

## RESEARCH ARTICLE

# Availability, consumer acceptance and safety of some dried traditional vegetables in Tamale, Ghana

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## ABSTRACT

In Ghana especially Tamale, vegetables are part of many dishes prepared with indigenous or traditional vegetables such as pepper, okra, bra, tomatoes and jute mallow. These traditional vegetables include pepper, okro, roselle, tomato and jute mallow are cultivated both on small scale for home consumption and on commercial basis for the local market and on large scale for export in the fresh form. It is also undisputed fact that vegetables are often not growth all year round since most agricultural productions are rain-fed. Drying of vegetables is one way vegetables are preserved as it removes enough moisture which inhibits the growth of microorganisms such as bacteria, yeast and fungi by ensuring food safety and security. This study sought to determine the availability, access and safety of dried indigenous vegetables on the market. Data was collected using questionnaire for the socioeconomic data, proximate and microbiological analysis was carried out using the official standards and recommendations of the Association of Official Analytical Chemists. Results indicate access of dried traditional vegetables on the market with different consumer preferences. Proximate compositions and varying microbial loads for the different vegetables were also established. Vegetables need to be sanitised adequately and drying methods improved to ensure the elimination of microbial loads on dried vegetables for food safety and security.

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## INTRODUCTION

Vegetables are usually consumed in relatively small quantities as a side dish with staple foods. Consumption of vegetables supply considerable quantities of vitamin A, B, C, D, E and K to the human body. It has been established that vegetables contribute significantly to the daily dietary requirements of calcium and iron among children mostly 2 - 5 years (Faber et al., 2007). A meta-analysis of 2006 human epidemiological studies and 22 animal studies by Steinmetz and Potter (1996), showed a consistent protective effect against gut cancer from the consumption of vegetables. Dark green vegetables have been suggested to be a significant source of vitamin A in Africa (Faber et al., 2007).

In Ghana especially Tamale, vegetables are part of many dishes prepared with traditional vegetables such as pepper, okra, bra, tomatoes and jute mallow. These traditional vegetables, pepper, okro, roselle, tomato and jute mallow are cultivated both on small scale for home consumption and on commercial basis for the local market and on large scale for export in the fresh form (MoFA, 2007). Vegetables are perishable and this usually happens when in abundance often leading to glut. Drying of vegetables is one way vegetables are preserved as it removes enough moisture which inhibits the growth of bacteria. According to Harison and

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Andress (2000), drying removes moisture from food so that yeast, bacteria and fungi cannot grow and spoil the food. Successful drying depends on heat, air dryness and air circulation. It is by far the simplest and cheapest method of preserving vegetables. Examples of vegetables that can be preserved through drying are green pepper, tomatoes, mushrooms (Harison and Andress, 2000). Dried vegetables are rich in micro nutrients needed by humans for good health, growth and development. A study by Abbey et al. (2006) indicated that the nutrient contents of some African dried vegetables are superior to some exotic types. Cultivation of more vegetables that can be dried instead of exotic vegetables means a better adaptation to the ecosystem and reduction in the need for pesticides application. Maintenance of the complex of indigenous vegetables means in-situ conservations of rich diversity of genotypes of importance for future generations (Chadha, 2003).

Considerable evidence suggests that productions of dried vegetables are largely unorganized and inefficient. Also, most of the vegetables are poorly hydrated and not stored very well. Despite the great value of dried vegetable, not much research has been carried on dried vegetables especially the area of marketing and nutrition. Inadequate information on dried vegetable species is causing gradual neglect of some of the useful ones such as okro, roselle, pepper and jute mallow that have been used for food over the years (Hassan et al., 2007). The aim of this research was to determine the availability, access and safety of dried traditional vegetables on the market in the Tamale metropolis.

## MATERIALS AND METHODS

### Availability, access and consumer preference

There was a limited range of dried vegetables on the market except for pepper, okro, roselle and jute mallow which has traditional been in existence. Dried tomato was limited to less than 20% of traders of vegetables while dried jute mallow was used solely processed and used at homes and not commercialised. Majority of processors and marketers (56%) of dried vegetables were obtained from their own farms, 42% was obtained from wholesalers and 2% from other sources. Affordability and availability of the vegetables are the reason why consumers buy dried vegetables. Percentage of consumers' patronage for dried vegetables was as follows pepper (50%), tomatoes (10%), roselle (10%), jute mallow (15%) and okro (15%).

These vegetables are patronised when the fresh vegetables are scarce and expensive. Most of the available vegetables are dried using open solar radiation which is subject to loss and contamination due to unhygienic practices. The mode of packaging and storage of these dried vegetables could also serve as potential sources of contamination as dried vegetables are often kept in open and "second hand" containers which are often unhygienic and unkept.

