DETERMINATION OF PROXIMATE, ANTI-NUTRIENTS AND SOME TRACE ELEMENTS OF TRINIDAD MORINGA SCORPION, BELL PEPPER AND CAYENNE PEPPER

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ABSTRACT
Three varieties of pepper (capsicum spp.) were evaluated for antinutrients and trace elements using standard analytical technique. The result shows that, an antinutrient of all the varieties varies significantly. Phytate results for Attarugu, Tattasai and Shambo were found to be 0.17%, 0.16% and 0.14% respectively. Oxalate content were 1.87%, 2.32% and 1.80%, alkaloid content were 2.00%, 6.00% and 8.00% respectively while Flavonoid content were 4.00%, 2.00% and 2.00% respectively. the trace element content shows that Attarugu, Tattasai and Shambo has the following quantity of trace minerals: Zn (6.80mg/kg, 6.5mg/kg and 6.6mg/kg), Fe (31.90mg/kg, 28.60mg/kg and 29.10mg/kg), Cu (4.86mg/kg, 5.02mg/kg and 4.66mg/kg), Co (1.05mg/kg, 0.85mg/kg and 0.96mg/kg) and Mn (1.24mg/kg, 1.39mg/kg and 1.06mg/kg). These result shows that peppers are a good source of antioxidants and minerals.

Keywords; Pepper, Nutrients, Anti-nutrients, Cayenne, Determination.

Introduction
Nutrition studies have provided unambiguous evidence that a number of human health conditions such as chronic coronary thrombosis, hypertension, diabetes, osteoporosis, cancer, old age, and lifestyle-related diseases are associated with the diet. Some human health disorders are often genetic, but there is definite interplay of disorders/diseases with contributions arising from consumption of certain, commonly used foods (Meydani, 2002; Desiere, 2004; Rist et al., 2006). Wide dissemination of such information has greatly helped to raise public awareness towards the consumption of food promoting
good health and containing active ingredients to combat nutritional and health disorders (Mattoo et al., 2009). Pepper or chili belongs to the solanaceae family, genus capsicum and is closely related to tomato, eggplant, potato and tobacco. The genus capsicum represent diverse plant group and include twenty seven species, five domesticated and twenty two undomesticated (Bosland, 1993). Chemosystematics studies help distinguish the differences between varieties and species. For example *C. baccatum var. baccatum* had the same flavonoid as *C. baccatum var. pendulum*, which led researchers to believe in two groups, belong to the same species (Ballard et al.,1970). The macronutrients are carbohydrate, fat, protein and water. The macronutrient (excluding fiber and water) provides structural materials (amino acid from which protein are built and lipids from which membrane and some signaling molecules are built) and energy (Fuhman, 2004). A wide spectrum of antioxidant, vitamins, carotenoids and phenolic compounds are present in peppers. The intake of these compounds in food is an important health-protecting factor by prevention of widespread human diseases. As consumption continues to increase, red peppers could provide important amount of nutritional antioxidant to the human diet (Marin et al., 2004). Nigeria like other tropical countries has abundant of pepper varieties that grow all year round. The pepper occupies an important place in the diet of Nigerians. Cayenne *Capsicum frutescense*, bell pepper *Capsicum annum L.* and Trinidad Moringa scorpion *Capsicum chinense* are among the pepper verities consumed in Nigeria. Their nutritional contribution has not been widely exploited. Nutritional information on these varieties of pepper will be useful for the nutritional education of the public as a means to improve the nutritional status of the population. In this study we are going to determine the nutritional, anti-nutritional and trace element quality of these peppers consumed in Nigeria (Christine et al., 2014).

**Cayenne (Capsicum frutescens)**
The cayenne pepper also known as the guinea spice, Culpeper, Nicholas (2011), cowhorn pepper, aleva bird pepper, Anonymous (2009) or especially in its powdered form, red pepper is a cultivar of capsicum annum related to bell peppers, paprika and others. It is a hot chili pepper use to flavor dishes. It is named from the city of Cayenne in French Guiana. The fruits are generally dried and ground, or pulped and baked into cakes, which are then ground and sifted to make the powder spices of the same name. Cayenne is used in cooking spicy dishes, as a powder or in its whole form (such as in Korean and other Asian cuisine), or in a thin vinegar based source. It is used as herbal supplement, and was mentioned by Nicholas Culpeper, (2011) in his complete herbal 1653, as “guinea pepper”.

