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Nutritional Value of Cucumber Cultivated in Three Selected States of Nigeria

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Abstract

Cucumber (*Cucumis sativus*) which was only cultivated in Northern Nigeria in the past, is now cultivated in other parts of Nigeria. However there is no data to show the nutritional quality of cucumber as it relates to the location of cultivation. This research involved the cultivation of cucumber in three selected states of Nigeria, (Rivers, Imo and Plateau State) with the same variety, same technique and treatment. At ten weeks after planting, the cucumber was harvested. The fruit were observed, their quantity, weight and length measured and recorded. The proximate analysis was carried out using standard laboratory technique; mineral analysis (K^+, Na^+, Ca, Cu, Mg, Mn and Zn) was analyzed using the Atomic Absorption spectrophotometer technique.

The result of the physical appearance showed no difference. Also the result of proximate analysis showed that the cucumber cultivated in Plateau State differ significantly at $P<0.05$ in moisture, protein, crude fiber, ash and fat content when compared with cucumber cultivated in Imo and Rivers States. The result of the mineral analysis showed that cucumber cultivated in Rivers state had the highest value in Ca and Mg content and cucumber cultivated in Plateau State had the highest value in K^+, Cu, Mn, Na^+ and Zn content. The result revealed that cucumber cultivated in Plateau State significantly differ in mineral content. Thus we may say that location is an important factor that could reflect on the nutritional quality of the cucumber.

Keywords: Cucumber; Nutritional composition

Introduction

Cucumber is a creeping vine that bears cylindrical fruits. It is scientifically known as *Cucumis sativus* it belongs to the gourd family cucubitacea. Other vegetables which belong to this family include Melon, squash, Watermelon and Pumpkins [1]. It originated from the Asia continent [2]. Cucumber plant can be cultivated in both temperate and tropical environment hence it is said to be a native of many regions of the world [3]. There are several varieties of cucumber but the edible cucumber is classified under two groups the slicing and pickling cucumber.

The slicing cucumbers are longer and thinner when compared to the pickling cucumber [4]. Cucumber contains nutrients vital for the body development [5]. It also has several health benefits such as: re-hydrating the body, health regulating the blood pressure, body weight management, cholesterol reduction, cancer prevention, bone health, diabetes cure and antioxidant activity [1,6-11]

Cultivation of cucumber requires soil types which possess a high water holding capacity and good drainage. It also requires soil rich in organic matter and manure. The soil pH ranges from 5.5 to 7.0 [12], its proper development is affected by water logged soil hence it needs a fair amount of water. Planting is usually done on a hill, rows or raised beds. After planting several seed on a hill it is later thinned to 2-3 plant per hill [13]. Harvesting of the cucumber is usually 40 to 60 days after planting [14].

Climates and season differ as you move from the Northern Nigeria to the Southern Nigeria and be broadly classified into two seasons, the dry season and wet season [3]. The environment a plant is cultivated include the soil and the climate of the site of cultivation [15]. The component of soil affects plant growth. The locations of the soil and climate affect the soil composition [16]. Plants which are cultivated in different location will have different quality as a result of the difference in the soil composition and climate [17].

Materials and Methods

Three States in Nigeria were selected for the study. The states are Rivers, Imo and Plateau. The seeds were bought from fruit garden market, Kaduna Street, Port-Harcourt. Same variety of cucumber was cultivated in the site of choice in the various states. Planting was done on hills. The plants were thinned to two plants per hill. Ten hills were made in each of the farm for the purpose of this study. At the end of ten weeks of planting the cucumber fruits were plucked and collected for analysis.

The physical observation of the yield of the cucumber by measuring the fruit length, weight and counting the number of fruit was done.

The proximate analysis was carried out at the food science laboratory of the Rivers State University Port-Harcourt. It was done using standard laboratory technique as described by Association of Analytical Communities [18,19]. The protein analysis was done using the technique described by Chang [20]. The mineral analysis was done using the Atomic Absorption spectrophotometer technique.

Results and Discussion

Table 1 showed the result of the physical yield. It showed the number of fruit per plant, weight of fruit per plant and length of fruit. The result reveals that the cucumber from the three states do not differ in physical characteristics.

State	Average number of fruit Per plant	Average weight of fruit per plant(kg)	Average length of fruit(cm)
Imo	11	2.1	21.5
Rivers	10	2.2	22
Plateau	10	1.98	21.3

Table 1: Yield of plant.

The results of the proximate analysis are shown in Table 2. The moisture content of cucumber from Plateau state was significantly ($p<0.05$) low when compared with that of Rivers and Imo state. The protein content range from 0.290.01 mg/100 g to 0.840.01 mg/100 g. Cucumber cultivated in Rivers state had the least protein content, while the one from Plateau state had the highest protein content. Cucumber cultivated from Imo state had the highest crude fiber content while the one cultivated from Rivers State has the least crude fiber content. For the ash content, Plateau state cucumber showed the highest value of 0.69 ± 0.00 mg/100 g and Imo state the least 0.42 ± 0.1 mg/100 g. This may be due to the low mineral content of Imo state soil [16] and the high mineral content of Plateau state soil [21], since the ash content measures the mineral content of a given sample [18]. The result of fat ranges from 0.30 ± 0.01 mg/100 g and 0.12 ± 0.00 mg/100 g, with Plateau State having the highest fat content and Imo state the least fat content. The result on carbohydrate showed that Rivers State cucumber has the highest carbohydrate content 2.63 ± 0.17 mg/100 g and Imo state the least with 1.89 ± 0.11 mg/100 g.

