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Some Physical Characteristics and Nutritional Composition of the Seeds of Wild Pepper (*Erythrococca anomala,* Benth)

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Abstract. Study of physical properties and nutritional components of whole and powdered wild pepper seeds (*Erythrococca anomala,*Benth) revealed that the seeds have good parameters for machineability. The contents of moisture, ash, protein, lipid and carbohydrate and major and trace minerals were found in functional quantities, while the heavy metals were negligible or absent. Thus the seeds are potential source of nutrients and can be used as additive in food product development.

Keywords: *Erythrococca anomala,* nutritional composition, product development, seed machineability

Introduction

Seeds are abundantly found in nature and are good and cheap sources of foods. They have multiple nutritive values and are also known to contain reasonable quantities of edible oils and fats. The satiety value, flavour enhancing and hunger delaying abilities are the particular attributes of fats. Moreover, seeds are cheap source of protein, known to be very important for the normal body functions in animals. Considering the shortage of food nutrients in human diet and reliance of the country on imports of food products from foreign countries, lot of efforts have been focussed on the exploitation of locally available natural raw materials for food production. For example, work has been done on bitter kola (*Garcinia kola*) (Daramola and Adegoke, 2007), African oil bean seed (*Pentaclethra macrophylla*) (Ajibola, 2005), African breadfruit seeds (*Treculia africana*) (Omobuwajo, 2002) etc.

Wild pepper (*Erythrococca anomala,* Benth) is an indigenous plant whose seeds are popular among the local people in the Western part of Nigeria, owing to the benefits associated with them. Its seeds are locally known as Iyere (Yor), Monsoro (Hausa) and Osunrisa (Ghana). They are usually of reddish to yellow colour on ripening, while deep brown after drying.

The plants are creepers, found clustering around the stems of cocoa and kolanut trees, proliferating freely in parts of Southern Nigera. The seeds of *E.anomala* are aromatic, pungent and medicinally used in treatment of sore throat, mouth infections, preparation of herbal soups for women and new mothers etc. The seeds are also used as food additive (in flavouring 'kunnusaki', preparation of pepper soups, cooking of rice and meat). Recently, the seeds of *E. anomala* have been employed in perfumeries in the northern Nigeria.

Since, no work has been rendered on determining the physical characteristics and the nutritional potential of the seeds, the present study was undertaken to establish the attributes of the seeds of wild pepper (*E. anomala,* Benth).

Materials and Methods

The physical characteristic including sphericity index, aspect ratio and density (kernel density, bulk density and density ratio) were determined using the methods of Maduako and Faborode (1990) and Mohsenin (1986).

Properly dried seeds of *E. anomala* were milled using Shromadzu grinding machine (AGG -270 F 005028F4) and sieved using a 6 mm mesh size. The powdered seeds were then made into 50 packs and kept for further analysis.

The moisture content was determined by drying method, protein by Kjedhal digestion method, and crude fat by Soxhlet extraction, according to AOAC (1990). The ash content was determined using Toyo Seisokusho Muffle Furnace (KL420: 00004023021) at 550 °C for one h.

Minerals analysis. Use of atomic absorption spectrophotometer, AAS-324-75603-84 & 2P88887GM, was made for the minerals analysis.

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Samples were prepared by ashing the weighed amount of powdered seeds in a Seisokusho Muffle Furnace PK50067FT; 4022004) at 500 °C which was then allowed to cool. The ashed sample was digested and diluted serially with 1N HCL. The digest was filtered and aspirated into the AAS, where the minerals were automatically quantified.

Results and Discussion

The sphericity index (56.70 ± 0.001) and the aspect ratio (87.00 ± 0.031%) of the seeds of *E. anomala* (Table 1) were found to lie within the range predicted for objects with round shapes (Akande, 1998). The values obtained equally falls within the range predicted by Omobuwajo (2002), for African breadfruit seeds (*Treculia africana*) which have the appearance similar to that of *E. anomala*.

The density characteristics of grains predict their machine-ability. The density of seeds was proportional to the material components in the given food sample which is according to the throught-put capacity of the machine (loading through the hopper to the action zone of the machine) and in relation to the power of the machine (Romeo, 2000). The seed kernel density was 1.01 x 10 ± 0.017 kg/m^3 , bulk density was 0.59 x 10 ± 0.002 kg/m^3 and the density ratio was 58% (Table 1). These values are within the range of values obtained for the seeds of a similar grain, African breadfruit seeds (*Treculia africana*) which predicts adequate value for grain density characteristics in relation to the material components of the seed (Akande, 1998).