**Trinidad Moringa Scorpion. (capsicum chinense)**
It is native to the district of Moruga in Trinidad and Tobago. On February 13, 2012, New Mexico state University chili pepper Institute identify the Trinidad moruga scorpion as the hottest chili in the world, with a mean heat of more than 1.2 million scovile heat units (SHUS) and individual plants with a heat of more than 2 million SHUS (Bannister, 2012). Paul Bosland, a chili pepper expert and director of the chile pepper Institute, said, “You take a bite. It doesn’t seem so bad, and then it builds and it builds and it builds. So it is so nasty. (Susan, 2012). Aside from the heat, the Trinidad Moruga Scorpion has a tender fruit-like flavor, which makes it sweet-hot combination (Joshi, 2012). The pepper can be grown in from seeds in most parts of the world. In North America, the growing season varies regionally from the last spring hard frost to the first fall hard frost.

Bell Pepper (Capsicum annum L.)
Bell pepper, also known as sweet pepper or pepper (in United Kingdom, Canada and Ireland) and Capsicum. Wells, (2008) (in Indian, Pakistan and New Zealand) is a cultivar group of the species capsicum annum. Cultivars of the plant can produce fruits in different colors, including, red, yellow, orange, green, chocolate/brown, vanilla/white and purple. Bell peppers are sometimes grouped with a less pungent pepper variety asa “sweet peppers”. The ribs and seed inside bell peppers may be consumed, but some fine the test to be bitter. Capsicum peppers are rich sources of antioxidants and vitamin c. compare to green pepper, red pepper have more vitamins and nutrients. (Wells, 2008). The level of carotene, like lycopene, is nine times higher in red peppers. Red peppers have twice the vitamin c content of green peppers.(Wells, 2008). Bell pepper is the most recognizable capsicum without capsaicin, a cultivar of capsicum annum will have a zero rating on the scoville scale. The lack of capsaicin in bell peppers is due to a recessive gene that eliminates capsaicin and consequently, the hot taste usually associated with the rest of the capsicum family (The Scovile Scale of Hotness, 2013).

Scope
This work is limited to determination of nutrients, antinutrients and some trace elements in Cayenne, Bell pepper and Trinidad moringa scorpion. This is important so as to contribute to the nutritional evaluation of food.

MATERIALS AND METHODS
Sample Preparation
Three pepper varieties (Bell pepper, Cayenne and Trinidad moringa scorpion) were purchased fresh from the local market in Gwallameji, Bauchi State. The samples were washed and thinly sliced, and allowed to dry at room temperature, after which they are pounded into powder and stored in air-tight containers ready for analysis.
**Determination of Moisture Content**

Exactly 2.0g of each of the powdered sample was placed into a weighted crucible and heated at 105°C for sometimes. After heating, it was removed from the oven, cooled, in the dessicator and weighted, procedure was repeated by replacing the sample back into the oven for some time, cooled in the dessicator and weighted again for several times until a constant weight was obtained. Percentage moisture content was given as

\[
\frac{W_2 - W_3}{W_2 - W_1} \times 100 \quad (AOAC \ 1990).
\]

Where
- \(W_1\) is the weight of the crucible (evaporating dish)
- \(W_2\) is the weight of the evaporating dish + sample before heating
- \(W_3\) is the weight of the evaporating dish + the sample after heating

**Determination of Crude Protein**

The crude protein was determined by the kjeldahl method. Exactly 1.0g of the sample was weighted into a micro Kjedahl flask, 20ml of concentrated \(H_2SO_4\), 1.0g \(K_2SO_4\) and 1.0g \(CuSO_4\) were added into the micro Kjedahl flask. The flask was in an inclined position on a muffle furnace. The heating was done gradually at the initial and later increased until the sample was completely digested. The digested sample was allowed to cool and transferred into a Markham distillation apparatus, exactly 100ml of distilled water, 20M of NaOH was added into distillation flask where the digested sample was transferred. While 30ml of 2% Boric acid and 2 drops of methyl red were also added as an indicator into the receiving flask and the distillation process commenced. The distillate obtained during distillation was allowed to cool and then titrated with 0.1M \(HCl\) until end point was reached, indicated by a colour change. The blank determination was also carried out using the entire reagent in the same quantity but without the sample to be tested present. The formula is percentage Nitrogen;

\[
\text{Nitrogen} = \frac{B_2 - B_1 \times \text{conc.}HCl \times \text{Weight of the sample}}{\text{Weight of the sample}} \times 100
\]