Concentration (mg/100 g) Sample						
Location	Moisture Content	Protein Content	Crude Fiber	Ash Content	Fat Content	Carbohydrate Content
Rivers	96.12 ± 0.06[*ad]	0.29 ± 0.01[*ad]	0.49 ± 0.0[*bd]	0.42 ± 0.01[*bd]	0.25 ± 0.00[*bc]	2.63 ± 0.17[*bc]
Imo	96.21 ± 0.12[*ad]	0.47 ± 0.01[*ad]	0.97 ± 0.01[*ad]	0.35 ± 0.02[*ad]	0.12 ± 0.001[*ad]	1.89 ± 0.11[*ad]
Plateau	95.83 ± 0.18[*bc]	0.84 ± 0.01[*bc]	0.60 ± 0.01[*bc]	0.69 ± 0.00[*bc]	0.30 ± 0.01[*bc]	2.41 ± 0.11[*bc]

Values are expressed as mean ± standard error of mean (SEM), n=3

Value in the same column with different superscripts (a, b), differ significantly at p<0.05 when comparing Imo State and other state.

Value in the same column with different superscripts (c,d), differ significantly at p<0.05. When comparing Plateau State and other state.

Values the same column with different superscripts (*), differ significantly at p<0.05. When comparing Rivers State and other state

Table 2: Proximate analysis.

Concentration (mg/100g) Sample							
Location	Potassium	Calcium	Copper	Magnesium	Manganese	Sodium	Zinc
Rivers	145.55 ± 0.3[*bd]	25.47 ± 0.02[*bd]	0.03 ± 0.00[*bd]	15.46 ± 0.00[*bd]	0.08 ± 0.00[*bd]	2.43 ± 0.00[*bd]	0.40 ± 0.00[*bd]
Imo	140.01 ± 0.08[*ad]	21.63 ± 0.00[*ad]	0.11 ± 0.03[*ac]	14.77 ± 0.00[*ad]	0.27 ± 0.00[*ad]	3.44 ± 0.03[*ad]	0.28 ± 0.00[*ad]
Plateau	152.07 ± 0.06[*bc]	20.45 ± 0.00[*bc]	0.14 ± 0.00[*ac]	12.72 ± 0.01[*bc]	0.81 ± 0.00[*bc]	7.01 ± 0.00[*bc]	0.45 ± 0.00[*bc]

Values are expressed as mean ± standard error of mean (SEM), n=3

Values in the same column with different superscripts (a, b), differ significantly at p<0.05. When comparing Imo State and other States.

Values in the same column with different superscripts (c, d), differ significantly at p<0.05. When comparing Plateau State and other State.

Values in the same column with different superscripts (*), differ significantly at p<0.05. When comparing Rivers State and other State.

Table 3: Mineral analysis.

Table 3 showed the result of the mineral content of the cucumber. The result showed that cucumber cultivated in Plateau state had the highest potassium value of 152.07 ± 0.06 mg/100 g which is significantly high at p<0.05 when compared with the ones of the other two states. This is next to cucumber cultivated in Rivers state and lastly cucumber cultivated in Imo state. The calcium content ranges from 20.45 ± 0.00 mg/100 g to 25.47 ± 0.02 mg/100 g, with Plateau state having the least value and Rivers state had the highest value. The result on copper showed that cucumber cultivated in Rivers State had the least value of 0.03 ± 0.00 mg/100 g, it also shows that only the copper value of Rivers State differ significantly when comparing cucumber cultivated in Plateau State with Imo and Rivers State. The result on magnesium content shows that Plateau state cucumber had a value 12.72 ± 0.1 mg/100 g which is significantly low when compared to the other two states. The manganese, sodium, and zinc result showed that Plateau state cucumber had a significantly high content when

compared to the other two states. The high mineral content could be attributed to the high mineral content of the soil in Plateau state [21]. This corresponds to the findings of Olatunde and Orisoya [17] that the mineral in the soil correlates with the mineral content of the plant grown on it.

Conclusion

The study showed that the cucumbers cultivated in the three locations do not differ physically. The cucumber cultivated in Plateau State differs significantly from that of Imo and Rivers in the moisture, protein, crude fiber, and ash content. It also differs significantly in potassium, calcium, magnesium, manganese, and zinc content. Hence the location in which the cucumbers are cultivated may affect the nutritional quality. However cucumbers cultivated from the three states have shown from the data obtained to be of good nutritional quality, because the value of the nutritional parameters obtained are within the range of United State standard of cucumber of good quality.

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