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Short Communication

Chemical analysis of leaves of *Abrus precatorius*

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Leaves of *Abrus precatorius* are sweet and traditionally used to treat cough, malaria, snake bites and boils. This study evaluates the proximate and mineral composition of *A. precatorius*, and establishes the best solvent for the extraction of the sweet component of the leaves, by performing organoleptic test on the extract of different solvents, under different temperature conditions. The proximate composition of *A. precatorius* shows that it contains carbohydrate (65.50 ± 3.12%) as its largest component, crude fibre (2.00 ± 0.00%) as its lowest component. Moisture is 11.00 ± 0.00%, Ash is 7.00 ±1.41%, crude protein is 8.00 ± 0.00% and lipid is 6.50 ± 2.12%. Mineral analysis reveals that the leaves contains Na 94.10 ± 0.145 mg/100 g, Cu 00.07 ± 0.004 mg/100 g, Fe 24.14 ± 0.002 mg/100 g, Zn 6.09 ± 0.020 mg/100 g, K 246.94 ± 0.0252 mg/100 g, Ca 231.84 ± 0.204 mg/100 g, and Mg 25.66 ± 0.012 mg/100 g of sample. The best solvent and method of extraction of the sweet component of the leaves is hot (soxhlet) methanolic extraction.

Key words: *Abrus precatorius*, minerals, proximate, organoleptic.

INTRODUCTION

Abrus precatorius is a slender perennial climber that twines around trees, shrubs and hedges. It has no special organ of attachment. The leaves are glabrous with long internodes. It has slender branches with cylindrical wrinkled stem with a smooth textured brown bark (Hara and Williams, 1979; Fernando, 1988). It roots is deeply and tenaciously difficult to be eradicated. It increases in population size following a fire (Holm et al., 1991).

A. precatorius (locally called “Idon Zakara” in Hausa) is a species of the plant family *Fabacea*. It is a wild plant that grows best in fairly dry regions at low elevations. The plant is native to Indonesia, but grows well in tropical and subtropical areas of the World (Lock and Ford, 2004). Other vernacular names include: Rosary pea, Crab’s eye, Jequerity, Precatory beans, Lucky beans, Indian beads, Deadly crab’s eye, Jumble beads, Rosary beads and Prayer beads.

A. precatorious leaves possess medicinal properties and have sweet taste that lasts long on the tongue upon ingestion. The leaves are taken orally as medicine and does not contain as much of the deadly component abrin (one of the most potent toxins known to man) as is found in the seed (Reedman et al., 2008; Burkill, 1997; Adedapo et al., 2007; Davis, 1979; Frohne and Pfander, 1983). The leaves have been used as food and as medicine. It is reported to be commonly chewed or sucked to obtain its sweet taste (Kennelly et al., 1996). It is also reportedly boiled with food for example, cereal pulp, as a sweetener and even as a vegetable. In addition, fresh leaves have been reportedly pressed on the gum for sores in the mouth and used in many countries in preparations for skin cancer (Adedapo et al., 2007; Duke, 2000). *A. precatorius* leaves have also been used in Nigeria for the treatment of myriad of diseases including malaria, ty-phoid, cough, respiratory tract infections and hepatitis (Saganuwan and Onyeyili, 2010).

This work aims at evaluating the proximate and mineral composition of *A. precatorius* and identifying best solvent for the extraction of the sweet component of the leaves.

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MATERIALS AND METHODS

Sample collection and preparation

The leaves and stems of healthy mature *A. precatorius* were collected from Zaria metropolis in Kaduna State, Nigeria and identified at the Herbarium of the Biological Sciences Department, Ahmadu Bello University Zaria, with Voucher No. 932.

The leaves were hand-picked from the stems and dried under shade until they were fully dry. The dried leaves were ground into powdered form with ceramic mortar and pestle. Powdered sample was then packed into clean, dry sample containers ready for analysis.

Reagents

All reagents used for this work were of Analar grade.

Method of extraction

The method of Association of Official Analytical Chemists (AOAC) (2010) was used.

Soxhlet methanolic extraction and soxhlet n-hexane extraction

50 g sample was weighed into a thimble and the thimble loaded into a soxhlet extractor. It was then connected to a pre-weighed round bottomed flask containing anti bumping granules and the solvent. The sample was exhaustively extracted using methanol or n-hexane for 6 h. The extractant (methanol or n-hexane) was distilled off, the flask was re-weighed, and the extract recovered for analysis.

Cold methanolic extraction

28 g of finely ground sample was dissolved in 140 ml of absolute methanol in a 250 ml conical flask and covered with aluminum foil for 24 h with continuous shaking on a shaker, after which it was filtered. The filtrate was concentrated on a water bath at 40°C and labeled.

Cold n-hexane extraction

28 g of finely ground sample was dissolved in 140 ml normal hexane in a 250 ml conical flask and covered with aluminum foil for 24 h with continuous shaking on a shaker, after which it was filtered. The filtrate was concentrated on a water bath at 40°C and labeled.