Where
- \(B_1\) is the titre value of the blank,
- \(B_2\) is the titre value of sample
Wp is the weight concentration of HCl used,  
\[
\text{% crude protein content} = \frac{\text{Nitrogen + factor (6.25)}}{6.25} 
\]

**Determination of Crude Lipids**
The estimation was performed using the soxhlet extraction method. Exactly 10.0g of the powdered sample was weighted and wrapped with a filter paper and placed in the extraction column that was connected to a condenser. 200ml of n-hexane was used to extract the lipid. (AOAC, 1990)

**Determination of Crude Fibre**
The estimation was done using the method described by AOAC (1990). Exactly 5.0g of the powdered sample and 200ml of 1.25% H$_2$SO$_4$ were added and heated for 30 minutes and filtered with a Buchner funnel. The residue was washed with distil water until it was acid free. Exactly 200ml of 1.25% NaOH was used to boil the residue for 30 minutes, it was filtered and washed several times with distil water until it was alkaline free. It was then rinsed once with 10% HCl and twice with ethanol; finally it was rinsed petroleum ether three times. The residue was put in a crucible and dried at 105°C in an oven. After cooling in a desiccator, it was ignited in a muffle furnace at 550°C for 90 minutes to obtain the weight of the ash.

**Determination of the Ash Content**
This was done using the method of AOAC (1990). The total ash content of a substance is the percentage of inorganic residue remaining after the organic matter has been ignited. Exactly 2g of the sample powder was placed in a crucible and ignited in a muffle furnace at 550°C for 6 hours. It was then cooled in a desiccator and weighted at room temperature to get the weight percentage of the ash.

\[
\%\text{Ash Content} = \frac{W_2 - W_3}{W_2 - W_1} \times 100 \quad (\text{AOAC 1990}).
\]

Where $W_1$ is the weight of evaporating dish, $W_2$ is the weight of evaporating dish + sample before heating, $W_3$ is the weight of evaporating dish + sample after heating.

**Carbohydrate Determination**
The carbohydrate content was determined by subtracting the summed up percentages of compositions of moisture, lipid, protein, fibre and ash contents from one hundred (Otitoju, 2009).

**Determination of Oxalate**

Titrimetric method described by Day and Underwood (1986) was used to determine the oxalate content. Exactly 1.0g of the sample was weighted into a conical flask and 75ml 3N $\text{H}_2\text{SO}_4$ was added and stirred intermittently with a magnetic stirrer for 1hr. it was then filtered using Whatman No.1 filter paper. From the filtrate 25ml was taken and titrated while hot (80-90°C), against 0.1N $\text{KMnO}_4$ solution until a faint pink colour persisted for at least 30 seconds.

$$\% \text{ Oxalic acid} = \text{Standard Value} \times \text{Average Titre} \times 0.02$$

Where 1ml of 0.1N $\text{KMnO}_4$ = 0.00450g anhydrous oxalic acid.

**Determination of Phytic Acid**

Exactly 2.0g of the sample was weighted into 250ml beaker and 100ml of 2% concentrated HCl was used to soak the sample for 3 hours. The soaked sample was then filtered through a double layer of hardened filter paper. 50ml of the filtrate was taken into another 250ml beaker and 107ml of distilled water added to give proper acidity. Then 10ml of 0.3% Ammonium thiocyanate solution was added into the beaker containing the sample filtrate solution as an indicator and then finally titrated with a standard Ferric chloride solution which contains 0.00195g iron per milliliter. The titration was repeated three times and the average titre was taken. These steps were repeatedly carried out for each of the samples.

$$\% \text{ phytic acid} = X \times 1.19 \times 100$$

Where $X$ = average titre value x mass of iron ml$^{-1}$ (0.00195) according to AOAC (1990).

