

## **CHEMICAL COMPOSITION AND ENERGETIC VALUE OF SOME EDIBLE PRODUCTS PROVIDED BY HUNTING OR GATHERING IN THE OPEN FOREST (MIOMBO)\***

**Composition chimique et valeur énergétique de quelques aliments provenant de la chasse et de la cueillette dans la forêt claire (miombo)**

**F. MALAISSE\*\* & G. PARENT\*\*\***

### *RESUME*

*La composition chimique et la valeur énergétique de quelques aliments d'origine animale, assez mal connues jusqu'à présent, sont précisées.*

### *ABSTRACT*

*As they are less known or until now unrecorded, the chemical composition and the energetic value of some wild animal foods of the miombo are reviewed.*

### INTRODUCTION

Synthesis regarding the ecology of the Zambezian woodlands of miombo type have been successively produced by MALAISSE (1978), CELANDER (1983), GAUSLAA (1989), CHIDUMAYO (1993) and FROST (1996).

According to the authors, miombo has been considered as savanna, woodland or open forest; nevertheless miombo is always regarded as a wooded ecosystem, submitted to well-marked seasonal rainfall, mostly occurring on poor soils and frequently fired.

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\* Note 65 of the "Contributions à l'étude de l'écosystème forêt claire (Miombo)".

\*\* Laboratoire d'Ecologie, Faculté universitaire des Sciences agronomiques, passage des Déportés, 2, B 5030, Gembloux (Belgique).

\*\*\* Square des Latins, 45, B 1050, Bruxelles (Belgique).

The non-woody forest products of miombo have received more interest in recent times, namely with the book "The Miombo in Transition : Woodlands and Welfare in Africa" edited by CAMPBELL (1996).

Wild edible products of the miombo area have been the subject of both, a lot of preliminary comments including short lists of item, as well as of some more elaborated reviews.

Belonging to the first step, we should namely noticed the papers and studies of WHITE (1959), LAMBRECHTS & BERNIER (1961), SCHMITZ (1967), HEYMANS & EVRARD (1970).

More recently, an interdisciplinary approach, mainly focussed on ecological and nutritional point of view, has been conducted in the Zambezi woodland area. Published data belong to mushrooms (PARENT & THOEN, 1977), plants (MALAISSE & PARENT, 1985), honey (PARENT *et al.*, 1978), large mammals (MALAISSE & PARENT, 1986), rodents (MALAISSE & PARENT, 1982) and caterpillars (MALAISSE & PARENT, 1980).

These studies present a global view; nevertheless some minor edible products exist which are lesser known and until now unrecorded. The aim of the present paper is to fill this gap. We will successively discuss such items as reptiles, insects, fishes and other animals.

## REPTILES

The meats of three snakes species are regarded as delicacies by most inhabitants of the Zambezi area. These snakes are :

- the African python or *Python sebae*, which is Africa's largest snake. He grows to about 5-6 m, is non-venomous, killing prey by constriction.;
- the Gaboon viper, *Bitis gabonica*, a massive and stout adder that grows to maximum of 180 cm. He is beautifully coloured in geometric patterns of rich purple and brown making a perfect camouflage in leaf litter (SIMBOTWE & MUBAMBA 1993);
- the puff adder, *Bitis arietans*, which present a general yellow coloration, dorsum yellow-brown with a series of backwardly-directed black pale-edged chevrons.

An other reptile of interest is the Nile Crocodile. He is related to aquatic environments. His meat is highly estimated and looks like that of the conger.

Monitors are poorly requested in Zambezi region in contrast with West Africa, whilst the meat of several Testudines is highly appreciated.

The Nile monitor, *Varanus niloticus*, is the largest African lezard. He grows up to 200 cm, is common wherever there is permanent water in the Zambebian region. He is locally appreciated for its meat which recalls a little bit that of chicken. The savanna monitor, *Varanus exanthematicus*, is an alert and agile lezard on land. Its meat is lesser appreciated. Land tortoises are represented by two subspecies of the Bell's hinged tortoise, *Kinixys belliana*. They are active during the rain season and easely caught. They are often offered to sale along the main roads of Katanga. They enter in the preparation of a meat stock. Two terrapins are also, from time to time, eaten. They inhabit perennial rivers and permanent water holes; they look less common as the Bell's hinged tortoise.

Table I presents original data of composition and nutritive value regarding 9 items dealing with six species of reptiles.

Tab. I - Composition and energetic values of reptiles' meat from Upper Shaba.

