Research Journal of Biological Sciences 2 (1): 33-35, 2007

Preliminary Studies on *Albizzia lebbeck* Seeds: Proximate Analysis and Phytochemical Screening

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Abstract: Qualitative determination of the nutritional and chemical composition of *Albizzia lebbeck*, an underexploited legume in Nigeria, was carried out. Seeds of *Albizzia lebbeck* were found to be rich in crude protein and carbohydrate but low in lipid content. The phytochemical screening of the seeds showed the presence of saponins and oxalate while tannins, cyanogenic glycoside and phytic acid levels were low. The seeds of this plant may serve as a cheap source of protein and carbohydrate in food supplements to animals.

Key words: *Albizzia lebbeck*, proximate analysis, phytochemical screening

INTRODUCTION

Albizzia lebbeck is a leguminous plant belonging to the family Fabaceae (formerly Leguminoseae), member of the mimosa subfamily. They comprise of trees and shrubs and are native to warm regions of Australia, Asia and Africa. They are grown in mild climates as ornamentals (Salim *et al*., 2002). *A. lebbeck* is an introduced species in Nigeria (Keay *et al*., 1964). The tree is easily grown from seeds and can be found on a variety of soils. It is hermaphroditic and so can reproduce itself readily. It is identified by greenish white flower heads and a grayish bark. Flowering occurs in Nigeria from November to February while pods ripen during September to May and remain on the trees for a long time, i.e., after the new flowers have appeared. The pods are thin, flat and straw coloured. Some of its common names are; Indian siris, Albizzia and Woman's tongue tree.

Albizzia lebbeck is a widely available plant in the tropics and subtropics with economic importance for industrial and medicinal uses. It is grown in some areas, like India, primarily as fodder for camels, water buffalo and cattle. In Sudan, goats eat the fallen leaves and flowers. The leaves are reported to be good fodder, with 17-26 % crude protein; 100 kg of leaves yield 11-12 kg of digestible protein and 37 kg of digestible carbohydrates. Lowry *et al*. (1994) reported that rabbits and bats feed on the leaves also and that the fallen flowers and pods can be used as feed early in the season since they are highly digestible. He went on to state that the leaves of *Albizzia lebbeck* are remarkably free of toxins and tannins and are low in phenolic compounds. The pods however contain saponin and are not eaten in large quantities by sheep, although cattle eat them readily (Salim *et al*., 2002).

Other functional uses are in the areas of; crop use: it is used as a windbreak crop (Fletcher, 2001). Also, *Albizzia lebbeck* is a nitrogen fixing woody legume. The amount of nitrogen fixed increases with the age of the plant (Kadiata *et al*., 1996). In addition, the nitrogen-rich leaves are valuable as mulch and manure; In the area of apiculture: its flowers are fragrant and so attract bees. It is highly regarded by bee-keepers for the light coloured honey its nectar provides (Salim *et al*., 2002). Medicinally, *A. lebbeck* leaves possess anticonvulsant activity (Kasture, 1996). The leaves or seeds are used for eye problems and the bark to treat boils. Saponin from the pods and roots has a spermicidal activity and the bark can be used for soap when dried and pounded (Salim *et al*., 2002).

Although considerable information now exists on the nutrient composition of most well known and easily cultivated legumes in Nigeria, no information could however be obtained concerning the nutritional and anti-nutritional factors of the seeds of *A. lebbeck*. The purpose of this work therefore was to chemically evaluate the nutrient composition of *Albizzia lebbeck* seeds as well as its phytochemical composition.

MATERIALS AND METHODS

Seed collection: Dry pods of *Albizzia lebbeck* were collected from the trees in the main campus of Ahmadu Bello University, Zaria-Nigeria, where they are grown as aesthetic plants. They were thrashed in the bags with which they were collected and winnowed on a tray to get clear seeds by blowing air through in order to remove the chaff. The seeds were subsequently milled to obtain a homogeneous powder and stored in air-tight stoppered glassware before analysis was carried out.

