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PERCEPTIONS AND ATTITUDES TOWARDS THE USE OF INDIGENOUS GREEN LEAFY VEGETABLES (IGLV) IN THE PREPARATION OF CHAMBERDISHES IN GANYE L.G.A

DASHU E., SARATU C. VANKE, HAULAT B. ALIYU, ANGELINA E. & SYMPATHY F. ERIC
Department of Home and Rural Economic, Adamawa State College of Agriculture, P.M.B 2088, Ganye Adamawa State - Nigeria.

Abstract

The study assessed the uses of Indigenous Green Leafy Vegetables (IGLV's) in the preparation of Chamber dishes. The objectives were to highlight health benefits of IGLV's, and determine their acceptability. A self-developed questionnaire was administered to 40 randomly selected individuals to assess their perceptions towards IGLV's in food preparation. Fifteen individuals (10 males and 5 females) were selected to sensory evaluate 10 recipes developed from 4 selected (IGLV's) to ascertain their overall acceptability. Panelists' scores were subjected to ANOVA and Turkey's test at $\alpha \leq 0.05$. Results: Out of 10 (IGLV's) identified by participants, only 4 were often used. Among the 4, Maringawas the most used and Amaranth was the least used. Recipes prepared with vegetables included stews, soups, salads and drinks and the soups were the most accepted by panel members who tasted. For overall acceptability, Pumpkin leafsoup was judged the best followed by Amaranth the least. Flavor of the products differed significantly at $\alpha \leq 0.05$ Indigenous Green Leafy Vegetables (IGLV's) could augment exotic vegetables in Chamber dishes if new tasty recipes are developed from hygienic vegetables and accepted by consumers.

Keywords: Perceptions, Attitudes, Indigenous Leafy Vegetables, Dishes and Ganye L.G.A

INTRODUCTION

Vegetables are highly beneficial for maintaining health and preventing diseases. Dark green leafy vegetables provide high amounts of micro-minerals which play vital roles in nutrient metabolism and retard degenerative diseases Chu YF *et al.,* (2002). In Nigeria, both wild and cultivated green leafy vegetables are used in food preparation. However, more people tend to patronize cultivated exotic vegetables which are often more expensive than indigenous ones that are cultivated or grown in the wild. In a study Obel-Lawson E (2005), non-appreciation of African traditional vegetables and urbanization were identified as some leading factors that contribute to peoples' preference for exotic vegetables as against indigenous ones Shei L. *et al.,* (2008). Reports show that vegetables are a vital constituent of West African diet especially traditional vegetable species but inadequate documented scientific information on indigenous African vegetable species is a major factor that influences people to choose exotic vegetables over indigenous ones. An earlier study Abbey L. *et al., (*2006), reported that the nutrient contents of some local African vegetables are superior to some exotic types. Thus promoting consumption of indigenous green leafy vegetables among Nigerians is a key to improving the health of many. Hunger and malnutrition have been reported Obel-Lawson E (2005), to threaten millions of people in Sub-Saharan Africa, and an increased consumption of African leafy vegetables (ALVs) can have a positive effect on nutrition, health and economic wellbeing of both rural and urban populations. Apart from promoting good health when indigenous green leafy vegetables are consumed, increased consumption of African indigenous vegetables will help to enhance crop diversity, alleviate poverty and promote food security Barry IN ***et al.,***(2008) . Despite the great value of these traditional leafy vegetables, not much research has been carried out on them especially in the area of nutrition specifically product or recipe development. To help promote the use of the many other indigenous green leafy vegetables which are under exploited and underutilized, it is important to develop recipes using these vegetables which will be accepted and used by others.

Despite the commitment made at the International Conference on Nutrition (ICN) in 1992 and at the World Food Summit in 1996 to eliminate or drastically reduce micronutrient malnutrition, unacceptably high rates of micronutrient malnutrition still persist. Hunger and malnutrition threaten millions of people in sub-Saharan Africa and it is estimated that in many countries in this region approximately 20% or more of the inhabitants experience food insecurity. Indigenous leafy vegetables are important sources of micronutrients including vitamins A and C, iron and other nutrients Van Jaarsveld, P., *et al*

(2014). These vegetables constitute a valuable intellectual and natural resource that needs to be preserved and that is crucial from a national and cultural point of view. Therefore, research on these crops should have high priority. First and foremost, it is necessary to understand what is happening at grassroots level, so as to establish which species are utilized.