**Determination of Flavonoid**
The ethyl acetate precipitation method was used (Bohn and Kocital, 1994). A weighted sample of exactly 5.0g was hydrolyzed by boiling in 100ml of 2M HCl solution for about 35 mins. The hydrolysate was filtered to recover extract (filtrate). The filtrate was treated with ethyl acetate drop wise until in excess. The precipitate flavonoid was recovered by filtration using a weighted filter paper. It was dried in the oven at 100°C for 30 mins., it was cooled in a desiccator and re-weighted the difference in weight gave the weight of flavonoid which was expressed as the percentage of the weight of sample analyzed.

\[
\text{% Flavonoid} = \frac{W_2 - W_1 \times 100}{\text{Weight of sample}}
\]

Where \( W_1 \) = weight of empty filter paper \( W_2 \) = weight of filter paper + paper precipitate

**Alkaloid Determination**

The alkaloid content was determined gravimetrically (Haborne, 1973). Precisely, 5.0g of each sample was weighed using a weighing balance and dispersed into 50ml of 10% acetic acid solution in ethanol. The mixture was well shaken and then allowed to stand for about 4hrs before it was filtered. The filtrate was then evaporated to one quarter of its original volume on hot plate. Concentrated ammonium hydroxide was added drop wise in order to precipitate the alkaloids. A pre-weighed filter paper was used to filter off the precipitate and it was then washed with 1% ammonium hydroxide solution. The filter paper containing the precipitate was dried in an oven at 60°C for 30 min, transferred into desiccators to cool and then reweighed until a constant weight was obtained. The constant weight was recorded. The weight of the alkaloid was determined by weight difference of the filter paper and expressed as a percentage of the sample weight analyzed. The experiment was repeated thrice for each food stuff sample and the reading recorded as the average of three replicates.

\[
\text{% Alkaloid} = \frac{W_2 - W_1 \times 100}{\text{Weight of sample}}
\]

\( W_1 \) = weight of empty filter paper
\( W_2 \) = weight of filter paper + paper precipitate

**Wet Digestion**
Exactly 2.00g of each of the sample (ground to pass a 1mm sieve) was weighted using the digital weighting balance into a 250cm³ conical flask and 20ml of the mixed aqua regia was added and the mixture was left for 3hrs. The mixture was heated for 1hr at 95°C on a hot plate with occasional swirling until there is no visible particle and the mixture was quite clear. After completing the digestion, the solution was removed from the hot plate and allowed to cool and the content was filtered with filter paper in a 50ml stirred bottle using deionized water until it reach the required mark on the sample bottle and the digest was kept prior to analysis.

Result

Result of the Determination of Proximate, Antinutrients and Trace Metals Composition of Trinidad Moruga Scorpion, Bell Pepper and Cayenne Pepper

Table 1 Proximate Analysis Trinidad Moringa Scorpion, Bell Pepper and Cayenne Pepper

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>ash</th>
<th>CP</th>
<th>CF</th>
<th>Fat</th>
<th>Moisture</th>
<th>NFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attarugu</td>
<td>0.9</td>
<td>10.3</td>
<td>25.1</td>
<td>7.2</td>
<td>3.9</td>
<td>52.4</td>
</tr>
<tr>
<td>Tattasai</td>
<td>0.7</td>
<td>9.6</td>
<td>24.1</td>
<td>6.6</td>
<td>3.5</td>
<td>55.5</td>
</tr>
<tr>
<td>Shambo</td>
<td>0.8</td>
<td>10.8</td>
<td>23.9</td>
<td>7.1</td>
<td>3.8</td>
<td>53.6</td>
</tr>
</tbody>
</table>

Results of Some Antinutritional Factors of Trinidad Moruga Scorpion, Bell Pepper and Cayenne Pepper

Table 2 Anti-nutritional factors of Trinidad Moringa Scorpion, Bell Pepper and Cayenne Pepper

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Phytate</th>
<th>Oxalate</th>
<th>Flavonoids</th>
<th>Alkaloids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attarugu</td>
<td>0.17</td>
<td>1.87</td>
<td>4.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Tattasai</td>
<td>0.16</td>
<td>2.32</td>
<td>2.00</td>
<td>6.00</td>
</tr>
<tr>
<td>Shambo</td>
<td>0.14</td>
<td>1.80</td>
<td>2.00</td>
<td>8.0</td>
</tr>
</tbody>
</table>
Result of Some Trace Metals in Trinidad Moruga Scorpion, Bell Pepper and Cayenne Pepper