Chemical analysis: The proximate composition (moisture, crude protein, crude lipid, crude fibre, ash and nitrogen free extract) of the seeds were determined using

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Table 1: Proximate composition of *A. lebbeck* seeds

Component	Value (% composition)
Moisture	4.55±0.04
Crude protein	38.04±0.40
Crude lipid	5.66±0.12
Crude fibre	11.63±0.21
Ash content	7.84±0.06
Nitrogen free extract	32.28±0.03

Table 2: Phytochemical screening of *A. lebbeck* seeds

Phytochemical component	Result
Cyanogenic glycoside (mg g^{-1})	0.11
Phytic acid (mg g^{-1})	0.25
Oxalate (mg g^{-1})	2.80
Saponin (%)	18
Tannin (mg g^{-1})	0.002

the standard methods of the Association of Official Analytical Chemists (A.O.C.A., 1980). The presence of oxalate (Oke, 1969), phytic acid (Wheeler and Ferrel, 1971), tannin (A.O.C.A., 1980), cyanogenic glycoside and saponin (A.O.C.A., 1984) were detected by standard methods. All chemical analyses were carried out in duplicate.

RESULTS

The proximate composition of *A. lebbeck* are presented in Table 1. The crude protein content recorded the highest (38.04±0.40) amongst the nutrient composition while the moisture content was found to be the lowest (4.55±0.04). The phytochemical screening of the seed (Table 2) showed the presence of oxalate and saponins, both of which were high. Tannin content was however the lowest at 0.002 mg g^{-1}.

DISCUSSION

The low moisture content recorded after proximate composition of the seeds is desirable because it implies that the shelf life for this seed will likely be long. For a feedstuff to be regarded as a potential protein source, its crude protein level must exceed 20%. This therefore means that *A. lebbeck* is a protein source and this finding conforms with various reports that legumes are proteinous (Norris, 2005; Apata and Ologhobo, 1994). It was observed that the seeds had low lipid content, a necessary factor in preventing rancidity in seeds stored for long periods. Apart from the oil legumes, other legumes have been reported to be low in oil content ranging from 1-5%. However, oilseeds have a range of lipid contents from about 18% in soyabean to as high as 43% in groundnut (Ene-Obong and Carnovale, 1992). These comparisons indicate that *A. lebbeck* is not an oil seed as its oil content is about 6%. The ash content (7.84%) of this seed is higher than that of other legumes which has been reported to range between 3.0 and 4.8% (Elegbede, 1998), an indication that it may possess a higher mineral content. The carbohydrate content (32.28%) is comparable with that of other legumes ranging from 23% in groundnut to 66% in Bambara g roundnut (Ene-Obong and Carnovale, 1992). Fibre is the portion of the plant that provides it with structural strength and form. Generally, vegetative parts, especially the stem possess high fibre content. Seed hulls and/or coats often contain fibre. Therefore, the high fibre content of the *Albizzia* seeds may have been due to the inclusion of the seed coat during milling. Fibre is not required in the diet of non-ruminants like fish therefore the fibre contents could pose a distinct deterrent to their use in aquaculture diets. Although crude fibre enhances digestibility in some other animals, the presence of high fibre levels in diet can cause intestinal irritation, lower digestibility and overall decreased nutrient utilization (Oyenuga and Fetuga, 1975).

The phytochemical screening of the seeds showed the presence of chemical compounds which suggests the pharmacological activities of *Albizzia lebbeck*. Saponins are glycoside components often referred to as "natural detergent" because of their foamy nature (Seiglar, 1998). Saponins in seeds have been known to possess both beneficial and deleterious properties depending on their concentration in the sample. Seiglar (1998) reported that saponins have anti-carcinogenic properties, immune modulation activites and regulation of cell proliferation as well as health benefits such as inhibition of the growth of cancer cells and cholesterol lowering activity. In high quantities however, they may lead to the rupture of blood vessels. The presence of saponins in the seed was expected as the pods have been reported by Salim *et al.* (2002), to contain large quantities of them. The toxic effects of cyanogenic glycoside include decreased heart rate, decreased sympathetic activity and decreased systemic vascular resistance (Seiglar, 1998), however for *A. lebbeck* the level was low. William *et al.*, (1967) reported that oxalate is a rapid irritant poison when in high quantities. They also reported that salts of oxalic acid occur in other plants such as sorrel and rhubarb. Both plants are eaten by humans even though they contain oxalate. Phytate is not broken down in monogastric animals (e.g., poultry, fish and swine) and the level is considerably low in the seed under study. Tannin reduces protein solubility by forming a complex with protein, thereby causing a reduction in digestibility and causing depressed growth rates (Seiglar, 1998). The level in the seeds of *A. lebbeck* was negligible and this agrees with (Lowry *et al.*, 1994) who reported that the leaves of the plant are tannin-free.

In view of the present study, it would appear that *Albizzia lebbeck* has a potential to be utilized as a cheap source of protein, energy and minerals supplement for animals.

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