

Observations on Natural Foods and Nutrition Content of Critically Endangered Turtle (*Leucocephalon yuwonoi*) in Central Sulawesi

Pengamatan Sumber Pakan Alami Beserta Kandungan Gizinya dari Kura-Kura Berstatus Kritis, *Leucocephalon yuwonoi* di Sulawesi Tengah

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Abstrak

Kura-kura Sulawesi (*Leucocephalon yuwonoi*) adalah satu dari dua jenis kura-kura endemik Sulawesi dengan penyebaran yang terbatas. Sejauh ini data natural historinya sangat minim, padahal sangat dibutuhkan dalam upaya penangkaran satwa yang berstatus kritis IUCN ini. Penelitian ini bertujuan untuk mengungkap tentang pakan di alam beserta kandungan nutrisinya. Survei lapangan dilakukan di kawasan Bangkir dari tanggal 23 Mei sampai 5 Juni 2004 dan di Moutong dari tanggal 11 sampai 19 Oktober 2004. Data pakan di alam diperoleh dari analisis sampel feces dan hasil wawancara kepada para pemburu kura-kura beserta pengumpul. Kepastian nama jenis pakan diperoleh dengan melakukan identifikasi sampel tumbuhan pakan di Herbarium Bogoriense. Data kandungan nutrisi diperoleh melalui analisis proksimat sampel pakan yang terkoleksi selama survei. Hasil penelitian ini menunjukkan bahwa terdapat 32 jenis tumbuhan yang jadi sumber pakan di alam, variasi kandungan nutrisi yang cukup besar, kandungan lemak rendah berkisar antara 0.74 - 8.33% (2.41 ± 2.03) dari berat kering. Berdasarkan dominansi, keberadaan di habitat (*multiple season*) dan tingginya kandungan energi diduga kuat bahwa *Colocasia esculenta*, *Limnocharis flava* and *Ipomoea aquatica* merupakan pakan utama di alam.

Kata kunci: *Leucocephalon yuwonoi*, pakan, nutrisi

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Introduction

As of recently, there are approximately 300 living species of freshwater turtles and tortoises worldwide, of which 38 species occur in Indonesia (Iskandar, 2000); and exported a live to commercial overseas 18 of these are markets (Yuwono, 1998). There are three species of non-marine chelonian in Sulawesi: two endemic species, the Sulawesi tortoise (*Indotestudo forsteni*) and the Sulawesi forest turtle (*Leucocephalon yuwonoi*), and the widespread Malayan box tortoise (*Cuora amboniensis*), (de Rooij, 1915; McCord *et al.*, 1995). However, the turtles of Sulawesi have

received scant scientific attention and little is known about their distribution and life history. Such information is essential for planning effective conservation and resource management strategies (Das, 1997), especially in Sulawesi where remaining wildlife populations are threatened by commercial exploitation and habitat loss (Whitten *et al.*, 1987).

The Sulawesi Forest Turtle was described as *Geoemyda yuwonoi* (McCord *et al.*, 1995), and later assigned to the new genus *Leucocephalon* (McCord *et al.*, 2000). The species has featured in the pet trade and Southeast Asian food markets for a number of

years, but very few natural history sightings? have been reported, and because this species has restricted geographic range and ongoing exploitation exists, *Leucocephalon yuwonoi* was recently listed as Critically Endangered by the IUCN Red List of Threatened Species (Hilton-Taylor, 2000) and assigned to CITES Appendix II. It has been targeted as a priority species by the recently formed IUCN/SSC Turtle Survival Alliance, and a Taxon Management Group for the species has been established (Innis, 2003). One of the items needed to support a successful husbandry effort is knowledge about their natural food and nutrition content. So, the objectives of this research are to highlight natural food and nutrition content of the Sulawesi Forest Turtle (*Leucocephalon yuwonoi*).

Materials and Methods

The fieldwork was conducted in two habitat localities in Central Sulawesi; “Bangkir River” and “Palembang River” in Bangkir village, Dampal Selatan (Damsel) Subdistrict, Toli-Toli district (0°15'8.27"N; 120°39'4.07"E; elevation 15 – 75 m) from 23 May until 5 June 2004 and 21 until 26 October 2004; and “Ganonggol River” in desa (village) Karya Agung, Kecamatan (subdistrict) Moutong, Kabupaten (district) Parigi-Moutong (0°31'5.34"N; 121°02'6.93"E; elevation 25-100 m) from 11-19 October, 2004. Karya Agung is a part of the large transmigration project in Moutong, and the Ganonggol river is characterized by a rocky channel with abundant woody debris and drains an area of second growth forest. Habitat in Bangkir is modified like drainage, small marshes and streams in cacao or coconut plantation areas.

The natural food data was gathered by collecting and analyzing feces, and also by interviewing turtle hunters and the villagers. In cases the samples of plants used for food which could not be identified in the field were collected and then later identified that plants as natural food not identified at localities, it's made specimen feature and then done identified on Herbarium Bogoriense, Indonesia. The parts of plant which become natural food

were taken among 500 gram and then were dried by the sun. Herein after to know the nutrition content that includes ash, protein, fat, fiber and gross energy were obtained by proximate analysis following Harris method (1970).

