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PROXIMATE COMPOSITION AND PHYSIOCHEMICAL CHARACTERISTICS OF *Acacia nilotica* AND *Albizia lebbeck*

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ABSTRACT

The present study analysed the proximate composition of seed powder in which protein content was highest in *Albizialebbeck* (28.5±0.6%)and yield of oil was highest in *Acacia nilotica* (13.6±0.3%) seed oil of both plants having following composition: Peroxide value and Iodine value were highest(1.4±0.1 meq/kg), (140.5±0.1 g/100g) in *Acacianilotica*. Saponification value and Unsaponifiable matter were also highest in (219.4±0.7 mgKOH/g),(6.1±0.2%) *Acacianilotica*. Free fatty acid was highest in *Albizialebbeck* (1.7±0.0%). The fatty acids prominent in both plant was Linoleic acid ($C_{18:2}$) which was highest (62.7±0.8%) in*Albizialebbeck*as compared to *Acacianilotica.* The prominent mineral in *Acacianilotica* was calcium (198.0±1.8%) which is lower than that of *Albizialebbeck* and in *Albizialebbeck*potassium (510.0±2.3%) was the prominent mineral.

Keywords: Acacia Nilotica, Albizialebbeck, Fatty Acid Composition, Oil Composition, Proximate Composition.

I INTRODUCTION

Acacia nilotica(L.) Del. belongs to the family Mimosaceae and is widely distributed in tropical and sub-tropical countries. Ayurvedic medicine practices have declared that green pods and seeds of *A. nilotica*can provide the nutrients and therapeutic ingredients to prevent, mitigate and treat various diseases (Singh *et al*., 2009a). It is used by traditional healers in Chattisgarh District of India for the treatment of various types of cancer. Different parts of *A. nilotica*are known to possess astringent, antibacterial, insect repellent, antioxidant, antidiabetic and antiviral properties (Bachaya*et al*., 2009). Traditionally the bark, leaves, pods and flowers are used against cancer, cold, congestion, cough, diarrhea, dysentery, fever, gall bladder, hemorrhoid, ophthalmia, sclerosis, small pox, tuberculosis, leprosy, bleeding piles, leucoderma and menstrual problems (Ambasta, 1994; Bhargava*et al*., 1998).

In West Africa, the bark and gum of this plant are used against cancer, tumors and indurations of liver and spleen, the root for tuberculosis, the wood for smallpox and the leaves for ulcer (Kalaivani andMathew, 2010).

*Albizialebbeck*L. Benth (AL), locally known as shirish,a large deciduous tree, belongs to the family Fabaceae. It is a medium to large tree, of multistemmed widely spreading habit (Everist, 1986).

The nutritive values of the leaf, flower and pod of *A. lebbeck*in rabbit and sheep have been reported (Gupta, 1981; Pradhan and Dayal, 1981; Lowry, 1987). Its leaves are reported to be good for ophthalmic diseases, night blindness, syphilis and ulcer, cold, cough, and respiratory disorders. The leaves are also used as cattle fodder, mulch, and manure due to high nitrogen contents. The bark of the plant is used as an astringent in the treatment of diarrhea. The bark has acrid taste and recommended for bronchitis, leprosy, scabies and helminthes infections. The plant is also reported to have antiseptic, anti-inflammatory, anti-dysenteric, anti-tumour and anti- tubercular properties.

II MATERIALS AND METHODS

Dry pods of *A. nilotica and A. lebbeck*were collected from forest area of District Palwal, India. The seeds were removed from their pods and ground to powder form using electric grinding machine. The powder seed and oil composition were determined by stsndard method of AOAC 1990.

2.1 Fatty Acid Spectrum

Preparation of methyl esters:

Method:

A suitable amount of oil sample was taken in a test tube and 0.5 ml of 0.5 N sodium methoxide was added and covered with aluminium foil and then immersed in a water bath at 65ºC to a depth of half inch and was shaken vigorously for 2 - 3 min. The mixture became homogenous indicating the complete esterification of the oil sample. The test tube was removed from the water bath and cooled to room temperature. One ml of carbon disulphide was added and shaken for 1 - 2 min. Approximately 100 mg of activated charcoal was added mixed uniformly and filtered through Whatman No. 1 filter paper. The filtrate constituted all the methyl esters of fatty acids.

