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Phytochemical and Nutrient Evaluation of Spondias Mombin Leaves

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Abstract: Sample of Spondias Mombin leaves was analyzed for the phytochemical composition, vitamins and minerals constituents. Phytochemical screening and subsequent quantification revealed the presence of bioactive compounds tannins 3.82%; Saponins 7.60%; Flavonoids 3.00%, alkaloids 6.00% and phenols 1.00%. Vitamin results showed the plant leaves contained ascorbic acid 19.35mg100^{-1}g; Niacin 3.75mg100^{-1}g. Riboflavin 0.25 mg100^{-1}g and Thiamine 0.05 mg100^{-1}g. Mineral analysis revealed in the plant leaves, K 2.55%, Mg 0.3045%, Na 0.100%, Ca, 1.310% and P, 0.200%. The results proved spondias mombin as a potential source of useful drugs formulation and feed stuff for ruminants as presently used in some African countries.

Key words: Spondias Mombin, phytochemical, nutrient, leaves

Introduction

The pant has been traditionally noted for its medicinal and food values. Preliminary result report a wide range of antibacterial and antifungal properties (Okwu, 2001; Urugulaga and Laghton, 2000). The chemistries of this pant has been reported (Shultes and Raffauf, 1990). Kramer *et al*. (2006), recommended its use for pregnant woman but only after five months of pregnancy. The results indicate that the cytotoxic effects of the plant may have some benefits in protecting the foetus from foreign pathogens. High levels of cytotoxicity is a good indicator of analgesic properties. The use to ease pain during childbirth support this evidence (Kramer *et al*., 2006). The results of antibacterial and antifungal bioassays demonstrate growth inhibition (Castner *et al*., 1998).

In Amazons the fruit is used mainly to produce wine sold as "Vinho de Taperita". In Guatemala, the fruit is made into a cider like drink. Young leaves are cooked as greens and excessive indulgence in the fruit is said to cause dysentery (Moran, 1987).

The objective of this look is to evaluate the phytochemicals and nutrient content of Spondias Mombin leaves.

Materials and Methods

The fresh leaf samples of study plant was collected from Umudike Ikwuato of Abia state Nigeria. The material was washed and sun dried in the open air for five days. Thereafter, the sample was ground into fine powder with a mechanical blender Thomas Willey machine and stored in air tight bottle prior to use for analysis. The phytochemical screening was done on the sample using methods as described (Sofowara, 1993; AOAC, 1980). Alkaloid was extracted using a slight modified method of Maxwell *et al*. (1995). Here the dried sample was homogenized and the alkaloid extracted from 10grams of the sample for 4h using 20% v/w acetic acid in ethanol. The extract was filtered to remove cellulose debris and then concentrated to about one quarter of the original volume.

One percent NH_4OH was added drop wise until a precipitate occurred. The crude alkaloid was dried to constant weight in an oven and the percentage alkaloid calculated. The multiple-nutrients wet acid digestion method as described (AOAC, 1980) was used for the mineral determination of the test sample. Calcium and Magnesium were determined by EDTA versanate complexometric titration method, while flame photometric method was used to determine Potassium and Sodium. Phosphorous was determined Spectrophotometrically by the vanadomolybdate yellow method. The composition of the water-insoluble vitamins riboflavin, thiamine and niacin was determined by the method of Scalar Analyzer (2000) and while ascorbic acid content was determined by the method of (AOAC, 1980).

The Bohm and Kocipai-Abyazan method (1994) was used for the determination of tannins and flavonoids while saponins was analyzed using that of Peng and Kobayasli (1995) method.

Results and Discussion

The phytochemical screening results of Spondias Mombin (Table 1) showed that the leaves contain alkaloids, flavonoids, tannins saponins and phenonlic compounds. The quantitative estimates in percentage of the phytochemicals are as shown in Table 2. Tannins, 3.82%, saponins, 7.60%; alkaloids, 6.00% and 3.00% flavonoids. The results of the mineral analyses indicate 2.55% Potassium (K), 0.10%, Sodium (Na), 0.304% Magnesium (Mg), 1.31% Calcium (Ca) and 0.20% Phosphorous (P), the vitamin composition of the leaves sampled falls within the consumable limits.

