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Research Article

Physical Features and Nutritional Value of the Traditional Picking Vegetable, *Cuervea isangiensis* (De Wild.) N. Hallé in Congo-Brazzaville

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Abstract: *Nsinga kuata* or *Mbumba kua* in local language is a vegetable. It pushes to the wild state. Outside its knowledge on the geographical distribution, one does not arrange the scientific information. The data of this study showed that the name of this vegetable is *Cuervea isangiensis* (De Wild.) N. Hallé. the physical features are: Length 15.32±0.22 cm; width 5.67±0.17 cm. The nutritional values of the vegetable-leaves are: Protein (9.59±0.41 g/100 g), lipids (4.00±0.06 g/100 g), total carbohydrate (25.75±0.42 g/100 g), caloric contribution (177.36 Kcal or 741.36 Kj/100 g). In conclusion, this vegetable is rich in protein, lipid and in total carbohydrate. Prepared alone or added to some sauces or with peanut dough, it constitutes a good food against the Caloric Protein Malnutrition (MPC).

Keywords: Caloric value, *Cuervea isangiensis* (De wild.) N. Hallé, nutritional value, physical features, vegetable-picking

INTRODUCTION

The vegetables of picking or so-called the traditional vegetables make part of the African species (Okigbo, 1977; Almekinders and De Boef, 2000). On estimates about 1025 cultivated or wild species (PROSEA, 1993; PROTA, 2004). Among the species of the forests of the central Africa is Cuervea *isangiensis* (De Wild.) N. Hallé. According to Wilczek (1960), *Cuervea isangiensis* (De Wild.) N. Hallé pushes precisely in the forests of Congo, Gabon, Cameroon, Central Republic, Angola and the Democratic Republic of Congo (RDC). It would currently interest more 13,068,161 habitants. The leaves of *Cuervea isangiensis* «*Nsinga Kuata* or *Mbumba Kua* " have been consumed a lot by many families in Congo during the armed conflicts of 1997-1999. Its leaves like the other vegetables-leaves are consumed with the basis starchy (Chweya and Eyzaguirre, 1999). While, it does not exist now the little strong information on these vegetable -leaves and in general the exact descriptinses make defect (Tchiengang and Kitikil, 2004). It is important to establish the exact determination of the species (Stevels, 1990).

The objective of this study is to promote this picking vegetable, *Cuervea isangiensis* (De Wild.) N. Hallé by its biologic knowledge (physical features of leaves, comestible parts), nutritional value (determination of proteins, lipids, total carbohydrate) and its Caloric contribution in the goal to lead a struggle against the Caloric Protein Malnutrition (MPC) with the available food.

MATERIALS AND METHODS

This study has been led to the laboratory of CERVE (Center of Plant Research and Ecology) of the General Direction of Research Scientific and Technical DGRST for the period of October 5, 2011 to December 20, 2011 for the determination of the species and the physical features. The nutritional values have been determined to the Institute of Research and Development (IRD, formerly O.R.S.T.O.M, French Organism of Research in Science and Technique of Overseas) to Jan 4, 2012 to Jan 12, 2012.

Plant material: The leaves of «*Nsinga Kuata*» (national language) have been harvested in two

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different localities; in the secondary forest to the village Makana (30 km to the south of Brazzaville, Capital of Congo) and in the primary forest of the village Mati (130 km to the north of Brazzaville). The *Gnetum africanum* vegetable-leaves, much consumed in Congo (Makosso-Vheiye *et al*., 2008) was early bought to the total market of Bacongo in the morning from the forest of INONI Cliff, to 150 km of Brazzaville.

Methods:

Determination of the species and physical features: The samples of *Nsinga nkuata* harvested in the Makana forest and those of *Mati* forest have been brought to the laboratory of CERVE (Center of Plant Research and Ecology) which arrange a national herbarium for the determination of the species and the physical features.