2.2 Fractination of methyl esters by GLC

Methyl esters of fatty acids were separated using Chemito 8610 HT Gas chromatograph equipped with FID and a BPX70, 0.25ml fused silica column (SGE Pvt. Ltd., Ringwood, Victoria, Australia) was used. The carrier gas was hydrogen and injection was operated in the split mode, the split ratio being approximately 50 : 1. Injector and detector temperature were 270ºC and 280ºC respectively. The oven temperature was held at 70ºC for 1 min. and then programmed at 30ºC/min. to 170ºC followed by further programming at 30ºC/ min. to 200ºC and held at this temperature for 6 min. Data was captured and analysed with, Chemito 5000 integrator (Tashniwal Instruments, India Ltd.).

2.3 Mineral Contents

Reagents:

Diacid mixture: Nitric acid and perchloric acid was mixed in ratio 5:1 just before use.

Hydrochloric mixture (1%): 1ml of conc. HCl was added in 50 ml distilled water and final volume was made upto 100 ml with distilled water.

Method:

0.2 gm powdered sample of the seeds was digested with 15 ml of diacid mixture ($5HNO_3$:$HClO_4$) in a conical flask by heating on hot plate in open space till clear white precipitates settle down at bottom of conical flask. The precipitates were dissolved in 1% HCl prepared in double distilled water, filtered and final volume of filterate was made up to 50 ml with double distilled water and analyzed by using atomic absorption spectrometer.

III RESULTS

The physiochemical characteristics of oil of *Acacianilotica* and *Albizialebbeck* were determined according to the standard methods of AOAC (1990), which were given in table 3.1. The free fatty acid were 0.9±0.1% & 1.7±0.0%, peroxide value of fresh oil were 1.4±0.1 meq/kg & 0.9±0.1meq/kg, saponification values were 219.4±0.7 mgKOH/g & 204.7±1.0mgKOH/g, unsaponifiable matter were 6.1±0.2% & 3.7±0.2%, iodine values were 140.5±0.1 g/100g & 101.0±0.7 g/100g.

Fatty acid Composition of seed oil of *Acacianilotica* and *Albizialebbeck* having the following composition: Palmitic acid ($C_{16:0}$) 13.7±0.4% & 13.5±0.3%, stearic acid($C_{18:0}$) 4.4±0.1% & 1.1±0.0%, oleic acid ($C_{18:1}$) 30.6±0.3% & 12.6±0.4%, linoleic acid ($C_{18:2}$) 40.5±0.4% & 62.7±0.8%, linolenic acid ($C_{18:3}$) 2.6±0.3% & 2.0±0.1%, arachidic acid ($C_{20:0}$) 0.1±0.1% & 0.9±0.1% and Behanic acid ($C_{22:0}$) 1.6±0.2% & 2.3±0.1% which is shown in table 3.2.

The *Acacianilotica*and*Albizialebbeck* seeds contained significant amount of important minerals shown below in Table 3.3. Calcium 198.0±1.8 mg/100g & 280.0±1.7 mg/100g, potassium 110.0±1.1 mg/100g & 510.0±2.3 mg/100g, sodium 25.0±0.3 mg/100g & 62.5±1.2 mg/100g, magnesium 2.5±0.1 mg/100g & 7.1±0.4 mg/100g, iron 18.0±0.3 mg/100g & 2.3±0.2 mg/100g, zinc 2.4±0.0 mg/100g & 2.0±0.1 mg/100g, cobalt 1.9±0.1 mg/100g & traces, manganese 3.0±0.2 & 0.2±0.1, copper 0.3±0.0 mg/100g & 0.6±0.3 mg/100g and phosphorus 51.4±1.5 mg/100g & 390.0±2.7 mg/100g.

Yield of oil in Acacia nilotica 13.6±0.3% which is highest than inAlbizialebbeck 10.9±0.4% and protein content were 23.4±0.5% & 28.5±0.6% in both plants.