Species		Water g	Proteins g	Fats g	Ash g	Ca mg	P mg	Fe mg	Energetic value	
									kJ	kcal
<i>Kinixys belliana</i> subsp. <i>spekii</i>	B	61.6	72.7	8.0	4.8	110	815	280	1,604	383
	E	48.9	67.0	24.3	8.4	300	1,050	10	2,114	505
<i>Pelusios subniger</i>	B	62.5	51.2	33.5	13.0	-	-	-	2,181	521
<i>Crocodylus niloticus</i>	A	77.3	70.3	25.0	5.4	120	80	-	2,198	525
<i>Varanus niloticus</i>	A	79.0	66.9	4.9	5.0	320	800	20	1,382	330
	D	59.0	65.0	4.4	5.5	450	700	10	1,327	317
<i>Bitis gabonica</i>	B	-	82.8	4.3	5.5	2,000	800	15	1,641	392
	C	40.3	79.3	1.6	4.6	2,000	700	10	1,478	353
<i>Python sebae</i>	A	75.3	84.4	5.2	4.5	-	-	-	1,704	407

A = fresh muscle, B = fresh meat, C = dry meat, D = tanned muscle, E = yolk after boiling.

## INSECTS

Beside caterpillars, which occupy a top position in native diet (MALAISSE & PARENT, 1980), various other insects are from time to time eaten. In decreasing order of importance we have quoted the consumption of termites (adults and soldiers), grasshoppers, beetles, crickets, larvae of cicads, dragonflies, etc.

Wood in decomposition host several larvae of various beetles. Some species, both at larval and imaginal stages, are regarded as delicacies. In the same way, two coleoptera are linked to palms (Arecaceae) and their larvae are swarming sometime found in local markets. Termites, mainly of *Macrotermes falciger*, are collected in large amount, mainly at the beginning of the rainy season during their.

Table II provides original values regarding insects.

Tab. II - Composition and energetic value of diverse insects of Upper Shaba.

Species	Water g	Proteins g	Fats g	Fi- bres g	Ash g	K mg	Ca mg	P mg	Mg mg	Fe mg	<u>Energetic value</u> kj kcal	
<b>ISOPTERA</b>												
<i>Macrotermes falciger</i> (imago)	46.4	41.8	43.5		4.4	100	400		35	-	2,357	563
<i>Macrotermes falciger</i> (soldier)	71.0	7.0	84.0		7.0	300	380		250	-	1,767	422
<b>ANISOPTERA</b>												
<i>Trithemis arteriosa</i>	90.6	23.0	15.0	-	2.3		-	-	-	-	979	234
<b>ORTHOPTERA</b>												
<i>Acanthacris ruficornis</i>	61.8	69.5	9.9	-	6.4		250	570		20	1,573	376
<i>Anacridium burri</i>	26.0	19.3	15.4	-	3.1		-	-	-	-	925	221
<i>Ornithacris magnifica</i>	61.3	69.4	17.5	-	4.1		170	500		15	1,900	454
<i>Homoxyrhopes punctipennis</i>	40.0	22.0	11.3	-	1.2		-	-	-	-	820	196
<i>Phymateus viridipes</i>	48.6	22.1	24.9	-	3.7		-	-	-	-	1,335	319
<i>Ruspolia differens</i> (green)	40.0	20.9	66.0	-	2.8		170	320		40	2,866	685
<i>Ruspolia differens</i> (brown)	38.0	21.7	68.8	-	3.5		350	300		40	2,983	713
<b>HEMIPTERA</b>												
<i>Lethocerus cordofanus</i>	72.3	66.9	16.8	-	5.6		-	-	-	-	1,828	437
<b>HOMOPTERA</b>												
<i>Ioba</i> sp.	62.5	23.0	15.0	-	2.3		-	-	-	-	979	234
<b>COLOPTERA</b>												
<i>Zographus aulicus</i> (grub)	61.0	25.2	41.3	-	16.7		9,200	300		40	2,008	480
<i>Zographus aulicus</i> (imago)	66.4	72.6	4.6	-	6.5		60	290		90	2,983	713
<i>Rhynchophorus phoenicis</i>	77.4	42.6	20.2	-	12.4		320	70		-	1,523	364
<b>HYMENOPTERA</b>												
<i>Apis mellifica adamsonii</i> (grub)	76.1	35.0	28.7	-	3.7		130	650		5	1,707	408

## FISHES

Fishes are an important constituent of diet in the miombo area, even if it remains below the intake by the fishing populations related to the large African lakes. Fish diversity of Shaba is about 309 species related to 80 genera and 24

families.

Information on composition and energetic values of local fishes are scarce.

Table III sums up some preliminary results.

Tab III - Composition and energetic value of diverse fishes of Upper Katanga.

Species	Water	Proteins	Fats	Ash	Ca	P	Fe	Energetic value	
	g	g	g	g	mg	mg	mg	kj	kcal
<i>Clarias gariepinus</i>	75.2	63.5	26.0	7.8	1,750	1,400	20	2,119	506
<i>Labeo annectens</i>	75.7	70.4	21.2	7.5	400	1,800	70	2,060	492
<i>Labeo lineatus</i>	78.1	86.9	5.6	7.5	-	-	-	-	-
<i>Labeo niloticus</i>	78.1	91.5	2.1	6.3	-	-	-	-	-
<i>Labeo weeksii</i>	79.7	91.5	1.2	7.3	-	-	-	-	-
<i>Lupeshie</i>	75.0	71.1	20.1	5.1	225	-	5	2,031	485
<i>Malapterus electricus</i>	79.7	89.4	4.2	6.4	-	-	-	-	-
<i>Mormyrops deliciosus</i>	79.1	94.0	0.5	5.6	-	-	-	-	-
<i>Tilapia rendalli</i>	77.9	79.2	17.9	2.9	750	960	5	2,093	500
<i>Tylochromis lateralis</i>	73.3	91.6	1.6	6.8	-	-	-	-	-

#### OTHERS ANIMALS

Beside all the until here reviewed some minor animal products remain. The present chapter deals with those species. They include giant African snails, fresh water mussels and oysters, as well as crabs and shrimps.

