Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 13 March 2017 doi:10.20944/preprints201703.0062.v1

Biochemical Compositions of Black Carpenter Ant, *Camponotus pennsylvanicus*

Francis Olawale Abulude [1,*] and Samuel Dare Fagbayide [2]
[1] Science and Education Development Institute, Akure, Ondo State, Nigeria
[2] Agricultural and Bio- Environmental Engineering Department, Federal Polytechnic, Ilaro, Ogun State, Nigeria; fsamueldare@gmail.com
* Corresponding author: waleabul@yahoo.com or samuel.fagbayide@federalpolyilaro.edu.ng

ABSTRACT

Biochemical compositions of black carpenter ants (*Camponotus pennsylvanicus*) were analyzed using standard methods. The proximate composition (%) were as follows: crude protein (22.50), crude fibre (1.46), carbohydrate by difference (30.86) and energy (35.4Kcal). The predominant mineral was potassium and nickel was the least. The antinutritional properties ($mgkg^{-1}$) ranged as follows: Oxalate (1.35), phytate (62.79), and tannins (0.72). The results suggested that the ant may be a good source of nutrition.

Keywords: biochemical composition; carpenter ants; potassium; phytate

INTRODUCTION

Black carpenter ants are about 3.4 to 13 mm long. They are different colours (black, reddish or yellowish). The ant lives outdoors and indoors, decaying or hollow wood. Carpenter ants do not eat wood, but they love sweets and meats, especially on other insects. Carpenter ants are similar to termites, but unlike termites however**,** do not eat wood for food **(**Orkin, 2016**).**

The nutritional values of insects have long been recognized (Abulude (2004, 2006, 2007). In the past, insects' consumption has mainly been confined to rural Nigeria, but nowadays it has spread to all parts of the country. There has been phenomenal rise in the costs of the conventional sources of protein like egg, fish, meat and others. To this end, there is an option to source for alternatives that are relatively cheap, hence there is the need to study this insect based on animal and human needs. The results will determine if it will be necessary to kill, conserve or breed the back ants for future use as feed to animals and food to human. Processing has assisted in eliminating or reducing some antinutrients, per chance if the antinutrients are high there may be the need for processing.

Like other insects, carpenter ants are food to fowls, lizards and other animals. There is a scanty information on the nutritional and antinutritional compositions of the ants in Nigeria and many parts of the world. It is in view of this that the study was embarked upon. To achieve this aim, the biochemical compositions of the black carpenter ants will be determined.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 13 March 2017 doi:10.20944/preprints201703.0062.v1

MATERIALS AND METHODS

Camponotus pennsylvanicus (Carpenter ants) was collected from Federal College of Agriculture, Akure, Ondo State, Nigeria. The ant was sundried for ten days in order to eliminate moisture, ground into fine powdery form, packed in a plastic container, labelled accordingly and stored in refrigerator prior to laboratory analysis**.**

The proximate and mineral compositions were determined as described by AOAC (2005), while phytate content was determined using the methods described by Abulude and Ojediran (2006). The calorific values in kilojoules were calculated by multiplying the crude fat, protein and carbohydrate by Atwater factor of 37, 17 and 17 respectively and calculated fatty acid (0.8 x crude fat) (Adeyeye *et al*., 2008).

Data obtained were generated in triplicates and analyzed using Mean, Standard deviation and one-way (one factor) analysis of variance with Duncan Multiple Range test at 95% confidence or $p < 0.05$.

Source: Present Study

Fig 1: *Camponotus pennsylvanicus* (Black carpenter ants*)*

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 13 March 2017 doi:10.20944/preprints201703.0062.v1

RESULTS AND DISCUSSION

Table 1: Biochemical Compositions of *Camponotus pennsylvanicus*

Parameters	Values
PROXIMATE COMPOSITION (%)	
Protein	22.50± 0.12^{b}
Fat	1.00 ±0.02^{c}
Carbohydrate	30.86 2.51^{bc}
Moisture	42.52 ±0.32^{b}
Fiber	1.46 ±0.02^{a}
Ash	1.66 ±0.2^{cd}
Energy	35.4Kcal ±2.51^{bc}
MINERAL COMPOSITION (mgkg^{-1})	
Sodium	610 ±2.32^{c}
Zinc	4.86 ±0.20^{c}
Calcium	524 ±2.30^{e}
Potassium	34.85 ±2.02^{c}
Magnesium	40.32 ±2.34^{c}
Copper	3.11 ±0.02^{d}
Iron	3.22 ±0.02^{a}
Nickel	1.21 ±0.05^{b}
Manganese	21.33 ±0.07^{b}
ANTI NUTRIENT COMPOSITION (mgkg^{-1})	
Oxalate	1.35 ±0.20^{a}
Phytate	62.79 ± 0.20^{b}
Tannins	0.72 ±0.20^{c}

All values were expressed as averages of triplicate determinations ± the standard deviations and values bearing the same superscripts in the same row are significantly not different ($p > 0.05$).

