

**UC Davis**

**The Proceedings of the International Plant Nutrition Colloquium  
XVI**

**Title**

Some dry season plants recommended as edible vegetables in Anyigba, Kogi State, Nigeria

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**Author**

Taiga, AKPOVUGHAYE, Dr.

**Publication Date**

2009-05-20

Peer reviewed

## INTRODUCTION

Dry season vegetables are shrubs or herbaceous annuals or biennial plants. The production of dry season vegetables has developed from small home garden to a form of commercial farming because of the production of both local and exotic vegetables. Some of the exotic vegetables cultivated in Nigeria are: cabbage, lettuce, cauliflower and turnip leaf; including stem such as carrot (Aliyu, 2006).

The need for vegetables in man's diet throughout the year cannot be overemphasized. From observation in Anyigba Community in Kogi State, Nigeria, there are inadequate vegetables during dry season. Available dry season vegetables such as the leaves of *Manihot esculentum* (Cassava), *Piper guineense* (Oziza) and many other plants, are not accepted as conventional vegetable.

This study is aimed at comparing the nutrient value of some dry season vegetables available in Anyigba market with a conventionally accepted vegetable (*Telfaria occidentalis*); and to carry out sensory evaluation on the vegetables, by which consumers' acceptability can be assessed.

## MATERIALS AND METHODS

*Piper guineense*, *Manihot esculentum*, *Solanum melanogaster*, *Voandzeia subteranea*, *Chromolena odorata* and *Telfaria occidentalis* were purchased from Anyigba market in Dekina Local Government Area, Kogi State, Nigeria. Each of the fresh vegetables was used to cook Mellon soup separately; using *T. occidentalis* leaves as a reference; while the other five plant leaves were used as the test plants. Each soup was served with Garri (Cassava flower) made into dough to ten panelists, to make a sensory evaluation.

Sensory evaluation of food products based on Hedonic Scale was carried out based on the methods described by AOAC (1990). Acceptability parameters such as appearance, color, taste, flavor, and texture were evaluated, using a questionnaire to score the seven-point Hedonic scale.

### Moisture Determination and Chemical Analysis

Proximate chemical composition of each vegetable sample was carried out to determine the moisture, ash, fat, crude fiber, protein and carbohydrate, using various techniques. Proteins by nitrogen determination using the Kjeldahl micro method and conversion of nitrogen to Proteins by the factor 6.25, Fat by Bligh dyer technique, Crude fibers by successive digestion of the defatted sample with 0.26 N Sulphuric acid and 0.23 N potassium hydroxide solutions, and carbohydrates is by difference (AOAC, 1980).

All data generated were statistically analyzed, using the Analysis of Variance (ANOVA).

## RESULTS AND DISCUSSIONS

Sensory evaluation of food products is an important criterion by which its consumer acceptability can be assessed (Samuel, et al (2006)). The sensory evaluation test on the six plant samples, based on the seven-point Hedonic Scale showed that, *C. odorata* recorded the highest mean value of 6.44, which was higher than the mean value of the reference vegetable (*T. occidentalis*), whose mean value was 6.28. *Solanum melanogaster* had the least mean value of 5.64; while *M.esculentum*, *P. guineense* and *V. subteranea*, recorded mean values of 6.02 and 6.10 respectively (Table 1).

There was no significant difference ( $P > 0.05$ ) between the mean values of *T. occidentalis* and those of *M. esculentum*, *P. guineense*, *C. odorata* and *V. subteranea*.

However, there was significant difference (P=0.001) between the mean value of *T. occidentalis* and that of *S. melanogaster*.

Edible vegetable is a vital component of human diet that should be eaten all year round (Aliyu, 2006). Roger et al (2005) reported that Protein level of green leafy vegetables range from 20.48-41.66% D.W. It has been reported that protein-calorie malnutrition deficiencies is a major factor responsible in nutritional pathology (Roger et al, 2005). The result of this work showed that adequate protein is present in *M. esculentum* and *C. odorata* leafy vegetable. There was no difference in the mean value of sensory evaluation of *M. esculentum*, *P. guineense*, *C. odorata* and *V. subteranea* when compared statistically with *T. occidentalis* which has been generally accepted as edible vegetable in this community. Also, there was no difference in the mean values of *T. occidentalis* and those of *P. guineense* and *V. subteranea* in their sensory test, despite their lower protein content than that of the former. However, the carbohydrate content of the later vegetables are higher than that of the reference vegetable, although there was no significant difference in their statistical analysis. This is probably the reason for their high acceptability by the consumers in the sensory test.

**Table1. Sensory Evaluation of tested Dry Season Vegetables.**

Vegetable Samples	General Appearances	Colour	Taste	Flavour	Texture	Mean
<i>Telfaria occidentalis</i>	6.5	6.3	6.3	6.4	5.9	<b>6.28*</b>
<i>Manihot esculentum</i>	5.9	6.0	6.2	6.2	5.8	<b>6.02*</b>
<i>Solanum melanogaster</i>	5.9	5.6	5.5	5.5	5.7	<b>5.64</b>
<i>Piper Guineense</i>	6.0	6.4	6.4	6.0	6.3	<b>6.22*</b>
<i>Chromolena odorata</i>	6.1	7.3	6.4	6.2	6.2	<b>6.44*</b>
<i>Voandzeia Subteranea</i>	5.8	6.0	6.0	6.6	6.1	<b>6.10*</b>

\* No significant difference

There was significant difference (P=0.001) between the mean value of *T. occidentalis* and that of *S. melanogaster*.

**Table 2. Proximate Moisture and Chemical contents of tested Vegetables.**

Vegetable Samples	% Moisture	% Ash	% Fat	% Protein	% Crude fiber	% Carbohydrate
<i>Telfaria occidentalis</i>	0.90	1.88	0.68	13.33	19.57	63.64
<i>Manihot esculentum</i>	0.91	2.21	0.69	29.30	8.14	58.79
<i>Solanum melanogaster</i>	0.60	1.02	2.90	2.50	5.40	87.57
<i>Piper guineense</i>	0.83	1.38	0.28	10.50	9.84	77.17
<i>Chromolena odorata</i>	1.01	1.86	0.96	32.4	8.4	55.37
<i>Voandzeia Subteranea</i>	0.60	3.05	0.63	3.3	3.0	89.42

The result from the proximate chemical analysis in this study showed that *M. esculentum* contained 29.30% and *C. odorata* 32.40% protein. Both vegetables contained more protein than the reference vegetable (*T. occidentalis*), that contained 13.33% protein. This observation collaborates the result of the consumer acceptability test which showed no difference between the acceptability mean value of *T. occidentalis* (6.28) and those of *M. esculentum* and *C. odorata* (6.02 and 6.44 respectively). This suggests that both *M. esculentum* and *C. odorata* have more nutritive value than *T. occidentalis*.

Therefore, *M. esculentum*, *C. odorata*, *P. guineense* and *V. subteranea* are hereby recommended as edible vegetables, particularly during the dry season when other conventional vegetables are scarce, expensive, or not available.

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