Bioavailability of iron, zinc and calcium in local foods resources traditionally used as ingredients in complementary foods for children aged 4-24 months

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Introduction

Micronutrient deficiency is one of the major nutritional problem in many countries. In Benin iron and zinc deficiencies are of public health importance while Ca is very important for children bones growth. Iron rich foods from plant origin are the most accessible to local population. However, bioavailability of iron and zinc from plant origin is very limited since they contains antinutritional factors such as IP6. In the present work, molar ratios are used to predict the bioavailability of iron, zinc and calcium in selected plants foods.

Objective

This study aimed at predicting the bioavailability of iron, zinc and calcium in local foods resources that are traditionnaly used to feed children aged 4 -24 months in Benin.

Material and method

A literature review combined with laboratory analyses of selected plant foods allowed identifiying local foods for their mineral and IP6 contents. Descriptive statistics was applied to laboratory data and the molar ratios (IP6/Fe, IP6/Zn, IP6/Ca) were used to predict their bioavailability in local food resources. Ascending hierarchical classification allowed grouping local food resources according to their minerals contents and their molar ratios. A nutritional map was also realised to show per agro-ecological zone the best resources in terms of predicted bioavailability of iron.

Results

The different grouping of Local foods resources, mean values of the three major mineral (iron, zinc, calcium) and their molar ratios [IP6]/ [Zn], [IP6]/ [Fe], [IP6]/ [Ca] are recapitulated in table 1. Figure 1 shows the availability of local foods resources rich in iron in each of eight agro-ecological areas of Benin.

Table 1 : Molar ratios of local foods resources

grouping variables	Cluster 1		Cluster 2		Favorite threshold
	Moy*	ET*	Moy	ET*	
Calcium	1892,80	760,85	506,53	418,08	
Iron	**151,24**	**157,13**	**51,31**	**64,65**	
Zinc	4,29	1,43	3,30	2,52	
[IP6]/ [Zn]	0,37	0,41	0,81	1,11	5 - 15
[IP6]/ [Fe]	**0,01**	**0,01**	**0,15**	**0,21**	**≤ 1**
[IP6]/ [Ca]	0,001	0,003	0,005	0,005	< 0,24

Grouping variables	Cluster 3		Cluster 4		Favorite threshold
	Moy	ET	Moy	ET	
Calcium	106,00	113,14	2580,00	-	
Iron	**33,50**	**32,67**	**207,60**	**-**	
Zinc	2,00	0,14	28,00	-	
[IP6]/ [Zn]	4,45	1,45	0,039	-	5 - 15
[IP6]/ [Fe]	**0,56**	**0,62**	**0,005**	**-**	**≤ 1**
[IP6]/ [Ca]	0,17	0,16	1.73.10 -18	-	< 0,24

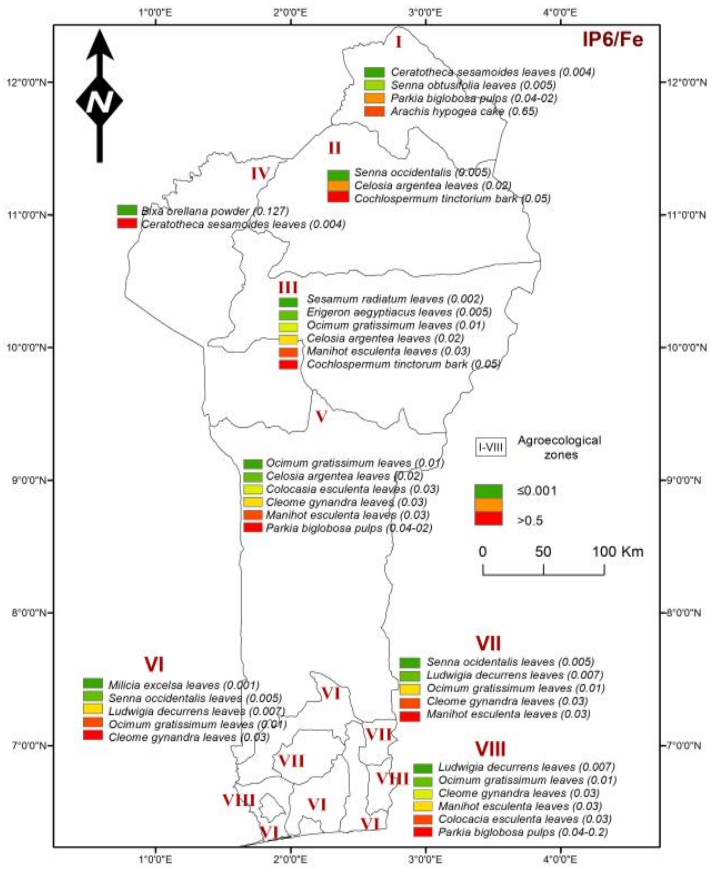

Figure 1 : Nutritional map of local foods resources with molar ratio (IP6/Fe) per agro-ecological zone

Legend:
Cluster 1: *Celosia* sp. leaves, *Launea taraxacifolia* leaves, *Ceratotheca sesamoides* leaves, *Sesamum radiatum* leaves, « *Fakoure* » leaves, *Ocimum gratissimum* leaves, *Ludwigia perennis* leaves, *Senna obtusifolia* leaves, *Cleome gynandra* leaves, Red Koata bark
Cluster 2: *Parkia biglobosa* fruit, *Vitex doniana* fruit, *Colocasia esculenta* leaves, *Manihot esculenta* leaves, *Milicia excelsa* leaves, *Senna occidentalis* leaves, *Solanum macrocarpon* leaves, Sorghum bicolor leaves, Champignon, *Blighia sapida* Arill, *Solanum* sp. leaves, *Cochlospermum tinctorium* bark, Yellow Koata bark, *Detarium microcarpum* fruit.
Cluster 3: *Bixa orellana* seeds, *Bixa orellana* spicy powder
Cluster 4: *Erigeron flloribundum* leaves

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