Diversification and tackling malnutrition in cocoa communities in Cameroon through traditional African vegetable home gardening

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1. Introduction

Cocoa (*Theobroma cacao*) remains the main cash crop to more than 75 percent of the rural population in Cameroon (Ngoe et al., 2016). Yet, most cocoa smallholders live below the poverty line (Ngoe, 2018). Cocoa farmers in Cameroon do not earn sufficient income to meet their household needs and to, ensure their food and nutrition security since they mainly rely on staple crops that lack essential micronutrients to attain a balanced diet. They are left to suffer, which endangers the cocoa sector and their livelihood (AFTA, 2005).

FAO (2012) reported that agricultural growth alone will not necessarily result in better nutrition and call for "nutrition-sensitive" agriculture. Thus, diversifying cocoa producers' production with Traditional African Vegetables (TAV) could contribute to tackling the problem through diet and income diversification. In order to diversify cocoa producers' activities with vegetable, cocoa farmers need to be well trained to produce high-quality vegetable for their nutrition and to meet market demand. Then, training in good agricultural practices to produce safe vegetables is requisite.

This paper aims at demonstrating the importance of diversifying diet and income of cocoa producers with vegetables and also the need for more research and policies focused on bringing food and nutritional security into the value chain of cocoa.

2. Materials and Methods

A rapid assessment study was conducted in March 2019 among 150 Cameroon cocoa producers from four targeted cocoa communities of Barry Callebaut (BC), one of the world's largest chocolate manufacturers, to ascertain the current status of TAV production and utilization. The interviews was conducted with computer-assisted personal interviewing (CAPI) technology using AkvoFlow software.

Four demonstration plots, 1000m^2 each, were established in 4 cocoa farmers communities; 24 varieties of 7 crops including 2 African eggplant (*Solanum aethiopicum*), 6 African nightshade (*Solanum scabrum*), 2 Amaranth (*Amaranthus cruentus*), 4 Jute mallow (*Corchorus olitorius*), 4 Tomato (*Solanum lycopersicum*), 2 Habanero pepper (*Capsicum chinensis*), 2 Chili pepper (*Capsicum frutescens*), 2 Okra (*Abelmoschus caillei*) were showcased at each of the demonstration plot. The target cocoa communities were sensitized and trained on good agricultural practices for vegetable production. A field day was organized for participatory varieties selection at each demonstration plot.

An in-depth individual hands-on training covering the whole vegetable production process was conducted from February to September 2019 for each of the 50 cocoa farmers who subscribe to BC's funded individual training program. Each of these farmers received seed kits of 4 different crops/varieties and established a home garden of at least 50 m^2.

3. Results

The majority of cocoa farmers do not practice vegetable farming. Those who cultivated vegetable integrate them into cocoa farms or cultivate in association with other food crops with associated risk of contamination by pesticides.

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Cocoa farmers apprehend their communities' health status as critical, with the prevalence of non-communicable disease as a relatively common occurrence.

Out of the 24 varieties displayed, farmers selected 16 [African Nightshade (4), Jute mallow (2), Amaranth (1), African eggplant (1), Okra (2) Habanero pepper (2), chili pepper (1), tomato (3)].

Approximately 2.5 t of TAV (table 1) was produced within the demonstration plots (4000 m^2) in one season and distributed to beneficiary farmers.

The cocoa farmers trained produced roughly 2.2 t of TAV (table 2) within their homes gardens.

Majority of the farmers preferred to consume their produce rather than to sell as earlier anticipated (table 2), they appreciated the taste and shelf-life of the produce.

Table 1: Summary of harvesting at demonstration plots

Crops	Area planted (m^2)	Yield (kg) in each target cocoa community				Total (kg)
		Biakoa	Bandounga	Ntui	Tonga	
African eggplant	30	89.27	3.24	147.62	1.3	241.43
African nightshade	90	**454**	**181**	**420**	**308**	**1,36**
Amaranth	30	**100.86**	**15.88**	**135.50**	**22.82**	**275.06**
Jute mallow	60	**322.58**	**170.46**	**62.53**	**65.33**	**620.89**
Okra	30	27	16.34	29.63	18.87	91.84
Chili pepper	30	36.78	6.22	29.7	33.62	106.32
Habanero pepper	30	18.96	4.44	20.4	44.68	884.8
Tomato	60	243.18	0	88.62	36.52	368.32
Total	360	1292.89	397.31	933.77	531.45	3155.42

Table 2: Summary of harvesting in the homes gardens

Crops	Total	Quantity consumed (kg)	Quantity sale (kg)
African eggplant	337.4	177.3	160.1
African nightshade	**1491.82**	**1210.72**	**281.1**
Amaranth	301.22	275.22	26
Jute mallow	72.18	72.18	0
Okra	35.94	35.94	0
Pepper	82.1	26.5	55.6
Tomato	128.86	128.86	0
Total	**2449.52**	**1926.72**	**522.8**

5. Conclusion and future plan

Most beneficiary cocoa farmers were not used to vegetable cultivation. Farmer's knowledge improved in production, nutritional importance of vegetables and the need for increased consumption.

Training seems to have positively affected cocoa farmers livelihood looking at the quality and quantity of vegetables they are able to produce which are enough to feed their household and to take some to the market for some monetary advantages .

Strategies and enabling policies aimed at promoting vegetable diversification can contribute to tackling malnutrition in cocoa communities and enhance the sustainability of the cocoa sector.

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