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Full Length Research Paper

Chemical composition and storage parameters of sun-dried Kola nuts

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Kola nuts (*Cola nitida*) were sun dried to determine their storage and suitability parameters for possible export. Moisture content of nuts could be reduced to 7 - 9% by sun-drying in wooden trays with raffia mat bases. Milled nuts stored for 12 months in sealed polybags at room temperature (25 - 27°C) did not significantly (*P* 0.05) absorb moisture over the period of storage. The chemical composition of most of the non-volatile components (protein, fibre, ash, non-soluble sugars, caffeine, lipids, potassium and total nitrogen) in the sun-dried nuts did not significantly differ from that of the fresh and cured nuts. There were, however, significant differences in soluble sugars and total polyphenols. Other differences observed were in the volatile profile of the nuts taken through various treatments. The implications of the result are discussed.

Key words: *Cola nitida*, cured nuts and caffeine.

INTRODUCTION

Most cola pickers, traders and industrial users depend on the traditional way of curing and preserving the nut, which lead to substantial losses by way of insect infestation (Owusu-Manu and Mama, 1995; Owusu-Manu and Bonku, 1994), *in-situ* germination, shrinkage, bolting and mouldiness (Adenikinju et al., 1989). Such losses can be avoided with the use of proper storage containers, proper pre- and post- storage insect control strategies and periodic turning of the nuts in storage. Discarded kola nuts are an economic loss to the farmer for lack of effective processing of such nuts. But with proper integration of sun drying of both insect infested and whole nuts, good curing and control of post harvest losses during curing / storage, the farmer can increase his income substantially. The industrialist can also benefit from the otherwise lost raw material and the possible high levels of caffeine/ theobromine which can be obtained through sun-drying of nuts for industrial use.

This paper discusses the changes in the mineral content, caffeine, crude protein and volatile aroma substances in kola nut compared to those in the traditional curing process.

MATERIALS AND METHODS

The experiments were carried out at the Cocoa Research Institute of Ghana (CRIG), Tafo. Freshly harvested *Cola nitida* nuts were depulped and divided into eight equal lots of approximately 5 kg. Nuts were sun-dried for four weeks at ambient day temperature of 32ºC in wooden trays. Weight of nuts was monitored until they were completely dried. Samples were then milled in a commercial mill, stored in polybags at room temperature and sampled once a month for 12 months for moisture determination. Another set of four, each consisting of 200 nuts, was taken through the curing process for 6 months using baskets lined with banana leaves.

The factors investigated were effect of sun drying and curing on the caffeine, volatile components, total nitrogen and mineral nutrients of the nuts. The dry weight of the samples was determined in triplicate by the method of Association of Analytical Chemist (A.O.A.C, 1990). Aroma volatile extraction was done using the Likens-Nickerson concurrent steam distillation- solvent extraction technique and analysed by gas chromatography with FID detector (AMS model 93), as modified by Tomlins (1993). Injector and detector temperatures were set at 220° and 250°C respectively. Carbowax 20 M (25 m x 0.32 mm id) column was used under the temperature programme 60°C for 5 min, gradient to 240°C at 4°C/min, followed by isothermal for 30 min. Nitrogen was used as the carrier gas at 1.5ml/min. A splitless injection of 5 l was done.

Total ash, crude fibre, total lipid content and total nitrogen were determined by the method of A.O.A.C (1990). Crude protein content was then calculated from total nitrogen (N x 6.25). Caffeine content was determined by HPLC with some modifications using the methods from literature (Anon, 1990). To 0.200 g of sample in a weighed 250 ml round-bottomed flask was added 95 ml distilled water and refluxed for 25 min. After cooling, weight of water added was adjusted to 100 g, thoroughly shaken and centrifuged for 5 min at 5000 rpm to obtain a supernatant. Prior to analysis, the extracts were filtered through a 0.45 µm Millex filter (SLHV013SL, Millipore, Carrigtwahill, Ireland). The HPLC system comprised a Cecil 1100

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