COLLECTION OF MATERIALS

Moringa olifera, Cucurbeta pepo, Vernonia amygdalin and Amaranthus Chlorostachys were obtained from communities around Ganye. Equipment such as gas cooker, pots, plates, weighing scales, measuring cylinder, stirrer and sieve were obtained in food laboratory Home And rural economics department Adamawa State college of Agriculture Ganye.

RESEARCH METHODOLOGY

The survey was conducted using a questionnaire to collect data on perceptions and attitudes to indigenous leafy vegetables, and their diversity. Information on the demographics of the participants, known types of indigenous green leafy vegetables, dishes prepared out of these vegetables, uses and sources of these vegetables, and problems associated with their utilization among others. The communities were selected purposively. Households were then randomly selected for the face-to-face interviews. Ganye is the metropolitan area and Gurum, is a remote rural area. The household was the unit of analysis for the survey study.

Four indigenous green leafy vegetables (IGLV's): *Moringa olifera, Cucurbeta pepo, Vernonia amygdalin and Amaranthus Chlorostachys*were selected out of ten (10) by survey participants as the most common IGLV's known and eaten. These IGLV's were obtained from surrounding communities and were used in developing recipes. Ten (10) recipes were developed in total and presented to a panel for sensory evaluation.

DATA ANALYSIS

Data obtained from the survey were presented in frequencies and that obtained from the sensory evaluation were subjected to analysis of variance (ANOVA) to determine any significant differences. Turkey's test was subsequently used to identify specific differences between individual products which were significantly different from the ANOVA at (P= .05).

RESULTS AND DISCUSSION

Although beans leaves were selected by survey participants as the most common indigenous green leafy vegetable known, the leaves were not used much in cooking or were not eaten much by participants. Rather the 4 vegetables selected **(Table1**) by the

participants as the most eaten were *Moringa olifera*(Black plum), *Cucurbeta pepo (*Pumpkin leaf*), Vernonia amygdalin*(Bitter leaves) *and Amaranthus Chlorostachys*(Spinach). Participants mentioned that they patronized these 4 vegetables because they could be bought from markets, grown in home gardens as well as easily obtained. Common names and local names for these vegetables were obtained from both literatures.

Table 1: The most common indigenous green leafy vegetables eaten by participants.

Common name	Scientific name	Local name (Nigerian)
Black plum	*Moringa olifera*	Zogale, Akukwa uchakiri
Pumpkin leaf	*Cucurbeta pepo*	Ganyen kabewa, Aku Ugbogiri and Efo sokoyoto
Bitter leaves	*Vernonia amygdalina*	Shiwaka, Onugbu Olugbu and Ewuro
Spinach,	*Amaranthus Chlorostachys*	Aleho, Griin: Inine ocha and Tete

USES OF INDIGENOUS GREEN LEAFY VEGETABLES

Participants mentioned that they used the vegetables in different ways. These included the preparation of stews, soups, salads and drinks/ beverages **(Table 2).** Majority of the participants (42.5%) used the vegetables to prepare stews and very few (about 5%) used them to prepare drinks/beverages. Based on this information, equal amounts of the 4 selected vegetables were used in developing similar recipes and presented to 15 panel members to taste and score according to certain sensory attributes.

Table 2: Uses of Indigenous green leafy vegetables

Product	Frequency N=40	Percentage (%)
Stews	17.0	42.5
Soups	13.0	32.5
Salads	7.0	17.5
Drinks/Beverages	1.0	2.5
Total	40.0	100.0

Results are based on responses obtained from 40 participants used for the survey

SENSORY ANALYSIS

Sensory evaluation scores were obtained from 15 panel members for the two sessions and subjected to analysis of variance (ANOVA) and Tukey's test to determine any significant difference at 5% significance level. The mean scores for quality and overall acceptability as produced from ANOVA results for both the male and female panelists for the first session of the sensory evaluation are presented in (Table 3) and that for

the second session in Table 4. Generally, all the samples obtained high mean scores for all the qualities considered in the sensory analysis.