Table 1, Showed the proximate composition of carpenter ants, the moisture content value was 42.52%, while others ranged thus; carbohydrate 30.86%, protein 22.50% Ash 1.66% fibre 1.46% and fat 1.00%. The mineral composition of carpenter ants, revealed that carpenter ants contained Na (610mgkg^{-1}), Ca (524mgkg^{-1}), Mg (40.32mgkg^{-1}), K (34.85mgkg^{-1}), Mn (21.33mgkg^{-1}), Zn (4.86mgkg^{-1}), Fe (3.22mgkg^{-1}), Na (1.21mgkg^{-1}) and Cu (3.11mgkg^{-1}). The anti-nutrient present in the black carpenter ants were 62.79mgkg^{-1}, oxalate (1.35mgkg^{-1}) and tannin (0.72 mgkg^{-1})

The results obtained in this study (Tables 1) showed that the sample analyzed contain appreciable amount of nutrients which compared favorably with the conventional feeds. The crude protein

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 13 March 2017 doi:10.20944/preprints201703.0062.v1

content 22.50% was lower than 39.9% recorded for cricket (Abulude, 2004). Also, the ant sample's carbohydrate content was lower than 35.75 – 71.22% found in varieties of mushrooms (Abulude and Ndamitso, 2013).

There was little or no difference in the proximate analysis between the carpenter ant and that of cowpea and soyabean, although the fat extracted in carpenter ant had a low percentage of fat 1.00% compared to that of *D. alata* (Udensi *et al*., 2010))

The ash content which is an indication of the percent mineral component of the ant was relatively high, it could be deduced that the ants will contain high levels of minerals.

The anti-nutrients are relatively high. This is an indication that some mineral and protein might not be available for the consumers of this sample. Anti-nutrients are known to inhibit the absorption of mineral and other food nutrients in the body.

CONCLUSION AND RECOMMENDATION

The study confirmed that carpenter ants contained high protein, fat, and carbohydrate, it may be good as alternatives to other convectional feeds for animals. The limitation of this sample could be the high content of phytate, oxalate and tannin, but it would be recommended that the sample should be subjected to different processing methods like boiling, autoclaving and so on before consumption.

REFERENCES

Abulude, F.O (2004). Proximate composition, minerals content and functional properties of cricket (*Acheta spp*.). *Pakistan J. Scientific and Industrial Research*, 47, (3): 212-213.

Abulude F.O., Ojediran V.A., (2006). Development and quality evaluation of fortified 'Ämala'. *Acta Scientiarum Polonorum Technologia Alimentaria*. 5 (2), 127–134.

Abulude F.O., Ogunkoya M.O, Esiet E.E., Kayode B. O and Oni J.O. (2006). Studies on scorpion (*Androctonus australis*): Nutritional and anti-nutritional factors. *J. Entomology* 3(2): 156 – 160.

Abulude, F.O, Folorunso R.O, Akinjagunla Y.S, Ashafa S.L and Babalola J.O (2007). Proximate compositions, mineral levels and phytate contents of some alternative protein sources (Cockroach, *Periplaneta americana*, soldier ants, *Oecophylla sp.* And earthworm, *Lubbricus terrestics*) for use in animal feed formulation. *Asian J. Animal and Vet. Adv*. 2 (1): 42-45.

Adeyeye E.I, Adubiaro H.A., Awodola O.J., 2008. Comparability of chemical composition and functional properties of shell and flesh of *Penaecus notabilis*. *Pak. J. Nutr*., 7 (6), 741–747.

AOAC, 2005. Official methods of analysis. Association of Official Analytical Chemists, Washington, DC., USA.

Steve Jacobs, (2014). Carpenter Ants (*Camponotus pennsylvanicus).* Insect Advice from Extension. Facts sheet. Entomological Notes. Department of Entomology, The Pennsylvania State University.

Ndamitso M. and Abulude F. 2013. Nutritional Assessment of Some Mushroom Species, EJPAU 16(4), #11. Available Online: http://www.ejpau.media.pl/volume16/issue4/art-11.html

Orkin (2016). Carpenter Ants: Facts, Identification & Control. Accessed on 20th July, 2016. http://www.orkin.com/ants/carpenter-ant/

Udensi E.A., Oselebe H.O., Onuoha A.U., 2010. Antinutritional assessment of *D. alata* varieties. *Pak. J. Nutr*., 9 (2), 179–181.