Dosage of proteins, lipids and total carbohydrate: Determination for *Cuervea isangiensis* (De wild.) N. Hallé Makana, *Cuervea isangiensis* (De wild.) N. Hallé Mati and *Gnetum africanum* seeds for crude protein (micro-kjeldahl) and oil (soxhlet) content were determined using the methods described by Pearson (1976), whereas the ashes content were determined using the method of Pomeranz and Meloan (1994) and total carbohydrate was determined by difference. All determinations were done in triplicate.

Oil extraction: Dried *Cuervea isangiensis* (De Wid.) N. Hallé and *Gnetum africanum* seeds were ground in a Moulinex Model Thermemix VORWERK 3300. For solvent extraction (soxhlet method, UIPAC, 1979), 50 g of grounds seeds were placed into a cellulose paper cone and extracted using hexane in 50 mL soxhlet extractor for 8 h (Pena *et al*., 1992). The oil was then recovered by evaporating of the solvent using rotary Model RE evaporator 100 series 2439 (BIBBY STERILIN STONE STAFFORDSUIRE, Made in U.K.) and residual solvent was removed by drying in an oven at 70°C for 1 h and flushing with 99.9% nitrogen. All experiments were done in triplicates and the mean and standard deviation were calculated.

Determination of the caloric value: The caloric value correspondent has been calculated with the specific coefficient conversion of Atwater for the protein, lipids and total carbohydrate (Dorosz, 2000).

Statistical analysis: Value represented is the means and standard deviations for three replicates. Statistical analysis was carried out by Excel version 8.0 Software. Significance was defined at ($p<0.05$).

RESULTS AND DISCUSSION

Scientific classification of the picking vegetable: *Nsinga nkuata* or *Mbumba nkua* (in local language) is a vegetable. It is in the branching of the angiosperms, class of Euditos, the order of celestraleses and the family of celastraceae. Its kind is Cuervea having like species *isangiensis* (De Wild.) N. Hallé. It carries various names in Congo: *Nsinga kuata* or *Mbumba kua* (in lari), *Ma vassa ma eucalyptus* (in teké, ntsangui) (Table 1). The vegetables of Africa and Asia concern about 1025 species cultivated or wild (PROSEA, 1993). On the 275 most important species of the tropical Africa, 207 species are consumed for their leaves and more of the 31 species known are used to other ends (PROTA, 2004).

Table 1: Scientific classification of the picking vegetable

Description	
Kingdom	Plantae
(Unranked)	Angiosperms
(Unranked)	Eudicots
(Unranked)	Rosids
Order	Celastrales
Family	Clastraceae
Kind	*Cuervea*
Species	*Isangiensis* (De Wild) N. Hallé
Heterotypic synonyms:	Hipprocratea molunduina leos.ex harms
Vernacular names	*Nsinga nkuata* (Lari); *mavassa ma eucalyptus* (Téké, Ntsangui)

Table 2: Physical features of the small leaves of *Cuervea isangiensis* (De Wild) N. Hallé according the gathering place

Physical features	Secondary forest (Makana sample) M±S.D.	Primary forest (Mati sample) M±S.D.	Significativity
length (cm)	08.2±0.87	06.62±0.48	$p<0.01$
Width (cm)	02.25±0.47	03.12±0.30	$p<0.01$
Leafstalk (cm)	01.09±0.86	00.47±0.12	$p<0.05$
Number of ribs	7.00±0.86	10.00±0.00	$p<0.001$

cm: centimeter; M±S.D.: mean±standard deviation of triplication determinations

Physical features of *Cuervea isangiensis* leaves (De Wild.) N. Hallé: Results of the Table 2 show the different measurements leaves according to the gathering place picking: for samples from the secondary forest (Makana), length is : 8.2±0.87 cm; width 2.25±0.47 cm; number of ribs is 7±0.86; features of samples come from the primary forest of Mati are: length 6.62±0.48 cm, width 3.12±0.30 cm and the number of ribs 10±0.00; we have noted a meaningful difference $p <0,01$: leaves of the Makana sample (secondary forest) are longer than those of Mati (primary forest); they are less large ($p<0.01$) and contain less ribs. The values of leafstalk vary between 1.09±0.86 cm (forest secondary, Makana) to 0.47±0.12 cm (primary forest, Mati) for the small leaves category and for the big leaves of 1.03±0.12 cm (Makana) to 0.97±0.14 cm (Mati), (Table 3). The National Institute for the Agronomic Survey (1960) had gotten the following values on the physical features of *Cuervea isangiensis* (De Wild.) N. Hallé: leafstalk 1, 0-2, 0 cm; the length leaf was 4-16 cm and the width 2-9 cm. These values correspond to our own obtained values in this study. We noticed that for the same species, the number of ribs varies between the secondary forest and the primary forest (Table 2 and 3).