Table 3 Sensory analysis results

Products	Flavor	Color	Texture	Taste	Appearance	Overall Acceptability
A	4.0^{a}	4.1^{a}	3.5	4.4^{a}	4.2^{a}	4.0
B	3.9^{b}	3.8^{ab}	4.1	4.1^{b}	3.8^{ab}	3.9
C	3.7^{c}	4.0^{a}	3.4	4.1^{c}	4.1^{a}	4.0
D	4.1^{d}	3.9^{ab}	4.1	4.4^{d}	4.1^{a}	4.1
F	3.8^{f}	3.0^{b}	3.5	4.4^{f}	3.1^{b}	3.5

$\alpha \leq 0.05$ values are means of 15 scores from 10 males and 5 females' panelist on each characteristic. Means with similar letter (s) in the same column or row are not significantly different at 5% significance level

Only distinct differences between samples and similarities among samples in **Table 3** and **4** have been highlighted. From **Table 3**, mean scores across columns showed that all products carried significant different flavors and taste but their individual colors, textures and appearances did not seem to be much different from each other. Also mean scores across rows showed that the individual characteristics scored for each product did not show many differences and thus were not significantly different. For example, the mean scores for the flavor, color, taste and appearance of sample "A" all carried the letter "a" showing that these characteristics were not significantly different unlike the flavor of the different products A, B, C, D and F in the column where all the mean scores were assigned different letters meaning the flavor of the different products were significantly different. Also, for sample "C", there was no significant difference between the flavor and taste since they both carried the same letter. Also, there was no significant difference between the color and appearance but these were significantly different from the flavor and taste. The flavor and taste of sample "F" swizzle drink across the row were similar but not significantly different from the color and appearance.

Table 4: Sensory analysis results

Products	Flavor	Color	Texture	Taste	Appearance	Overall Acceptability
A1	3.9^{a}	3.5^{b}	3.5	4.4^{ab}	3.6	3.8^{ab}
B2	3.8^{b}	4.1^{ab}	4.0	4.1^{a}	4.0	4.1^{ab}
C3	3.8^{c}	4.7^{a}	4.1	4.3^{ab}	4.3	4.2^{a}
D4	3.4^{d}	4.0^{ab}	3.9	3.9^{b}	3.9	3.8^{b}
E	3.9^{e}	3.8^{ab}	4.0	4.5^{e}	4.0^{ab}	4.0

$\alpha \leq 0.05$ values are means of 15 scores from 10 males and 5 females' panelist on each characteristic. Means with similar letter (s) in the same column or row are not significantly different at 5% significance level

From **(Table 4),** mean scores across columns showed that all products carried significant different flavors but were similar in color, texture, taste and overall acceptability except for the taste and appearance of sample "E" which was significantly different. The flavor and taste of sample "E" were similar but not significantly different from the color and appearance.

The Pumpkin leaf soup ("D") was selected by the panel as the most acceptable product in terms of all the characteristics scored for followed by Maringa leaf ("B2). These results reflect that provided by participants in the earlier survey where about 33% stated that IGLV's are commonly used in preparing soup. Also, Maringa soup is well known and taken by lots of people so probably panel members were already conversant with it and thus scored it high. Amaranth ("F") was the least accepted which is consistent with results obtained

was the least accepted which is consistent with results obtained from the earlier survey where only 1 participant stated that IGLV's are used for preparing drinks. Drinks often come in colors such as red, pink or orange not often green. This perception could influence panelists' acceptability of the product.

Although "sex" is usually an important factor to consider in sensory analysis of food products to help bring out differences in certain characteristics like taste, scores for males were not analyzed differently from that of females for the simple reason that there were twice as many males as females on the panel. Probably, if equal numbers of males and females had been used for the evaluation, then analyzing the scores for males and females separately could have produced some significant results or differences. Also, another important limitation in this study was the small number of participants (15) used. This averted any deeper analysis on the sex ratio, age, or rural-urban influence which would have enriched the study and provided more applied outcomes for improving ALGV consumption in Ganye.

Equal amounts of the vegetables were used in order to compare how well the different IGLV's did or performed in the different products yet, the flavor and taste of pumpkin soup "D", Maringa drink "F", and amaranth pastry "E" were significantly different from that of the other products at 5% significance. This indicates that adding vegetables to recipes could affect or change the flavor and taste of the recipe. Findings from a study on the effect of food color on perceived flavor indicate that beverage color has a significant effect on liking and consumers' capability to correctly recognize fruit flavor of beverages indicating that food color affects the favorable evaluation of

foods Garber LL *et al.,* (2000) Further, food color tends to affect consumers' ability to: (i) correctly form food preferences, (ii) take over taste of food and (iii) make selection of uncharacteristic food color Garber LL *et al.,* (2000). Such information is important when developing products using IGLV's to help increase consumers acceptance.

