Material Composition

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Preliminary Study Material Compotition of Wreathed Hornbill (*Rhyticeros undulatus*) Nest Wall Entrance in Mount Ungaran

Margareta Rahayuningsih, Siti Alimah, Novita Hermayani, Misbahul Munir

***Abstract*—**Wreathed Hornbill (*Rhyticeros undulatus*) was a protected bird that we can found in Mount Ungaran Central Java. Previous research showed that the bird have been nesting and breeding on the mountain. The objective of the research was to analysis the materials composition of the Wreathed Hornbill nest wall entrance or plaster. The study was carried out in Kalisidi and Gunung Gentong, Mount Ungaran. Nest wall plaster samples were collected from nest cavities were used by hornbill but after they left from the nest. The nest tree species on Gunung Gentong was *Syzygium antisepticum* and *Syzigium glabratum* on Kalisidi. Materials analysis used proximate analysis and have been done on Chemistry Laboratory of Semarang State University. The result of proximate analysis showed that the material composition of nest wall entrance such as water, proteins. lipid, carbohydrate, and ash between Kalisidi and Gunung Gentong was different.

***Keywords*—**Mount Ungaran, nest wall entrance, proximate analysis, *Rhycticeros undulates*

I. Introduction

Hoornbill (Fam: Bucerotidae) are large tropical forest birds and as well as known they use unique nesting habits. Even though hornbills nest in cavities, usually in large trees, they cannot excavate their own nest ho They must use existing cavity in trees as nest sites [1]. Most hornbills sting holes occur in trees of the genus *Dipterocarpus* [2]. Hornbills are useful indicators of forest condition and human disturbance because they require large tracts of forest with large fruiting trees for feeding and nesting [3][4]. Also Wreathed Hornbill (*Rhyticeros undulatus*) that we can found on Mount Ungaran are large birds and they need large nesting cavities that exist naturally only in large trees genus Dipterocarp [5]. The previous study showed almost 31 species (12 families) of fruiting plants identified in the diet of Wreathed Hornbill in Mount Ungaran [6]. So, Hornbills can play a very important role in the forest ecosystem as seed dispersers [7]-[9]

Mount Ungaran is one of the Important Birds Areas (IBA) in Central Java Indonesia and has a potential a natural forest for Wreathed Hornbill habitat [10]. The breeding periode of Wreathed Hornbill in Mount Ungaran were reported to be on Agust-December. Hornbills nest in cavities, usually in large trees, they cannot excavate their own nest holes. Hornbill nest hole created capable excavators (e.g. woodpeckers and barbets), or natural cavities that form after branches breaks or after other injuries are inflicted upon forest tree [11]. When the breeding season, the female hornbill enters the nest and while sitting within the nest cavity she was prepared the cavity and plastering of the cavity entrance. The female keeps her bill sliding over the cavity entrance with the mud lump being smeared into layers of semi solid soil. Only a narrow opening hole for male will delivery feed for female and the chicks [12]. The nest wall plaster that the female build was look very strong, because when the female and chick emergence from the nest its take 3-4 hour to break the nest wall plaster [6]. There is no data or documentation yet about material composition such as chemistry or physicaly of the nest wall plaster of the Wreathed Hornbill on Mount Ungaran. So we are going to find out all about the nest wall entrace (plaster) data, especially of the Wreathed Hornbill on Mount Ungaran. The first step, we try to analyze the compotition of the net wall plaster using proximate analysis. The objective of the preliminary study of the research was the materials composition of the Wreathed Hornbill nest wall entrance using proximate analysis and compare between two site nest location.

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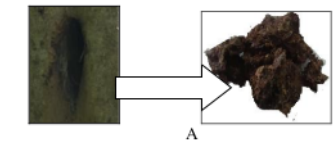
II. Method

The study was carried out in Mount Ungaran : Kalisidi $07^{0}09'18.04"$ S $110^{0}20'49.15"$E and Gunung Gentong $07^{0}09'26.8"$ S $110^{0}20'11.8"$ E (Fig 1). The materials and equipment needed for this research are GPS Garmyn e-trex 12 chanel, tallysheet, sample botle, label, climbing equipment, glove, and stationeries. Nest wall plaster samples were collected from nest cavities in Kalisidi and Gunung Gentong were used by hornbill but after they left from the nest (Fig 2). The proximate analysis have been done on Chemistry Laboratory Faculty of Mathematics and Science, Semarang State University. Proximate analysis procedure according to the certification procedures outlinee by SNI 01-2891-1992.

III. Result and Discussion

The result in proximate analysis nest wall plaster showed that the compotition of water, fat, protein, carbohidrate, and ash value between Kalisidi and Gunung Gentong quite different. The water, fat, and protein value was highes in nest

wall plaster Kalisidi, but carbohidrate and ash value was highes in nest wall plaster Gunung Gentong (Table 1).



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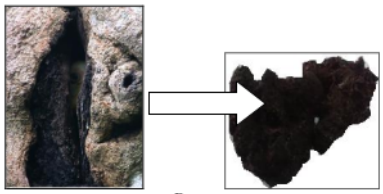

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Fig 2 The sample of nest wall entrance (A) Gunung Gentong, (B) Kalisidi

TABLE 1
PROXIMATE ANALYSIS OF THE NEST WALL PLASTER ON KALISIDI AND GUNUNG GENTONG

No	Proximate	Gunung Gentong	Kalisidi
1.	Water (%)	12,209	53,301
2.	Fat (%)	13,135	39,022
3.	Carbohidrate (%)	67,654	35,032
4.	Ash(%)	16,644	5,823
5.	Protein	2,584 mg/ml	20,123 mg/ml

Composition of macro molecule or chemical compound in the Wreathed Hornbills' soil-covered nest are indicate the mixture of soil and macromolecules aimed to improve soil-covered nest solidity. It is strongly possible related with Wreathed Hornbill behavior during breeding season duration. In those duration time Wreathed Hornbill will occupied traces nest or existing trees cavity and brooded the eggs and nursed, therefore they needstrong protection.