Table 3: Physical features of the large leaves of *Cuervea isangiensis* (De Wild) N. Hallé according the gathering place

Physical features	Secondary forest (Makana sample) M±S.D.	Primary forest (Mati sample) M±S.D.	Significativity
length (cm)	15.32±0.22	14.50±1.54	p<0.05
Width (cm)	05.67±0.17	06.20±0.24	p<0.01
Leafstalk (cm)	01.03±0.12	0.97±0.14	p<0.05
Number of ribs	08.75±0.93	09.50±0.86	p<0.05

M±S.D.: means±standard deviation of triplication determinations

Table 4: Comparison of *Cuervea isangiensis* (De Wild) N. Hallé features to those of *Gnetum africanum* (usually consumed)

Physical features	*Cuervea isangiensis* M±S.D.	*Gnetum africanum* M±S.D.	Significativity
length (cm)	15.32±0.22	12.92±0.22	p<0.001
Width (cm)	05.67±0.17	06.27±0.49	p<0.05
Leafstalk (cm)	01.03±0.12	01.25±0.29	p<0.05
Number of ribs	08.75±0.93	10.50±0.86	p<0.01

M±S.D.: means±standard of triplication determinations

Table 5: Nutritional and caloric values of *Cuervea isangiensis* (De Wild) N. Hallé (100 g of dry matter)

Characteristic	Obtained values (100 g of dry matter)
Water content (%)	61.22
Protein (g)	09.59±0.41[a]
Lipid (g)	04.00±0.06[a]
Total carbohydrate (g)	25.75±0.42[a]
Caloric value (Kcal)	177,36

a: M±S.D. means standard deviation of triplication determinations

Table 6: Comparison of nutritional and caloric values of two vegetable-leaves: *Cuervea isangiensis* (De Wild) N. Hallé and *Gnetum africanum*

Characteristic	*Cuervea isangiensis*	*Gnetum africanum*	Significativity
Water content (%)	61.22	62.30	p<0.05
Protein (g)	09.59±0.41[a]	04.86±0.16[a]	p<0.001
Lipid (g)	04.00±0.06[a]	02.45±0.15[a]	p<0.001
Total carbohydrate (g)	25.75±0.42[a]	23.80±0.20[a]	p<0.001
Caloric values (Kcal)	177.36	136.69	

a: M±S.D. means±standard deviation of triplication determinations

Comparison of features physical *Cuervea isangiensis* (De Wild.) N. Hallé to those of *Gnetum africanum*: The *Gnetum africanum* is a vegetable-leaf much consumed in Congo-Brazzaville (Makosso-Vheiye *et al.*, 2008). It is the family of Gnetaccae answered in the tropical regions of Asia, of South America (Mialoundama and Paulet, 1986). Results of the Table 4 show that the leaves of *Cuervea isangiensis* (De Wild.) N. Hallé are longer (15.32±0.22 cm) that those of *Gnetum africanum* (12.92±0.94 cm) but they are less large (5.67±0.17 cm) for *Cuervea isangiensis* (De Wild.) N. Hallé against (6.27±0.49 cm) for the *Gnetum africanum* (p<0.05); however the length of the leafstalk between the two species presents no difference: for the *Cuervea isangiensis* (De Wild) N. Hallé ,the value is 1.03±0.12 cm and 1.25±0.29 cm for the *Gnetum africanum* (p>0.05). According to Bettencourt and Konopka (1990), many traditionally species of vegetables leaves are again under exploited. The International plant Genetic Resources Institute (IGRI) tents to protect this diversity in Africa through the promotion of the use of these species. It is why the maintenance of the traditional kitchen represents an economic means but also a strategic and ecological mean (Future Harvest, 2001).

