). All great apes including orangutans build feeds that can be used both for resting during the day and sleeping at night (Van Schaik et al, 1994). Feeds for orangutans can also serve as play areas for young orangutans, shelter, childbirth, copulation, and feeding activities (Rijksen, 1978). Based on the results of interviews with field guides, wild Tapanuli orangutans did not repair old feeds but semi-wild Tapanuli orangutans repaired old feeds using fresh leaves and twigs for reuse. The nesting activities of the tapanuli orangutan include: breaking and bending tree branches, and taking leaves from trees to make feeds to be used for resting (sleeping), mats for feeding, and protecting the body to withstand rain. The Tapanuli orangutan nest building plant is a type of plant used by the Tapanuli orangutan to build their feeds. In general, Tapanuli orangutans use plant species that come from nesting trees. The plants that make up the Tapanuli orangutan nest can be seen in Table 1.

Table 1. Tapanuli Orangutan Feeds

No	Feeds	Totally	Persentage
1	Medang (*Litsea brachystachys*)	4	29
2	Hayun Dolok (*Syzygium sp*)	6	43
3	Mayang (*Palaquium gutta*)	2	14
4	Laccat bodat (*Shorea hopeifolia*).	1	7
5	Hoteng (*Quercus gemelliflora*)	1	7
Totally		**14**	**100**

The number of Tapanuli orangutan nest building plants found during the observation was 14 plants, consisting of 5 types of plants. The type of plant that is most widely used as a place to build feeds is the type of Hayundolok in the local language, namely 6 trees (43%). (Syzygium sp) from the family Myrtaceae, this cannot be separated from the morphology of Syzygium sp. which is more in line with the needs of orangutans in making feeds. From the observations in the field, this type of tree has a hard wood texture, reaches 30 m high, has many branches, and the leaves are not so thick. Thus, the orangutans in this study site tended to select the Syzygium sp. Compared to other trees. Kuswanda and Sukmana (2005) stated that the behavior of selecting the part of the nest tree that will be used as a nesting place for orangutans is the tree branching.

Phytochemical Analysis Test for Tapanuli Orangutan Feed

Based on the feed sample of the Tapanuli orangutan taken from the Batang Toru Forest of South Tapanuli, a phytochemical analysis test was carried out which included: Test of Alkaloids, Flavonoids, Tannins and Saponins. Obtained data such as the following Table 2.

Table 2. Nest phytochemicals

No	Nest	Alkaloids	Flavonoids	Tanins	Saponins
1	Medang (*Litsea brachystachys*)	+	+	+	+
2	Hayun Dolok (*Syzygium sp*)	+	+	+	-
3	Mayang (*Palaquium gutta*)	+	+	+	+
4	Laccat bodat (*Shorea hopeifolia*).	+	+	+	+
5	Hoteng (*Quercus gemelliflora*)	+	+	+	+
6	Rotan (*Calamus manan*)	+	+	+	+
7	Pege pege (*Ficus crassiramea*)	-	-	+	+
8	Hopong (*Macaranga lowii*)	+	+	+	+
9	Hayu Hotang (*Podocarpus neriifolius*)	+	+	+	+
10	Torop (*Artocarpus elasticus*)	+	+	+	+
11	Darodung (*Knema conferta*)	+	+	-	+

Table 2 shows that the compounds contained in the ethanol extract of HayunDolok (Syzygiumsp) are flavonoids, as indicated by positive test results. The color change to orange in the flavonoid test is due to the reduction of the benzopyrone core by Mg metal. Flavonoid compounds function as antibacterials which can interfere with the diffusion of food into cells so that bacterial growth is inhibited and will die. Flavonoid compounds work to inhibit bacteria in vitro. In addition, flavonoids also have high potential as antioxidants that are able to transfer electrons or hydrogen atoms to free radical compounds and stop the initial stage of the reaction (Latifah, 2015).

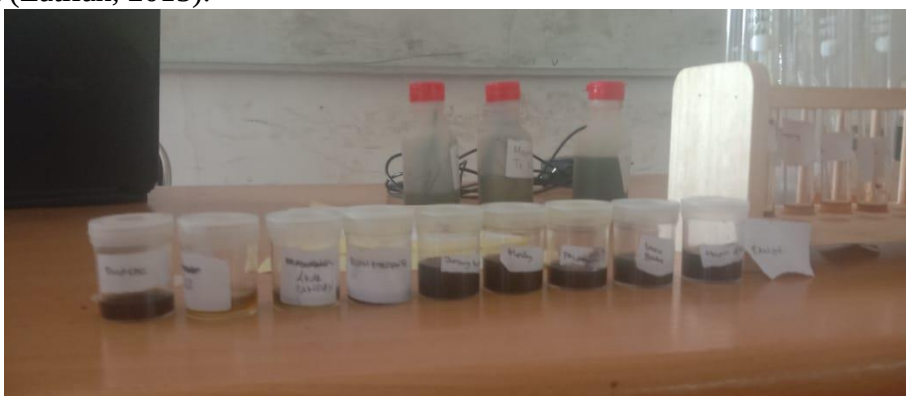

Figure 1. Test sample of Orangutan feed

Based on the previous literature, the ethyl acetate extract Syzygium had a high number of active secondary metabolites. Whereas in this study using ethanol solvent against Syzygium also had good secondary metabolite compounds. The results of the phytochemical screening of the ethanol extract of Syzygium showed some potential for Syzygium to be further developed. Syzygium secondary metabolite can be used as a natural antioxidant and antibacterial. Utilization of these phytochemicals can be used as a reference for the development of natural herbal medicines derived from Syzygium in the Tapanuli orangutan nest. Phytochemicals in Mayang (Palaquiumgutta), namely tannins that function as antibacterial and anti-fungal as well as an adstringent that causes shrinkage of skin pores, hardens skin, and stops light bleeding. Tannins also have antibacterial activity by precipitating protein, because it is suspected that tannins have the same effect as phenolic compounds. The antibacterial effects of tannins include reactions with cell membranes, enzyme inactivation, and destruction or inactivation of genetic material functions.

The phytochemicals in Laccat body (Shoreahopeifolia) contain flavonoids that function as antibacterials by forming complex compounds against extracellular proteins that disrupt the integrity of the bacterial cell membrane. The mechanism of flavonoids is to improve blood circulation throughout the body and prevent blockage of blood vessels, contain anti-

inflammatory properties as well as antioxidants, and help reduce pain in the event of bleeding or swelling. Apart from flavonoids, the alkaloids in Hoteng (Quercusgemelliflora) also have antibacterial properties. The alleged mechanism is by disrupting the peptidoglycan constituent components in bacterial cells, so that the cell layer is not formed completely and humiliates the cell's death. Saponins have the ability to act as a cleanser and antiseptic, which kills germs or prevents the growth of microorganisms that usually occur in wounds so that the wound does not experience serious infections.

CONCLUSION

Based on the results of the research that has been done it can be concluded that: The number of Tapanuli orangutan nest building plants found was 14 Tapanuli orangutan feeds consisting of HayunDolok (Syzygiumsp), Medang (Litseabrachystachys), Mayang (Palaquiumgutta), Laccatbodat (Shoreahopeifolia) and Hoteng (Quercusgemelliflora) and Phytochemical compounds contained in Tapanuli orangutan feeds are alkaloids, flavonoids, tannins and saponins.

RECOMMENDATION

Suggestions for future researchers are if you want to do research related to orangutan feeding to take more samples so that more accurate tests can be carried out to get better results.

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