Table IV listed some preliminary results regarding their composition.

TAB. IV - Composition and energetic value of some animals from Upper Shaba.

Species	Water	Proteins	Fats	Ash	Ca	P	Fe	Energetic value	
	g	g	g	g	mg	mg	mg	kj	kcal
<b>CRUSTACEA</b>									
<i>Potamonauts bayonianus</i>	76	57.0	28.9	10.1	2,600	1,250	58	504	2,110
<i>Caridina africana</i>	81	60.0	15.0	20.1	6,800	800	75	396	1,658
<b>MOLLUSCS</b>									
<i>Achatina sp</i>	77	59.9	6.4	6.9	1,980	1,100	100	314	1,315
<i>Aspatharia wahlbergi</i>	75	2.7	5.7	22.3	6,700	4,500	70	63	264

## DISCUSSION

Even if their consumption takes only from time to time, the minor edible products listed in the present paper are of some interest. They enlarge the diversity of wild edible products and provide energy during several of the year. The collecting activities related to their obtaining indicate, once more, the strong ecological knowledge of the miombo inhabitants. Information regarding their composition and energetic value are presented mostly for the first time.

## REFERENCES

- CELANDER, N., 1983. Miombo woodlands in Africa - distribution, ecology and patterns of land use. *Working Paper 16, Swedish University of Agricultural Sciences, International Rural Development Centre, Uppsala.*
- CHIDUMAYO, E.N., 1993a. Responses of miombo to harvesting : ecology and management. *Stockholm Environment Institute, Stockholm.*
- CHIDUMAYO, E.N., 1993b. Zambian charcoal production : miombo woodland recovery. *Energy Policy 12*, 586-597.
- GAUSLAA, Y., 1989. Management and regeneration of tropical woodlands with special references to Tanzanian conditions. A literature review. *Lidia 2*, 37-112.
- HEYMANS, J.C. & EVRARD, A., 1970. Contribution à l'étude de la composition alimentaire des insectes comestibles de la Province du Katanga. *Problèmes Sociaux Congolais (Bull. Trimest. C.E.P.S.I.)* 90-91, 333-340.
- LAMBRECHTS, A. & BERNIER, G. 1961. *Enquête alimentaire et agricole dans les populations rurales du Haut-Katanga (1957-1958)*. Elisabethville (Congo), Centre d'Etude des Problèmes Sociaux Indigènes. Mémoire, 11, 236 p.
- MALAISSÉ, F., 1978a. The miombo ecosystem. In: *Tropical forest ecosystems, a state-of-Knowledge report prepared by UNESCO/UNEP/FAO*. Paris : Unesco. Natural Resources Research 16, pp.589-606.
- MALAISSÉ, F., 1978b. High termitaria. In: WERGER M.J.A. (ed.) *Biogeography and ecology of Southern Africa*. The Hague (The Netherlands) : W. Junk. Monographiae Biologicae 31, pp. 1279-1300.
- MALAISSÉ, F. & PARENT, G., 1980. Les chenilles comestibles du Shaba méridional (Zaire). *Les naturalistes belges*. 61, 2-24.
- MALAISSÉ, F. & PARENT, G., 1982. Rodents of the miombo woodland area: a

- nutritional and ecological approach. *Ecol. Food Nutr.* 11, 211-216.
- MALAISSSE, F. & PARENT, G., 1985. Edible wild vegetable products in the Zambezi woodland area : a nutritional and ecological approach. *Ecol. Food Nutr.* 18, 43-82.
- MALAISSSE, F. & PARENT, G., 1986. Mammals of the Zambezi woodland area : a nutritional and ecological approach. *Geo-Eco-Trop*, 10, 91-103.
- PARENT, G. & THOEN, D., 1977. Food value of edible mushrooms from Upper-Shaba Region. *Econ. Bot.* 31, 436-445.
- PIENAAR, U. de V., 1966. The reptile fauna of the Kruger National Park. *Koedoe, monograph*. 1, 223 p.
- SCHMITZ, A., 1962. Les Muhulu du Haut-Katanga méridional. *Bull. Jard. Bot. Bruxelles*, 32, 221-299.
- SIMBOTWE, M.P.M. & MUBAMBA, R., 1993. A Guide to reptiles, amphibians and fishes of Zambia. *Wildlife Conservation Society of Zambia*, Lusaka, 89 p.
- WHITE, C., 1959. A preliminary survey of Luvale rural economy. *Rhodes-Livingstone Pap.* 29, 1-58.