Table3.1: Physiochemical characteristics of seed oil of *Acacia nilotica*and *Albizialebbeck*

Parameters	Composition	
	Acacia nilotica	Albizialebbeck
Peroxide value (meq/kg)	1.4±0.1	0.9±0.1
Iodine value (g/100g)	140.5±0.1	101.0±0.7
Saponification value (mgKOH/g)	219.4±0.7	204.7±1.0
Unsaponifiable matter (%)	6.1±0.2	3.7±0.2
Free fatty acid (%)	0.9±0.1	1.7±0.0

Values are mean of three replicates ± standard error

Table 3.2: Fatty acid Composition of seed oil of *Acacianilotica*and *Albizialebbeck*

Parameters	Composition (%)	
	Acacia nilotica	Albizialebbeck
Palmitic acid ($C_{16:0}$)	13.7±0.4	13.5±0.3
Stearic acid ($C_{18:0}$)	4.4±0.1	1.1±0.0
Oleic acid ($C_{18:1}$)	30.6±0.3	12.6±0.4
Linoleic acid ($C_{18:2}$)	40.5±0.4	62.7±0.8
Linolenic acid ($C_{18:3}$)	2.6±0.3	2.0±0.1
Arachidic acid ($C_{20:0}$)	0.1±0.1	0.9±0.1
Behanic acid ($C_{22:0}$)	1.6±0.2	2.3±0.1

Values are mean of three replicates ± standard error

Table 3.3: Mineral Composition of seeds of *Acacianilotica* and*Albizialebbeck*

Parameters	Composition	
	Acacia nilotica	**Albizialebbeck**
Ca (mg/100g)	198.0±1.8	280.0±1.7
K (mg/100g)	110.0±1.1	510.0±2.3
Na (mg/100g)	25.0±0.3	62.5±1.2
Mg (mg/100g)	2.5±0.1	7.1±0.4
Fe (mg/100g)	18.0±0.3	2.3±0.2
Zn (mg/100g)	2.4±0.0	2.0±0.1
Co (mg/100g)	1.9±0.1	Traces
Mn (mg/100g)	3.0±0.2	0.2±0.1
Cu (mg/100g)	0.3±0.0	0.6±0.3
P (mg/100g)	51.4±1.5	390.0±2.7

Values are mean of three replicates ± standard error

IV DISCUSSION

Table 3.1 presents the result of thephysicochemical analysis of the oils of *A. nilotica*and *A. lebbeck.* The free fatty acid content was0.9±0.1 % in *Acacianilotica*and *Albizialebbeck*had it as 1.7±0.0 % respectively. The iodine value isa measure of the unsaturation in oils. Thisvalue was found as 140.5±0.1 g/100gin *Acacianilotica*which placed it as the moreunsaturated among both oils evaluated. *Acacianilotica*also hadthe highest saponification value (219.4±0.7mgKOH/g) and unsaponifiable matter (6.1±0.2mgKOH/g) among thestudied oils. The peroxide value was 1.4±0.1meq/kg in *Acacianilotica*, 0.9±0.1meq/kg in *Albizialebbeck.*

The fatty acid composition of the seed oils of theseplants is presented in Table 3.2. C18:2 was thedominant fatty acid in the seed oils of *Acacianilotica*(40.5 ± 0.4%)and *Albizialebbeck*(62.7± 0.8 %). C18:1 and C18:3were highest in *Acacianilotica*(30.6 ± 0.3 % & 2.6 ± 0.3%), while C22:0 had the highest value in *Albizialebbeck*(2.3± 0.1%). C16:0 were(13.7± 0.4 %) in *Acacia nilotica*while (13.5± 0.3 %) in *Albizialebbeck.*

A total of ten minerals were determined in the seeds. The results of which shown in table 3.3. These minerals are known to play vital roles in both plants and animals (Schwartz; 1975) and they were accumulated in different amounts in the seeds. K was detected as the most accumulated metal in the seeds. This was foundin the seed of *Albizialebbeck*as 510.0 ± 2.3mg/100g while the seeds of *Acacianilotica*hadit as 110.0±1.1 respectively. Na, Ca, Mg and P were also detected high in the seeds of *Albizialebbeck.* Na was (62.5 ± 1.2mg/100g), Ca(280.0 ± 1.7mg/100g) while Mg and P were(7.1 ± 0.4mg/100g) and (390.0±2.7mg/100g).

study support the fact that some medicinal plants commonly consumed in India are promising sources of potential antioxidants.

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