Result and Discussion

With respect to the variety of natural food countered from both localities that as a whole the food availability on the nature of *Leucocephalon yuwonoi* shown only 37.5% is from wild plant (12:32). But when we separated food availability in both localities we found that in the Bangkir area is 30.77% from wild plant (8:26) and in the Karya Agung area is 61.11% from wild plant (11:18) (Table 1). This means that *Leucocephalon yuwonoi* have a wide variety of natural food. As long as this research done, the occurrence of the turtle more even on cultivation areas is more even in Bangkir than in Moutong locality. This is interesting phenomena that the turtle can exist in a cultivation area like in Bangkir. So, the questions are why they can exist and what happens? There are two explanations to answer those questions. The forest in Bangkir is relatively smaller and the rivers, which are connected to the forest and cultivation area, have closed bush riverbank. This condition made the turtle easily migrate to the cultivation area which providing more food. The other explanation, that the villagers in Bangkir are more established than in Moutong that transmigration area so they do not need other income by hunting the turtle. The villagers in Bangkir and buyer said that they have been stop hunting the turtle since 2003. But, this situation truly in endangered because if one times any requests the turtle very easy to capture because until now *Leucocephalon yuwonoi* not included in protected animal in Indonesia and also no exact information of their presence in conservation area like national parks.

Pursuant to eaten shares as a whole in both localities, shown that leaf is 9.38% (3:32); leaf and trunk is 6.25% (2:32); fruit is 78.12% (25:32); and eaten shares of leaf, trunk and

corm is 6.25% (2:32). *Ipomoea aquatica* and *Limnocharis flava* are consumed in leaf and trunk part. *Alocasia macrorrhiza* and *Colocasia esculenta* are consumed in leaf, trunk and corm part.

The availability of the fruits depends on season and awaits ruin when ripe; this matter caused the fruits to be eaten by turtles in ripe conditions. For this reason, the multiple season

presence of the *Ipomoea aquatica*, *Alocasia macrorrhiza*, *Limnocharis flava* and *Colocasia esculenta* in both areas are indicated them as main natural food. These is also supported by fact that most all of *Alocasia macrorrhiza* and *Colocasia esculenta* part like leaf, trunk and corm were consumed; and leaf and trunk of *Ipomoea aquatica* and *Limnocharis flava*.

Table 1. The natural foods of *Leucocephalon yuwonoi* on Bangkir (Dampal Selatan) and Moutong.

No	Species	Shares eaten				Plant Category		Locality	
		leaf	fruit	Trunk	corm	wild	cultivate	Moutong	Bangkir
1	<i>Alocasia macrorrhiza</i> Schoot	+	-	+	+	+	-	-	+
2	<i>Annona muricata</i>	-	+	-	-	-	+	-	+
3	<i>Artocarpus elasticus</i> Bl.	-	+	-	-	-	+	-	+
4	<i>Artocarpus integra</i>	-	+	-	-	-	+	+	+
5	<i>Averrhoa bilimbi</i> Linn	-	+	-	-	-	+	-	+
6	<i>Cayratia trifolia</i> (L) Domin	-	+	-	-	-	+	+	-
7	<i>Citrus maxima</i>	-	+	-	-	-	+	-	+
8	<i>Colocasia esculenta</i> Hook .f.	+	-	+	+	-	+	+	+
9	<i>Cucumis sativus</i>	-	+	-	-	-	+	-	+
10	<i>Cucurbita ficifolia</i>	-	+	-	-	-	+	-	+
11	<i>Desmodium heterocarpum</i> (L.) DC.	+	-	-	-	+	-	+	+
12	<i>Dillenia</i> sp.	-	+	-	-	+	-	+	-
13	<i>Diplazium esculentum</i> (Retz.)Sw	+	-	-	-	+	-	+	+
14	<i>Eugenia subglauca</i> K. & V.	+	-	-	-	+	-	+	+
15	<i>Ficus parientalis</i> Bl.	-	+	-	-	+	-	+	-
16	<i>Ficus septica</i> Burm.f.	-	+	-	-	+	-	+	+
17	<i>Ficus variegata</i>	-	+	-	-	+	-	+	-
18	<i>Horsfieldia</i> sp.	-	+	-	-	+	-	+	+
19	<i>Ipomoea aquatica</i>	+	-	+	-	-	+	-	+
20	<i>Limnocharis flava</i> (L.)Buchenau	+	-	+	-	+	-	+	+
21	<i>Litsea</i> sp.	-	+	-	-	+	-	+	-
22	<i>Mangifera indica</i> Blume	-	+	-	-	-	+	-	+
23	<i>Monochoria vaginalis</i>	-	+	-	-	-	+	-	+
24	<i>Musa acuminata</i> Colla	-	+	-	-	-	+	-	+
25	<i>Musa brachycarpa</i>	-	+	-	-	-	+	-	+
26	<i>Musa</i> (AAp Group)	-	+	-	-	-	+	-	+
27	<i>Nauclea</i> sp.	-	+	-	-	-	+	+	-
28	<i>Pometia pinnata</i> J.R.& G. Forst	-	+	-	-	+	-	+	+
29	<i>Psidium guajava</i> Linn	-	+	-	-	-	+	+	+
30	<i>Sandoricum koetjape</i> Burm.f	-	+	-	-	-	+	+	+
31	<i>Syzygium</i> sp.	-	+	-	-	-	+	+	+
32	<i>Zea mays</i>	-	+	-	-	-	+	-	+
		7	25	4	2	11	20	18	26