Table 3 Trace Minerals in Trinidad Moringa Scorpion, Bell Pepper and Cayenne Pepper

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Zn (mg/kg)</th>
<th>Fe (mg/kg)</th>
<th>Cu (mg/kg)</th>
<th>Co (mg/kg)</th>
<th>Mn (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attarugu</td>
<td>6.80</td>
<td>31.90</td>
<td>4.86</td>
<td>1.05</td>
<td>1.24</td>
</tr>
<tr>
<td>Tattasai</td>
<td>6.50</td>
<td>28.60</td>
<td>5.02</td>
<td>0.85</td>
<td>1.32</td>
</tr>
<tr>
<td>Shambo</td>
<td>6.60</td>
<td>29.10</td>
<td>4.66</td>
<td>0.96</td>
<td>1.06</td>
</tr>
</tbody>
</table>

Discussion

Table 1 shows that moisture content of the three pepper varieties are 3.5% (tattasai), 3.9% (attarugu) and 3.8% (Shambo) of the dried samples compare to the moisture content obtained from the fresh samples of cayenne and bell pepper reported by Ogundale et al., (2012) which was 85.19% and 82.14% respectively. These samples contain considerable amount of moisture in the powdered form. The moisture content of any food is an indication of its water content and it’s important as a number of biochemical and physiological changes in food depends on it (Onwuka, 2005). The low moisture content of these pepper suggest that they have a high shelf life. Food samples with high moisture contents is susceptible to microbial growth (Gulssepe and Baratta, 2000). The ash contents are 0.7% (tattasai) 0.8% (shambo) and 0.9% (attarugu). The ash content recorded are lower than those recorded for *Pachira glabra* (4.34%) and *Afrelia Africana* (4.0%) seed flour (Ogundale et al., 2011). The ash content obtained in this study is relatively low, as a result, they may be considered unsuitable for compounding animal feed. The low ash content may enhance the quality control of their extracted oil (Ibanga and Ekpa, 2009). The fat content are 6.6% (tattasai), 7.2% (attarugu) and 7.1% (Shambo). These values show that the fat contents are on the same range with that of scarlet runner bean (7.5%) and higher than cowpea (3.1%), kersting groundnut (5.9%) and Bambara nut (6.7%) (Aremu et al., 2006). The crude fibre contents are 23.9%(shambo) 24.1%(tattasai) and 25.1% (attarugu) which are higher than legumes such as cowpea (2.1%) (Giani, 1993), cream coat Bambara groundnut (2.1%) (Aremu et al., 2008). These values are within acceptable limits which help to maintain the health of gastro intestinal tract, but in excess may bind trace elements, leading to deficiency of iron and zinc (Sidduraju et al., 1996). The crude protein ranged from 9.6% (tattasai) 10.3% (attarugu) and 10.8% (shambo) the protein content is significantly higher than that reported by Esayas et al., (2011) in the following Capsicum varieties, Bako local (9.0%), Odaharo (8.8%) and Marakofana (9.2%). The amount of crude protein obtained in these samples are
considerable even though their percentages are low compare to the protein level in some oil seeds consumed in Nigeria (Enujiugha and Agbede, 2000). The low protein level obtained in this study is an indication that the potential usage of these peppers for food and feed formulation is limited. The carbohydrate as nitrogen free extract (NFE) calculated by difference accounted for 52.4% (attarugu), 53.6% (shambo) and 55.5% (tattasai). The carbohydrate contents suggest that pepper could be a good supplement to scarce cereal grains as sources of energy and feed formulations. The values are higher than those of soya bean (26.3%) as reported by Temple et al., (1991), Cranberry beans (31.4%) (Aremu et al., 2006) but lower than those reported for Lima bean (66.9%), pigeon pea (66.8%) and Jack bean (57.3%) (Oshodi et al., 1998). The results of this study indicated that these peppers contain a moderate amount of carbohydrate and this can provide accessible fuel for physical performance and regulate nerve tissues (Onwuka, 2005).