The source of soil is not clearly understanding, but from the physical analysis has shown the main composition of nest cover is wood decay. It is also the reason of high carbohydrate compound inside nest cover [13]. It was possible that Wreathed Hornbill collect soil or using wood decay from inside cavity and using some material to stick the decay together. The Wreathed Hornbill's nest that was found from Gunung Gentong and Kalisid has quite different component amount such as water contain, ash, carbohydrate, fat and protein.

Different amount of water indicate that nest cover at Gunung Gentong was built in different time and strongly possible latest than nest cover at Kalisidi. It was proved that water amount at Gunung Gentong are lowest, due to long duration and high evaporation causing the nest cover dried quickly. Nest elevation is also contribute due to high wind velocity and high sun bright intensity will influencing nest evaporation rate,

Carbohydrate and lipid also could be found in the component of nest cover and possibility correlated with nest solidity. Carbohydrate may play important roles as a coating layer which is covering soil surface and absorbing water molecules and bounding the soil aggregate [14]. It will compact the soil cover and increase the strength of the nest when it dries. Carbohydrates also play a role in stabilizing soil aggregates as an interaction between hydroxyl and carboxyl with soil particles [15]. Meanwhile, the fat compound is able restrain moisture and water. Hydrophobic profile of lipid, able to act as a repellent molecules that prevent water from entering the soil and avoid soiltilling process.

Proteins that are in the soil is likely to come from the results of the enzyme activities of microorganisms, fungi, plants and also contained in Wreathed Hornbill's saliva. Enzyme has an important role in maintaining the microhabitat conditions that exist in the nest and preventing the growth of harmful fungi and pathogenicmicrobacterial [16]. Enzyme also plays a role in reducing the potential for growth of plants seedlings that may carry over when soil taken.In addition, together with carbohydrate, protein will be transform to be glycoprotein that acts as a natural cement [15].

These results also related to surrounding habitat conditions, the availability and abundance of the Wreathed Hornbill food sources. Kalisidi have the highest protein value than Gunung Gentong, but the carbohidrate in the Gunung Gentong have the higher than Kalisidi. This may be an indication that Kalisidi is a good feeding environment and abundance of feed in the area, while Gunung Gentong was decreasing food supplay in the area. The nest on Kalisidi near water body (the river) which provide a good environment for insect to provide Wreathed Hornbill during the breeding season. The previous study showed that 28 species (12 families) of fruiting plants from nest and around the tree of nest have been identified in the diet of Wreathed Hornbill in Gunung Gentong [6]. While in Kalisidi only 3 species of fruting plants have been identified in the diet of Wreathed Hornbill [17]. The source of food in Kalisidi although lowest species of fruit than Gunung Gentong but the number of fruits in Kalisidi more abundant. While Mount Ungaran showed more limited food availability. Conditions on Mount Gentong showed that during on the breading season hornbill requires a number of more food and more protein, because the hornbill must survive so they eating fruit species that exist regardless of preference.

It is also possible that crude fibre consit of fibrous protein that not detected in the crude protein values, but they include in the crude fibre value. The digestibility of food is related to its chemical compotition. The fibre fraction of food has the greatest influence on its digestibility and both the amount and chemcial compotition of the fibers are important [18].

IV. Conclusion

Based on the result, it can be concluded that the water, fat, and protein value was highes in nest wall entrance Kalisidi, but carbohidrate and ash value was highes in nest wall entrance Gunung Gentong. These results also related to surrounding habitat conditions, the availability and abundance of the Wreathed Hornbill food sources in Mount Ungaran.

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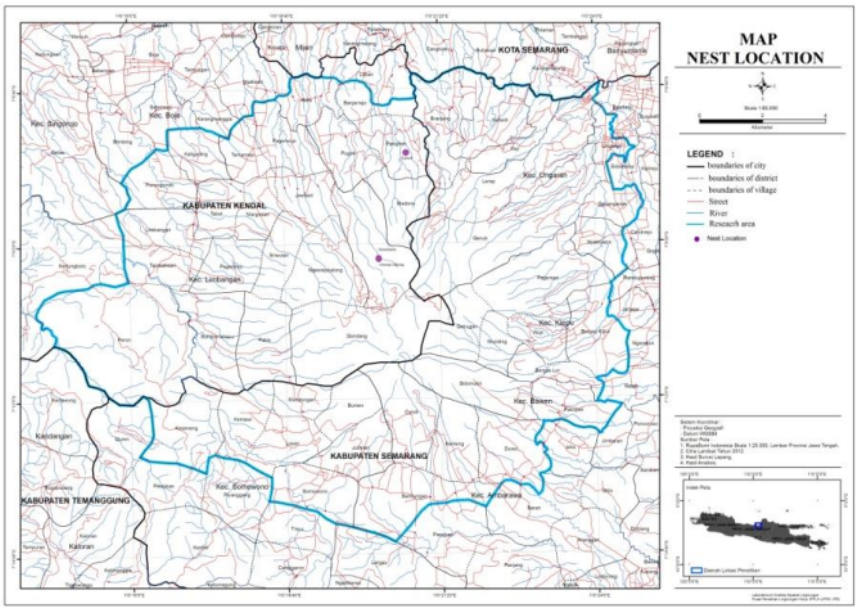

Figure 1. Nest location in Kalisidi and Gunung Gentong – Mount Ungaran Central Java

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