Nutritional and caloric values of *Cuervea isangiensis* (De Wild.) N. Hallé: The Table 5 shows that the vegetable *Cuervea isangiensis* (De wild.) N. Hallé leaves contain: Proteins 9.59±0.41 g for 100 g of dry matter; lipid: 4.00±0.06 g for 100 g of dry matter; total carbohydrate: 25.75±0.42 g for 100 g of dry matter and these nutriments (protein, lipids and total carbohydrate) provide 177.36 kcal (741, 36 kj). Proteins intervene to the growth and the renewal of proteins of the organism. They are especially indispensable to the children at the low age, to the pregnant and nursing women (Tirilly and Bourgeois, 1999). The proteins plants have the tendency to lower blood cholesterol tam in the organism and to improve the lipo-protein balance (Lewis, 1979). Lipids play an essential role in the cellular membrane constitution (Grubben, 1975), however total carbohydrate constitutes the good caloric sources (Davidson and Passmore, 1972).

The Table 6 indicates that the nutritional and caloric values of the vegetables-leaves of *Cuervea isangiensis* (De Wild.) N. Hallé constitutes the duplicate of the values of the *Gnetum africanum* leaves.

The nutritional value of a vegetable varies according to the species or the cultivar. The Table 7 shows that leaves of *Cuervea isangiensis* (De Wild.) N. Hallé are rich in proteins (9.59 g for 100 g of dry matter) that the known species and fluently consumed like: *Moringa oleifera* (6.8 g for 100 g of dry matter), *Manihot esculenta* (7.0 g for 100 g of dry matter);

Table 7: Nutritional and caloric values of the usually consumed vegetable-leaves and those of *Cuervea isangiensis* (De Wild) N. Hallé (100 g dry matter)

Scientific names	Name	Proteins (g)	Lipids (g)	Carbohydrates (g)	Caloric value (Kcal)
Amarenth spp[c]	Amarenth	4.6	0.2	8.3	42
Manihot esculenta[c]	Cassava	7.0	1.0	4.0	71.7
Phaseolus vulgaris[c]	Bean	2.5	0.5	7.9	36
Basella alla[c]	Vinespinach	1.8	0.3	3.7	20
Solanum nigrum[c]	Nightshade, black	4.3	0.8	5.7	38
Moringa oleifera[c]	Moringa	6.8	8.0	40	300
Cichorium endiva[c]	Endive	1.5	0.2	4.3	21
Cuervea isangiensis[c]	Nsinga nkuata	9.59	4.00	25.75	177.36

a: Our own values; b: Broin M. Propage. http://www.moringaens.org (August 20, 2012); c: FAO table of the used food of Africa

Amarenth spp (4.6 g for 100 g of dry matter) and *Cichorium endiva* (1.5 g for 100 g of dry matter).

The vegetables-leaves can have many necessary minerals to the good working of the organism (Dansi *et al*., 2008). The leaves of *Cuervea isangiensis* (De Wild.) N. Hallé is rich in Potassium K, Phosphor P, Magnesium Mg and in iron, (Mbemba *et al*., 2012). The leaves of *Cuervea isangiensis* (De Wild.) N. Hallé is often prepared with the plant oils (palm oil, peanut oil) and sometimes with the association of the peanut dough. These preparations increase the disposition of nutriments (McLaren and Frigg, 2002; Brown *et al*., 2004).

CONCLUSION

The *Cuervea isangiensis* (De Wild) N. Hallé leaves compared to the *Gnetum africanum* leaves because much consumed are longer but less large; the number of ribs is lower to the one of *Gnetum africanum.* The leaves of *Cuervea isangiensis* (De Wild.) N. Hallé is rich in proteins, lipids and total carbohydrate. They constitute a good food for the struggle against the Caloric Protein Malnutrition (M.P.C) when they are prepared alone or added to certain sauces.

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