The Potential of Underutilized Species to prevent Micronutrient Deficiencies in Northern Ghana

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Introduction

Food and nutrition security remains an issue and while some crops supply a significant amount of calories worldwide, other so-called neglected and underutilized species (NUS) are not considered for commercial agriculture despite that many have nutritional benefits. In Ghana, anemia and vitamin A deficiency are prevalent among women and children.

Aims of the study

To assess the nutritional status of selected NUS and their availability, and accessibility, in relation to their potential to increase food and nutrition security in northern Ghana.

Identify underutilized species that contain micronutrients that are lacking in the diets of Ghanaians.

Two specific examples are contrasted – one which is introduced - orange fleshed sweet potato (OFSP) (*Ipomoea batatas*) and – one that is indigenous – African Locust Bean (ALB) (*Parkia biglobosa).*

Conclusions

The analysis revealed that the availability of NUS is a key factor for farmer's uptake and therefore using the potential that the species offers. To increase the availability of certain crops, production diversification needs to be increased. Nutritionally valuable species should be made substantially and sustainably available year-round.

***Parkia biglobosa* is a traditional plant that is ingrained into the Dagomba culture, however, it is not sufficiently available anymore. *Ipomoea batatas L.* on the other hand is not sufficiently available yet. Farmers are willing and eager to plant vines, but the low availability of vines is reported by several groups.**

Data on NUS is generally scarce and NUS in Ghana should be put more in the center of attention regarding their nutritional potential. Awareness for dying seedlings of *Parkia biglobosa* but also of *Adansonia digitate,* both food sources during the dry season, is needed to prompt action to help these species survive.

Conclusively, not one approach to increase the availability and accessibility of NUS will fix micronutrient deficiencies sustainably but a combination of many.

Results

1) Identification and Characterization of NUS

Iron, Vitamin A, Folate, and Zinc
32 different species in 22 different plant families have been analyzed of their Iron, Vitamin A, Folate, and Zinc contents with the help of publically available databases (e.g. INFOODS). OFSP and ALB are contrasted here and percentages of the recommended daily intake (RDI) over 30 % are highlighed in bold.

Name	Iron	Vitamin A	Zinc	Folate
Ipomoea batatas	3,74 % of RDI	**79,44 % of RDI**	7,86 % of RDI	-
Parkia biglobosa (Seeds)	**31,63 % of RDI**	-	**77,55 % of RDI**	-
Parkia biglobosa (Fruits)	**47,62 % of RDI**	1,59 % of RDI	**105,1 % of RDI**	**95 % of RDI**

2) Accessibility and Availability of *Parkia biglobosa* in Kpachi

Parkia bigblobosa or known in Ghana as dawadawa is a perennial deciduous multi-purpose tree of the Fabaceae family that grows normally up to between 7 and 20 meters high. Dawadawa, or kpalago in Dagbani, is a high-protein product of the tree. It consists of the strong-smelling fermented seeds of the tree in little cake or ball-form used to flavor food or make tea. It is an important ingredient for the complimentary soup to meals and traditionally a female practice and responsibility (Padmanabhan 2007). Three different ways to access the seeds were identified: The local market, the own community, and through the own harvest. The majority of farmers reported a reduction of trees in their fields. The reasons for the decrease can be summarized in six different categories, 1) Aging tree populations, 2) Agricultural changes with increases mechanization and pesticide use, 3) Over-use as a firewood resource, 4) Usufruct rights between traditional chiefs, male land owners and women who should be granted access to the trees according to Dagomba cultural values, 5) Challenge in caring for saplings into maturity, 6) Reduced water availability influences the yield of seed pods among existing trees.

Access Points	Availability: Reason for Decrease	
Market *"I buy the dawadawa seeds. So we have been buying it in the market."* **Chief 3**	**Natural** *"So why are the dawadawa trees dying? (…) Their old trees."* **Female Farmer 5**	**Usufruct Rights** *"(…) The owners of the land are those that own the land, so they are supposed to do what is required of them to benefit from it. (…) So when you find a dawadawa tree on your land, you find ways to kill it so that they do not disturb you."* **Female Farmer 6**
Community *"So that time when you were getting the ten bowls, what were you doing with the seeds? I gave two bowls to my wife and two bowls to my other wife and one bowl to my neighbor's wife."* **Chief 1**	**Agricultural** *"(…) I think it is the weedicides too that are destroying the trees."* **Male Farmer 6**	**Difficult Care** *"The way the dawadawa tree is, it is challenging to plant. I won't lie; when you plant it, and it grows, is very tiresome. Why will you be tired? Until it becomes a big tree, you can't leave it alone."* **Chief 1**
Own Harvest *"I heard that there are some households that after others have gone to harvest, they also go to get small of it, and do you do that in your household? Yes, we do."* **Female Farmer 7**	**Humans** *"It used to fruit a lot. I think that it's the constant cutting is the reason it has died."* **Female Farmer 1**	**Water Access (Reason for low yield)** *"And we do not know the reason why they no longer fruit? Water. (…) (…) it was the dawadawa trees closer to the river/dam that was always yielding. Those days every branch will fruit a lot but now you not find such a tree. Now when it fruits, you can only see two to tree fruit."* **Chief 1**

3) Uptake, Accessibility, and Availability of *Ipomoea batatas L.*

Uptake, Accessibility, and Availability of *Ipomoea batatas L.*
Out of the 27 groups, 5 mentioned that they farm OFSP and 8 groups stated that they farm the local white sweet potato. USAID's Resiliency in Northern Ghana (RING) project was the primary access point to the idea of growing OFSP. The constraints to growing OFSP was lacking vines, skills, or rain. OFSP was primarily for home-use.

Example extracts of the group meetings:

Lack of Vines	Lack of Skills	Lack of Rain
"Do they cultivate sweet potatoes? Some of them. They hardly get the vines."	*"(…) the point is they don't have the skills yet because they haven't been trained on how to do it and cultivate it (…)."*	*"When we planted it, it didn't do, it didn't get enough rain."*

Source: Group Activity of selected NUS with the women's group Suhuyini in Sankpala, Central Gonja District, south of Tamale. Photo Credit: Lelea, 2018

Study Location

Source: Report 6.1 CHARACTERISTICS OF WOMEN'S GROUPS IN GHANA AND NIGERIA (2020)

NUS of the Study

Source: African Locust Bean and processed dawadawa (left) and OFSP (right), Wikipedia

Methods of Data Collection

Semi-structured interviews (n=19):
August 2020
8 female farmers
7 male farmers
4 chiefs

Group discussions (n=21):
June 2018
27 womens' groups
13 Communities
523 women participants

Analysis of the transcripts with the program MAXQDA

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