Cold aqueous extraction

28 g of finely ground sample was dissolved in 140 ml distilled water in a 250 ml conical flask and covered with aluminum foil for 24 h with continuous shaking on a shaker, after which it was filtered. The filtrate was concentrated on a water bath at 40°C and labeled.

*Organoleptic tes*t

This involves tasting of foods, by using sense organs to evaluate flavor, odor, appearance and even mouth feel. This was carried out by a panel of four (4) different persons tasting each extract one at a time without disclosure of result(s). The results and observations were collected and summed up (Amadi et al., 2004).

RESULTS

The results of the tests carried out on *A. precatorius are* presented in Tables 1, 2 and 3. Table 1 gives the proximate composition of the leaves of *A. precatorius*, while Table 2 shows the mineral composition. The results of the organoleptic test carried out on the leaves of *A. precatorius* are presented in Table 3.

Table 1 shows that the leaves of *A. precatorius* has carbohydrate as the major proximate content (65.50 ± 3.12%), while the crude fibre content was very low at 2.00 ± 0.00%.

From Table 2, it can be seen that the highest mineral component of *A. precatorius* is potassium (246.94 ± 0.252 mg/100 g) followed by calcium (231.83 ± 0.204 mg/100 g). The lowest mineral element was copper with a concentration of 0.07 ± 0.004 mg/100 g.

Table 3 gives the results of the organoleptic tests carried out on the plant *A. precatorius*. The agreement between the reported tastes of the plant as reported by the panel of four is obvious.

DISCUSSION

The results of the proximate analysis showed that the largest proximate composition of the leaves of *A. precatorius* is carbohydrate with a value of 65.5 ± 3.54%. While the low level of crude fibre content suggest that most of the carbohydrates are digestible by acid and alkaline hydrolysis.

This suggests that carbohydrates (sugars) are probably responsible for the sweetness of the leaves but since there are other chemical substances/sweeteners that are sweeter than carbohydrates, it should not be concluded that sugars are the principal sweeteners in the leaves of *A. precatorius*. The ash content from the proximate analy-sis shows that the leaves have high mineral composition (inorganic components) while the low level of crude fibre content suggest that most of the carbohydrates are digestible by acid and alkaline hydrolysis. The percen-tage moisture content was low indicating that water con-tent of the leaves is within the reasonable range while organic and inorganic components are major constituents of the leaves. Crude lipid and crude proteins were also relatively moderate.

It should not be concluded that sugars are the principal sweetener in the leaves of *A. precatorius*. Further works on the leaves is required before this conclusion can be drawn.

The outcome of the mineral analysis reveals that the leaves of the *A. precatorius* are rich in potassium and calcium than other mineral element determined. The copper content of the leaves were significantly low com- pared to other minerals, while sodium, iron, zinc and magnesium were moderately low this indicates that potassium and calcium are the major mineral contents of the leaves of *A. precatorius*.

The sweet components in the leaves of *A. precatorius* were tested for using organoleptic test by a panel of four. Although organoleptic tests are subjective in nature, it is significant to note the accord between all members of the panel of four. It can be concluded from the result that the sweet components of the leaves reside in the methanolic

Table 1. Proximate composition of leaves of *A. precatorius*.

Proximate parameter	Percentage
Moisture	11.00 ± 0.00
Ash	7.00 ± 1.41
Crude fibre	2.00 ± 0.00
Crude protein	8.00 ± 0.00
Crude lipid content	6.50 ± 2.12
Total carbohydrate	65.50 ± 3.12

Table 2. Mineral composition of leaves of *A. precatorius* (mg/100 g)

Element	Concentration (mg/100 g)
Sodium (Na)	94.10 ± 0.145
Copper (Cu)	0.07 ± 0.004
Iron (Fe)	24.14 ± 0.002
Zinc (Zn)	6.09 ± 0.020
Calcium (Ca)	231.83 ± 0.204
Potassium(K)	246.94 ± 0.252
Magnesium (Mg)	25.66 + 0.012

Table 3. Organoleptic Test of leaf extract of *A. precatorius.*

Extract	Tasteless	Sweet taste	Bitter taste	Sweet-bitter taste
Hot aqueous extract from crude sample	+	—	—	—
Cold aqueous extract from crude sample	+	—	—	—
Cold n-hexane extract	+	—	—	—
Soxhlet n-hexane extract	+	—	—	—
Cold methanolic extract	—	+	+	+
Soxhlet methanolic extract	—	+	+	+

+, positive result, - = negative result

extract.

CONCLUSION AND RECOMMENDATION

Leaves of *A. precatorius* are rich and edible considering the proximate and mineral composition. Although the leaves are medicinal, they can also be useful in foods as sweeteners if the sweet portion is extracted and characterized. This will form part of a planned further work on *A. precatorius.*

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