### Proximate composition of dried vegetables

All sampled vegetables had appreciable levels of fat, protein, fibre and a higher percentage of carbohydrate to supplement the nutrient requirement of consumers. All dried vegetables had safe and low moisture content for further storage.

**Table 1: Proximate composition of sampled vegetables**

Sample	Moisture (%)	Ash (%)	Fat (%)	Fibre (%)	Protein (%)	Carbohydrate (%)
Okro	6.75	7.6	1.33	6.5	16.45	61.73
Tomato	10.25	9.65	2.16	10.25	18.73	48.96
Pepper	9.52	12.5	6.4	17.75	11.86	41.97
Jute mallow	5.25	6.2	1.8	4.5	22.55	58.7
Roselle	6.5	7.3	1.2	3.8	11.99	71

### Microbiological quality of dried vegetables

Conventional production of these products implicates a number of hygienic problems so vegetables may be exposed to a wide range of microbial contamination during pre and post-harvest handling and can be presented in microbial counts. The results indicate a contamination of microorganisms classified as faecal and total coliforms, and total heterotrophic counts showing poor microbiological quality (Table 2). Processors must work at producing and supplying microbiology free dried vegetables to protect consumer safety and wellbeing as most dried vegetables are a delicacy.

**Table 2: Microbiological status of sampled dried vegetables**

Sample	Faecal Coliform (CFU/ml)	Total Coliform (CFU/ml)	Total Heterotrophic (CFU/ml)
Tomato	$1.2 \times 10^8$	$9.8 \times 10^8$	$2.6 \times 10^8$
Okro	$1.0 \times 10^6$	$1.1 \times 10^9$	$4.2 \times 10^7$
Roselle	-	$1.4 \times 10^8$	$6.9 \times 10^8$
Pepper	$1.1 \times 10^5$	$1.5 \times 10^6$	$6.1 \times 10^7$
Jute mallow	$9.2 \times 10^7$	$2.5 \times 10^8$	$1.1 \times 10^7$

### CONCLUSION

Dried indigenous vegetables (pepper, roselle, jute mallow, okro and jute mallow) are most available at the markets and is often patronised by consumers while dried tomato is seldom available at the market in large quantities nor retailed by many traders despite the market demand. The preference of dried vegetables is not solely based on the scarcity of fresh vegetables as some consumers have a preference for dried vegetables (okro, pepper and roselle) even when fresh vegetables are abundant. Open sun drying is a cheap way of preserving vegetables but needs improvement to reduce the microbial effects on the vegetables. Final packaging is equally important in ensuring the safety of vegetables. It's equally important to set standards for the regulation and duration of dried products on the market for consumer safety.

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### REFERENCES

- AOAC (Association of Official Analytical Chemistry) 2005. Official Methods of Analysis, 14th Edition, Association of Official Analytical Chemists, Washington DC. Arlington, Virginia, USA, pp.1137–1139
- Abbey L., Bonsu K.O., Glover-Amengor M. and Ahenkora K. 2006. Evaluation of some common leafy vegetables used in Ghana. Crop Research Institute, Kumasi. Ghana Journal of Horticulture. Volume 5 Pp 23.
- Chadha, M. L. 2003. AVRDC's experiences within Marketing of Indigenous Vegetables – A Case Study on Commercialization of African Eggplant AVRDC-Regional Center for Africa. Duluti, Arusha, Tanzania.

- Faber, M., Van J. P. and Laubscher, R. 2007. The contribution of dark-green leafy vegetables to total micronutrient intake of two-to five-year-old children in a rural setting. *Water SA*; 33 (3): 407-412.
- Harrison, J. A. and Andress E. L. 2000. *Preserving food: Drying Fruits and Vegetables*. University of Georgia cooperative Service. Pp.2.
- Hassan S.W., Umar R.A., Maishanu H.M., Matazu I.K., Faruk, U.Z. and Sani, A.A. 2007. The Effects of Drying Method on the Nutrients and Non-Nutrients Composition of Leaves of *Gynandropsis gynandra* (Capparaceae). *Asian Journal of Biochemistry* 2 (5): 349-353.
- MoFA (Ministry of Food and Agriculture) 2007. *Food and agriculture sector development policy (FASDEP II)*. Accra.
- Steinmetz, K.A and Potter, J.D 1996. Vegetables, fruit, and cancer prevention: A review. *J. Am. Diet. Assoc.* 1996; 96 (10): 1027-1039.