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TRACE ELEMENT COMPOSITION OF MEAL AND OIL OF RUBBER AND SANDBOX

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ABSTRACT

Two species from the Euphorbiaceae family Hevea brasiliensis (rubber plant) and Hura crepitan (Sandbox plant) were analysed for total ash and mineral nutrients in both the defatted meals and oils. Specie differences were not significant in the quantity of trace elements present.

Key words: Rubber, *Hura crepitan* seed, trace elements.

INTRODUCTION

Information on the trace element content of some common oil-seeds are available (Deosthale, 1980; Elson et al, 1979) but, to our knowledge, not on members of the Euphorbiaceae family. It is therefore important to assess these elements if plants in this family are to be utilized in nutrition as well as in other allied industries. Oilseeds such as groundnut (Arachis hypogea), coconut (Cocos nucifera), mustard (Brassica nigra), and safflower (Carthenom tinctorius) are primarily used for extraction of edible oil. The oilseed cake or the meal obtained after extraction of oil is largely used as cattle feed or as a fertilizer. But the defatted meal is a rich source of protein and if suitably processed, has a great potential as food for human consumption. Some members of the Euphorbiaceae family when processed are used as food materials. Castor oil has been found to be a good seasoning agent when fermented, so also is rubber seed which is used as a vegetable oil source and the defatted meal used as a protein supplement (Anosike and Egwuatu, 1981; Oyenuga et al, 1977).

Scanty reports are present on the elemental composition of oilseeds in the Euphorbiaceae family (Oyenuga et al, 1977). Thus in this investigation, two varieties in this family namely Hevea brasiliensis (rubber) and Hura crepitan (sandbox) were analyzed and compared for their mineral and trace element compositions.

MATERIALS AND METHODS

Hevea brasiliensis (rubber) and *Hura crepitan* (sandbox) grown at the Faculty of Agriculture Demonstration Farm, University of Nigeria, Nsukka were used for this work. All samples were cleaned to remove grit and foreign matter, washed thoroughly with distilled water to remove surface contamination. The samples were dried and defatted by Soxhlet extraction using diethyl ether (34 - 36°C). The defatted meals were ground to fine powder to pass through a 40-mesh sieve and ashed at 500°C ± 5°C. The solution prepared from the ash was used for the estimation of calcium, phosphorous and iron content by official methods (AOAC, 1960). Copper, zinc, magnesium, manganese, sodium, lead and cadmium were estimated by atomic absorption spectrophotometry. The oils after digestion were diluted to 10 ml, and then 10 μl aliquots were measured out and injected into an electrochemical atomizer coupled to an atomic absorption spectrophotometer, Model Pye Unicam SP 9.

RESULTS

The metal contents of the defatted meals is presented in Table 1.

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Table 1: Mineral and Trace element composition of rubber and sandbox meals.

	Hevea brasiliensis (rubber)	Hura crepitan (sandbox)
Ash (g %)	2.6 ± 0.02	3.3 ± 0.09
Calcium	0.92 ± 0.05	0.75 ± 0.3
Phosphorous	0.98 ± 0.07	0.82 ± 0.09
Sodium	0.24 ± 0.05	0.18 ± 0.02
Magnesium	0.38 ± 0.07	0.24 ± 0.07
Iron	1.09 ± 0.75	0.92 ± 0.34
Manganese	0.03 ± 0.24	0.01 ± 0.29
Zinc	0.68 ± 1..35	0.65 ± 0.60
Copper	0.45 ± 3.3	0.07 ± 0.50
Lead	0.02 ± 0.1	bdl
Cadmium	bdl	bdl

bdl - below detection limit (0.02 ppm).

From the results, the ash content of *Hura crepitan* (sandbox) were greater than those of rubber seed meals. Similarly, the elemental; composition of rubber seed meal were higher than those of *Hura crepitan* meal. Table 2 presents the metal content of rubber and *Hura crepitan* oil. The metal content of the oil are relatively lower than those of the meal, with rubber seed oil having higher elemental composition than the *Hura crepitan* oil. The error limit represents 95% confidence limits based on at least three determinations while the detection limits are based on a signal equal to twice the baseline noise and typical dilution and sample size.

Rubber seed and *Hura crepitan* are tropical plants found abundantly in the eastern parts of Nigeria. These plants which hitherto are not currently used to any reasonable level in nutrition were investigated for the presence of trace elements.

DISCUSSION

The results suggest that *Hevea brasiliensis* (rubber) and *Hura crepitan* (sandbox) defatted meals and oils contain no detectable lead and cadmium. This result justify previous work on their use, especially rubber seed oil, in animal nutrition experiments associated with lipid metabolism (Gandhi et al, 1990), since these two metals have been associated as possible factors that could led to coronary heart disease and hypertension (Elson et al, 1979). It is also interesting to note that the values reported in this work are comparable to earlier work reported by Oyenuga et al (1977) on defatted and non-defatted rubber seed meals from the rubber belt zones of Nigeria. It appears that possibly geographical location, has little or no effect on the trace elements as compared to variations earlier reported on oil content and fatty acid profile (Hilditch et al, 1952). Of interest also are the contents of the minerals calcium, phosphorous and magnesium which are important in animal nutrition. These elements were relatively high in the two oilseeds studied and the values compare well with those of other conventional oilseeds, corn, groundnut, coconut and safflower (Deosthale, 1980).

In general, members of the Euphorbiaceae family are potential sources of industrial vegetable oil, and the meal obtained after oil extraction constitute potential source of food for man and feed for animals, as previous toxicological studies carried out showed no adverse effect on tissues of experimental animals (Gandhi et al, 1980).

Table 2: Metal contents (ppm) of the oils from rubber and sandbox seeds.

	Hevea brasiliensis (rubber)	Hura crepitan (sandbox)
Calcium	0.073 ± 0.02	0.064 ± 0.01
Magnesium	0.001 ± 0.01	bdl
Sodium	0.018 ± 0.02	0.001 ± 0.02
Iron	0.021 ± 0.04	0.019 ± 0.03
Zinc	0.001 ± 0.01	bdl
Phosphorous	0.001 ± 0.02	0.002 ± 0.01
Copper	bdl	bdl
Manganese	bdl	bdl
Lead	bdl	bdl
Cadmium	bdl	bdl

bdl - below detection limit (0.001 ppm).

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