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Estimation of Some Anti-nutritional Factors in Oil-Free Seed Cake of Egusi (*Citrullus colocynthis* L.).

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Short Communication

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ABSTRACT

In this study, some anti-nutritional factors present in oil-free seeds of egusi (*Citrullus colocynthis* L.) seed cake were determined. Oil was extracted from the oil-free egusi seed by the Soxhlet extraction method. The anti-nutritional factors were determined using the standard methods. The result of anti-nutritional factors analysis revealed that the seed contains phytate (3.09 ± 0.65mg/100g), oxalate (16.20 ± 2.12mg/100g), nitrate (1.09 ± 0.03mg/100g), cyanogens (13.78 ± 0.13mg/100g) and tannins (6.19 ± 0.04mg/100g). From the result, the oil-free seed cake of egusi contains some anti-nutritional factors in minute amounts, and this serve as a guide towards their elimination.

INTRODUCTION

Citrullus colocynthis L. belongs to *cucurbitaceae* family, which usually consists of a large number of varieties that are generally known as melons [1]. It is among the 300 species of melon found in tropical Africa and it is cultivated for its seeds, which are rich in oil (53%) and protein 28% [2]. The seeds popularly called 'egusi' contain about 53% oil, 28% protein and some other important mineral nutrients [3]. They are consumed in 'egusi soup', melon ball snacks and ogiri, (a fermented condiment) [4].

Anti-nutritional factors are defined as natural or synthetic compounds found in animal feed or human diet that can affect good health and growth by limiting the absorption of the nutrients from food [5]. They can also be generated in natural feedstuffs by the normal metabolism of species or by different mechanisms (for example inactivation of some nutrients, diminution of the digestive process or metabolic utilization of the feed) which exerts effect contrary to optimum nutrition [6].

Edible plants are a good source of several thousands of various nutrients and substances. However, the key problem regarding the nutritional exploitation of these kinds of plants is the presence of anti-nutritional factors. The aim of the present study was to estimate some anti-nutritional factors present in oil-free egusi (*Citrullus colocynthis* L.) seed cake.

MATERIALS AND METHODS

Sample Collection, Identification and Preparation

Indigenous Citrullus colocynthis L. seeds were bought from Aliero central market, in Aliero area of Kebbi State, Nigeria. The seed was identified and authenticated by a Botanist at the Biological Sciences Department, Kebbi State University of Science and Technology, Aliero, Kebbi State, Nigeria. The seeds were de-shelled, cleaned,

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well dried and ground using a mortar and pestle. The oil was extracted with the use of Soxhlet extractor (Konte, USA), [7] the oil-free seed cake residue was subjected to the following anti-nutritional factors analysis.

Anti-nutritional factors determination

The concentrations of the following anti-nutritional factors were determined in oil-free egusi (*Citrullus colocynthis* L.) seed cake. The Phytate content were determined using the method as described by AOAC [8], the oxalate content were determined using the method as described by Dye [9], the nitrate content were determined using the method as described by Strong and Kock [10], the tannin content were determined using the method as described by Burn [11] and the cyanogen content were determined using the method as described by Obile *et al.,* [12].

RESULTS AND DISCUSSION

The concentration of anti-nutritional factors present in oil-free *Citrullus colocynthis L.* seed cake is presented in table 1.

Table 1: Concentration of antinutritional factors in oil-free *Citrullus colocynthis* L. seed cake.

Anti-nutritional factor	Concentration(mg/100g)
Phytate	3.09 ± 0.65
Oxalate	16.20 ± 2.12
Cyanogens	13.78 ± 0.13
Tannins	6.19 ± 0.04
Nitrate	1.09 ± 0.03

Values are presented as mean±standard deviation (n=3)

The concentration anti-nutritional factors present in oil-free seed cake of *Citrullus colocynthis* L. is presented in table 2. The Phytate content of 3.09 mg/ 100g is lower than the reported value of 27.60mg/100g in sesame seed [13]. Phytate has a high affinity for minerals like P, Zn, Cu, Mg which forms insoluble complexes and make them unavailable for absorption affecting the bioavailability of such minerals in the body [14].

The oxalate content of 16.20 mg/ 100 is lower compared to the reported values of total oxalate content of almond seed (26.4 mg/100g) [15] and 51.4mg/100g obtained for *Vigana unquicaulata* seed [16]. Oxalate is also believed to make complexes with calcium to form an insoluble calcium-oxalate salt.

The nitrate content of 1.09 mg/ 100g is lower compared to the reported values of 21.6 mg/100g obtained from almond seed [15] and 28.4mg/100g for *Vigana unquiculata* [16]. High concentration of nitrate in seed nut oil poses a serious threat to human health as it can indirectly inhibit oxygen transport to the blood, a condition known as methaemoglobinaemia [16].

The tannins content of 6.19 mg/ 100g is lower compared to the reported value of 34.90mg/100g for almond seed [15] and 73.1mg/100g obtained for *Vigana unquicaulata* [16]. High amount of tannis inhibits the absorption of micronutrients like Manganese, Zinc, Chromium and also form complexes with the digestive enzymes.

The cyanogens content of 13.78 mg/100g is lower compared to the reported value of 396.2mg/100g for cassava tubers [17]. Excess CN^- released from its hydrolysis inhibits the cytochrome oxidase which stops ATP formation depriving the tissues from the required energy [18].

Although most food substances contain toxic constituents, it is the amount of such toxic constituents that determine the palatability of the food. Thus, although egusi seed contains some amount of anti-nutritional factors such as oxalate, tannins and cyanogens, in relatively small amounts, their intake could be minimize during the processing stage using the processing techniques such as cooking, roasting, washing with water (hard) and autoclaving. These techniques were reported to significantly decrease the concentration of the various anti-nutritional factors in seeds [19].

CONCLUSION

Although egusi seed cake contains some anti-nutritional factors in relatively small amounts, their presence do not interfere with the palatability of the seed as food. Processing methods such as roasting, cooking, washing with hard water and autoclaving are some of the methods that have been previously shown to reduce the levels of these anti-nutrients in seeds.

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RECOMMENDATION

Further research is needed to compare the levels of these anti-nutrients in rough and processed egusi seed nut.

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