Table 2 shows the antinutrient results obtained from the three different pepper varieties. The range of the percentage alkaloids present in the samples were from 2% (Attarugu) - 8% (Shambo). Among these samples cayenne has the highest value of alkaloid. Alkaloids are often reported to be toxic and are able to initiate strong physiological changes in the body when consumed (Harbone, 1973). Flavonoids ranges from 2% (Shambo) – 4 % (Attarugu). The result shows that flavonoids are higher in Attarugu compared to Shambo and Tattasai. The difference in flavonoid content may be due to the high level of capsaicin in Attarugu compared to Shambo and Tattasai. The presence of flavonoids and alkaloids is an indication of medicinal potential of the pepper varieties particularly Attarugu. Flavonoids are free radical scavengers, super antioxidants which prevent oxidative cell damage and has strong anticancer activity (Salah, 1995). Alkaloids are efficient therapeutic substances; pure isolated alkaloids are used as basic medicinal agents because of their bacterial properties (Stray, 1998). Reports have shown that the lethal dose of oxalate is between 200 and 500mg /100g (Pearson, 1976). Noonan and Savage (1999) noted that the intake of 4-5g of oxalate is the minimum dose that can result to death in an adult human. They further reported that a number of authors have shown that 10-15g could be lethal. Akwaowo et al., (2000) reported that a daily intake of 450g of oxalic acid interferes with metabolism. The authors also noted that high oxalate levels in food may reduce the bioavailability of calcium. The levels obtain in this study is within acceptable limits. They range from 1.80% - 2.32%. Large amount of phytic acid has been reported to be present in fibre rich food, such food however are pharmacologically recommended because they protect humans from cardiovascular diseases and some forms of cancer (Norhaizan and Nor-faizadatul, 2009). In spite of these advantages phytic acid reduced bioavailability of minerals because it has strong binding affinity to them.
(Ekholm, et al., 2003). Fortunately the phytic acid contents observed in this study are quite low. The general order of the mineral content is Fe>Zn>Cu>Mn>Co. The iron value ranges from 28.60mg/kg (Tattasai) – 31.90mg/kg (Attarugu), the Zinc values range from 6.50mg/kg (Tattasai) – 6.80mg/kg (Attarugu), Copper range from 4.86mg/kg (Attarugu) – 5.02mg/kg (Tattasai), Manganese values range from 1.06mg/kg (Shambo) – 1.39mg/kg (Tattasai) and lastly Cobalt which range from 0.85mg/kg (Tattasai) – 1.05mg/kg (Attarugu). All the pepper varieties could be good sources of valuable trace minerals with Attarugu been the highest in Zinc, Iron and Cobalt. The daily recommended requirement of these trace elements for both men and women are: Iron 8.70mg and 14.8mg, for Zinc is 9.00mg and 7.00mg (NHS, 2007), these shows that the three pepper varieties are good sources of iron which is a component of hemoglobin. According to Okwu and Morah (2004), iron helps in oxygen transport and together with hemoglobin and ferrodoxin plays important role in man’s metabolism. It is necessary in the normal functioning of the body central nervous system. The zinc contents of the three samples are slightly below recommended level though they can still augment the requirement (Attarugu 6.80, Tattasai 6.50 and Shambo 6.60 mg/kg) respectively. Zinc is important in the production of insulin and carbonic anhydrase in human body. The zinc content of these Capsicums could be an indication that the plants can play a role in the management of diabetes that result from insulin malfunction (Okwu and Morah, 2004). Copper is 1.20mg for both sexes, the three samples provided values above the recommended level and thus could serve as an excellent source for Copper. Cobalt is 0.0015mg for both the sexes respectively, the samples were found to contain higher cobalt content than the recommended daily requirement (NHS, 2007). Manganese is 0.50mg for both sexes, the three varieties provided values above that of the recommended daily requirement and therefore could be good sources of this mineral.

Conclusion
This study reveals that proximate composition, antinutritional composition, and trace metals composition of *Capsicum chinense* (attarugu), *Capsicum annuum* L. and *Capsicum frutescense* (shambo). The pepper varieties contain substantial quantities of minerals and antinutrients. Comparatively, the average nutritive value of *Capsicum chinense* is superior to those of the other pepper varieties analyzed. The findings suggest that all the three pepper varieties contain appreciable amounts of nutrients. However, it is observed that none of them is rich in all the nutrients, hence the need to consume the pepper as supplements with other food substances.
Recommendation
People could be encouraged to continue consuming the pepper varieties as they serve as good anti-oxidants and also supplements for the nutrients.

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