Table 1. Physical characteristics of the seeds of *E. anomala*

Parameters	Values
Sphericity index (%)	56.70 ± 0.001
Aspect ratio (%)	87.00 ± 0.31
Mean kernel density (kg/m^3)	1.01×10 ± 0.017
Bulk density (kg/m^3)	0.59×10 ± 0.002
Density ratio (%)	58%

The nutritional composition of food materials is crucial in the study of foods. Specific nutritional values of the food are recorded for various applications in food processing, food preservation, product development and engineering applications (Gordon, 1990). The result of the proximate analysis is shown in Table 2.

Although the proximate composition of the seeds of *E. anomala* has not been officially documented, Adebisi (2006), who studied the effects of various drying temperatures on the seeds, quote the base values close to the values obtained in this study. In addition, these values indicate that the seeds are of adequate nutritional value as recorded by Tull (1985).

The moisture content (Table 2) of 10.6 ± 0.031% of the seeds is less than 12% (moisture content predicted for grain storeability), thus the seeds can actually have a long shelf-life when needed to be stored before utilization or processing (Ihekoronye and Ngoddy, 1985).

Table 2. Proximate composition of seeds of *E. anomala*

Nutrients	Percentage composition
Moisture content	10.60 ± 0.311
Ash content	4.95 ± 0.095
Protein content	15.12 ± 0.033
Lipid/fat content	11.33 ± 0.069
Carbohydrates	58.00

The ash contents of 4.95 ± 0.095% is approximately equal to 5% which is believed to be adequate enough to contain reasonable quantities of minerals i.e., predisposing the seeds to be rich in minerals.

The lipid content of 11.33 ± 0.069, shows that the seeds cannot be categorized as oil seeds; an oil seed should contain at least 40% or above lipids. However, it proves that the seeds contain some non-polar compounds that are phytochemicals, essential oils and essential fatty acids.

The protein and carbohydrate contents were 15.12 ± 0.033% and 58.00%, respectively. These values show that the seeds are rich in carbohydrates but protein content is at a lower level. The protein value of 15.12 ± 0.033 is actually not enough to fulfil the daily dietary requirement of an average body weight of 70 kg, however, when the seed is used as a part of food product, it can contribute meaningfully to protein intake. Carbohydrates are known to supply energy to the body and equally act as “protein sparer” so that proteins can be spared to perform their primary function. Tull (1985) stated that carbohydrates should be used in preference to proteins as energy supplier so that proteins can be used for body growth and repairs. Since the seeds of *E. anomala* contain higher percentage of carbohydrates than proteins, proteins are spared to perform their primary function when used in product development.

The mineral elements determined in this study (Table 3) include major elements, required in amounts greater than 100 mg/day, trace elements required in less than 100 g/day and the heavy metals that are not required at all. Mineral elements are chemicals required by the body for optimal physiological activities and are required in small quantities by the body

systems. However, since they cannot be synthesized by the body, they are to be supplied in the diet or food consumed (Ihekoronye, 1987). The values obtained for the minerals present in the seeds of *E. anomala* especially the major ones (Mg, Fe, Ca, Na) are appreciable and so can support the daily dietary requirements. The trace mineral elements Mn, P, K, and Zn were found in functional amounts while the heavy metals were negligible or not found at all (Table 3). The implication of this is that the seed is a potential source of the essential macro and micro mineral elements needed by human body.

Table 3. Mineral composition of the seeds of *E. anomala*

Minerals	Trials 1	2	3	Mean ± SD (µg/mg)
K	0.4479	0.4339	0.4393	0.44 ± 0.0076
Ca	1.3295	1.3132	1.2746	1.306 ± 0.028
Mg	3.2703	2.8722	3.2109	3.118 ± 0.215
Zn	3.3583	3.3279	3.3460	3.344 ± 0.015
Fe	3.3800	3.0545	3.0943	3.1760 ± 0.178
Mn	0.8422	0.8534	0.8353	0.844 ± 0.009
Na	0.9240	0.9250	0.9211	0.9233 ± 0.016
Al	nil	nil	nil	nil
P	0.0460	0.0445	0.0450	0.0452 ± 0.006
Pb	nil	nil	nil	nil
Co	nil	nil	nil	nil

Conclusion

The physical characteristics and nutritional qualities of the seeds of *Erythrococca anomala* Benth were determined. The seed dimensions and the shape were established as being spherical. The seeds contain appreciable quantities of macro-nutrients (proteins, fats and carbohydrates) and mineral elements. It can, therefore, be concluded that the seeds of *E.anomala* can be mechanically processed and used in food product development.

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