According to the Proximate analysis result to some natural food from Bangkir and Moutong areas shows that *Leucocephalon yuwonoi* has a large variety in nutrition content, e.q: dry materials among 81.26 – 95.46%; ash 2.18 - 49.51%; protein 1.92 - 31.60%; fiber

1.75 - 43.20%; fat 0.74 - 8.33%; and gross energy 1473-5247 Cal/g (Table 2). According the fat content, we strongly suggest that *Leucocephalon yuwonoi* needed fat in their food, as their in take level is very low (2.41+2.03) %.

Table 2. Nutrition content of some natural foods of *Leucocephalon yuwonoi* from Bangkir (Dampal Selatan) and Moutong, Central Sulawesi.

No	Natural Foods	Nutrition Content (%)					
		DM	Ash	P	F	Ft	GE (Cal/g)
1	<i>Artocarpus</i> sp. (fruit)	87.76	4.72	4.62	5.39	1.78	3650
2	<i>Cauratia trifolia</i> (fruit)	93.64	4.75	10.19	34.58	8.33	5247
3	<i>Colocasia esculenta</i> (trunk)	85.69	14.30	9.06	24.42	1.49	3568
4	<i>Colocasia esculenta</i> (leaf)	81.26	6.76	15.89	19.59	1.92	4226
5	<i>Colocasia esculenta</i> (corm)	84.04	2.18	4.40	8.06	2.18	4213
6	<i>Desmodium heterocarpum</i> (leaf)	93.52	6.04	13.92	27.75	1.76	3889
7	<i>Diplazium esculentum</i> (leaf)	89.67	10.65	31.60	10.27	1.13	4303
8	<i>Ficus variegata</i> (fruit)	94.61	9.17	8.05	33.77	7.07	4060
9	<i>Syzygium</i> sp.	90.51	4.94	6.64	41.94	1.10	3414
10	<i>Citrus maxima</i>	83.89	4.27	5.95	6.91	1.62	3387
11	<i>Ipomoea aquatica</i> (leaf)	90.90	11.03	12.46	26.35	0.74	3480
12	<i>Cucurbita ficifolia</i>	92.49	7.40	9.60	30.59	1.19	3516
13	<i>Limnocharis flava</i> (trunk)	95.46	15.77	1.92	23.83	3.57	3800
14	<i>Limnocharis flava</i> (leaf)	82.11	7.66	17.12	20.82	1.99	3142
15	<i>Litsea</i> sp. (fruit)	86.10	7.11	6.07	27.02	2.71	4187
16	<i>Diplazium esculentum</i> (leaf)	94.54	49.51	11.20	14.08	1.46	1473
17	<i>Mangifera indica</i> (fruit)	91.66	3.88	5.25	8.64	1.20	3636
18	<i>Musa brachycarpa</i> (fruit)	91.78	7.01	7.97	34.28	1.18	3432
19	<i>Musa</i> (AAp group) (fruit)	93.92	2.22	3.70	1.75	1.29	3611
20	<i>Psidium guajava</i> (fruit)	93.88	2.27	4.68	43.20	4.56	3166

Remarks: DM = dry materials; P = Protein; F = Fiber; Ft = Fat; and GE = Gross Energy.

The highest energy provided by fruit of *Cauratia trifolia*, then followed by leaf of *Diplazium esculentum*, leaf of *Colocasia esculenta*, corn of *Colocasia esculenta*, fruit of *Litsea* sp. and fruit of *Ficus variegata*. *Cauratia trifolia* seldom is found at the habitat while *Diplazium esculentum* met many riparian.

As long as observation, in the areas especially in Bangkir most turtle found were predominantly *Colocasia esculenta*, *Limnocharis flava* and *Ipomoea aquatica*. Based on the nutrition content of these plants they have highest gross energy. These facts strongly suggested that *Colocasia esculenta*, *Limnocharis flava* and *Ipomoea aquatica* were the main natural food.

Conclusion

The *Leucocephalon yuwonoi* has large variety in their natural food nutrition content with very low fat among 0.74 - 8.33% (2.41±2.03) their dry material. Based on the multiple season presence, highest gross energy content and predominant in the place of turtle

found, *Colocasia esculenta*, *Limnocharis flava* and *Ipomoea aquatica* are main natural food.

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