Most of the products presented to the panel for tasting or evaluation came with food accompaniments which could also influence the way panelists scored. Studies have reported taste interactions between individual components of a meal stressing that such effects are smaller in more complex meal combinations Aaslyng M.D and Frost M.B (2010). Other studies have also looked at the effect of meal accompaniments on the acceptability and sensory attribute liking for certain foods Miele NA *et al.,* (2010). Positive sensory changes have been achieved in vegetables like cauliflower and broccoli which have strong sulfur flavor when served with gravy as a food accompaniment Meinert L, *et al.,* (2011). In this study, gravy with different fat concentrations was poured over cauliflower, broccoli, and potatoes, and the flavors of these vegetables were reduced significantly but that of the meat increased thus enhancing the acceptability of the meals. Findings showed that only 5% fat was actually required in the gravy to obtain a reduction in vegetable flavor Meinert L, *et al.,* (2011).

Certain food borne outbreaks have been associated with vegetables and fruits. For example *Escherichia coli* have been associated with eating contaminated lettuce and sprouts, *Cryptosporidium* (onions and cider), and Hepatitis A (green onions) Dewaal CS and Bhuiya F (2007). Food borne illnesses have become an important public health issue in the wake of more complex food system, coupled with factors such as increased chronic ailment or compromised immunities, more focus on hygiene and its related risks, and the emergence of more virulent strains of microorganisms. These illnesses cause individual distress and deaths which could easily be prevented, and the economic implications associated with treatment are huge. Common practices in vegetable production in Ganye that have huge health implications are the use of contaminated water for watering plants and the application of non-composted manure to plants. During harvesting, infected workers do contaminate the vegetables and even after harvesting, some vegetables are still washed with contaminated water. Risks still persists after purchasing these vegetables, bringing them home and storing them prior to use. It is necessary to step up teaching growers and vendors about these risks, and also develop a food safety plan with the goal of reducing microbial risk and assuring food safety. These food safety issues are important to address in order to keep the health value of the vegetables and encourage more consumption.

SUMMARY

Indigenous leafy vegetables are used as the base of soups, stews and relishes which accompany carbohydrate staples such as maize, sorghum, millet or rice. They make significant contributions to the nutritional well-being of humans providing us with a wide range of tastes and flavors to complement our starchy based diets.

Indigenous leafy vegetables are often cited as having and providing vitamins such as B and C and even higher amounts of some minerals such as calcium and iron, as well as being rich in proteins Babalola, S.O. & Akinwande, B.A. (2014).

Highly nutritious and well cited examples include members of the genus *Amaranthus*. Panda P. (2010) found out that this genus has leaves containing high levels of essential nutrients and vitamins (A and C), iron and calcium when compared to exotics such as carrots and cabbage. The flowers, leaves and roots of *M. oleifera* are widely used as remedies for several ailments (Maroyi, 2006). The recently witnessed widespread cultivation of *M. oleifera* (Maroyi, 2006) is due to its use as a dietary supplement.

CONCLUSIONS

In conclusion, IGLV's do possess great levels of vitamins, minerals and fiber as confirmed in literature and the fact that they are comparatively cheaper than exotic vegetables, promoting IGLV food products is important in enhancing nutrition of the Nigerian population. With the great health promoting effects of these vegetables, it would be of great advantage to incorporate them into as many recipes as possible for human benefit. Results from the survey showed that respondents used IGLV's mostly for preparing soups and stews. Developing new tasty recipes from these vegetables that would be accepted by consumers could help promote their consumption. Also, ensuring that vegetables used in preparing these recipes are hygienic and safe to eat is critical in order to keep the health value of the vegetables. In addition to soups and stews, other products like pastries, drinks, sauces and salads could be prepared using these vegetables and served with food accompaniments that would enhance their acceptability by consumers. Having a wide variety of products to choose from could attract people to eat more of these vegetables and obtain all the health benefits associated with consuming these vegetables.

RECOMMENDATIONS

As seen from the examples of vegetables assessed in this work, there is great potential for a number of currently underutilized vegetables to play a major role in a more diversified and sustainable food production system. However, there must be greater investment in long-term research and breeding programs and improved seed supply sources for these crops to ensure they can be competitive in the marketplace. Research and breeding of underutilized vegetable crops are clearly underfunded compared with

the few main staple crops. Substantial initial funding by the international donor community and national state programs is necessary to achieve this goal and to generate interest among private sector breeders once significant market potential is within reach.

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