Table 1: Photochemical screening of Spondias Mombin

Constituents	Bioassay
Tannins	+
Saponins	+
Alkaloids	+
Phenols	+
Flavonoid	+

+Represent presents, -No activity, Results are mean of five determinations

Table 2: Quantitative estimates of phytochemicals of Spondias Mombin (%)

Constituents	Quantity (%) w/v
Tannins	3.82
Saponins	7.60
Alkaloids	6.00
Flavonoid	3.00
Phenols	1.00

Results are mean of five determinations

Table 3: Mineral composition of the leaves of Spondias Mombin on dry weight basis expressed in %

Mineral	%
K	2.550
Na	0.100
Ca	1.310
P	0.200
Mg	0.30

Results are mean of five determinations

Table 4: Vitamin compositions of the leaves of Spondias Mombin on a dry weight basis expressed as $Mg100^{-1}g$

Vitamin	Amount ($Mg100^{-1}g$)
Ascorbic acid	19.35
Riboflavin	0.25
Thiamine	0.05
Niacin	3.75

Results are mean of five determinations

19.36mg/10g ascorbic acid; 0.25mg/100g riboflavin; 0.05mg/100g. Thianin and 3.75mg/100g niacin. Spondias Mombin leaves is rich in phytonutrients such as flavonoids, tannins, saponins and alkaloids (Table 2). The biological function of flavonoids include protection against allergies, inflammation, platelets aggregation microbes, ulcer, vineses and tumors (Okwu and Okwu, 2004; Farquar, 1996). Flavonoids represent the most common and widely distributed groups of plant phenolics. Flavonoids are free radical scavengers, super antioxidants and potent water soluble which prevent oxidative cell damage and have strong anti-cancer activity (Salah *et al*., 1995). As antioxidants flavonoids provide anti-inflammatory actions (Okwu, 2001A; Okwu, 2001B), this may be the reason behind the use of Spondias Mombin in the treatment of intestinal troubles in herbal medicine (Okwu and Okwu, 2004). The Saponin constituents is responsible for the possession of hemolytic property. This can give the plant the traditional medicinal use as cholesterol binding agent. The high content of the Saponin (7.60%) shows that Spondias Mombin has cytotoxic effects such as permealization of the intestine. It also gives the plant leaves the bitter taste. Saponin has relationship with sex hormones like oxytocin. Oxytocin is a sex hormone involved in controlling the onset of labour in women and the subsequent release of milk (Okwu and Okwu, 2004). This is why the leaves of Spondias Mombin are given to expectant ruminant animals and those that delivered without the release of their placenta (Okwu and Ekeke, 2003).

Alkaloids are the most efficient therapeutically significant plant substance. Pure isolated alkaloids and the synthetic derivatives are used as the basic medicinal agent because of their analgesic antispasmodic and bacterial properties (Stray, 1998). They show marked physiological effects when administered to animals.

The high tannin content (3.82%) may be partly responsibility for the bitter principle associated with the leaves. Tannins has astringent properties, hastens the healing of wounds and inflamed mucous membrane. The presence of tannins in the leaves of Spondias Mombin can support its strong use for healing of wounds, varicose ulcers, hemorrhoids, frost-bite and burn in herbal medicine (Igboko, 1983; Maduiyi, 1983). The presence of phenolic compounds in the leaves of Spondias Mombin shows that the plant may have anti-microbial potential. This is because phenols and phenolic compounds have been extensively used in disinfections and remain the standards with which other bactercides are compared (Okwu, 2001). Deficiency of ascorbic acid is associated with pains in the joint and defect in skeletal calcification, anemia, manifestation of scurry hemorrhage from mucous membrane of the month and gastrointestinal track (Hunt *et al*., 1980). This function of ascorbic acid accounts for its demand for normal wound healing. There is also an interesting ability of ascorbic acid as an antioxidant, to prevent or at least minimize the formation of carcinogenic substances from dietary material (Hunt *et al*., 1980). As a result of the presence of ascorbic acid in Spondias Mombin leaves, the plant can be used in herbal medicine for the treatment of common cold and other diseases like prostrate cancer (Okwu and Okwu, 2004; Okwu and Ekeke, 2003).

Other vitamins though in trace amount are essential for body metabolism.

The result of the mineral composition clearly shows that Spondias Mombin leaves contains rich source of mineral elements this result become so important when the usefulness of such mineral like Ca, Mg, P, K and Na in the body are considered. However, the lower Na content (0.100g) of Spondias Mombin is an added advantage because of the direct relationship of sodium intake with hypertension in human (Dahl, 1972).

Conclusion: This present study has shown the phytochemicals, vitamins and minerals composition of spondias Mombin leaves. This partly shows the use of this plant in herbal medicine. As a rich source of phytochemicals, coupled with the presence of the essential vitamins and minerals, Spondias Mombin can be seen as a potential source of useful food and drugs. The saponins content of this plant also shows its oxytocin property. This also proves that the plant can be used to abort pregnancy and this is why the plant is given to ruminants before or after birth to induce labour. Further studies has to be carried out to isolate, characterize and elucidate the structure of the bioactive compounds from the plant for industrial drug formulation.

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