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Physicochemical Properties of *Acacia Polyacantha* Gum

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Introduction

Although there are more than 1100 species of *Acacias* botanically, known distributed throughout the tropical and subtropical areas of the world, most commercial gum Arabic is derived from *Acacia senegal* locally known as hashab gum (in the Sudan) and as Kordofan gum in the world. Gum Arabic has been known for many thousands of years and there are no artificial substitutes that match it for quality or cost of the production (Gabb, 1997). Chemically, gum Arabic consists mainly of high-molecular weight polysaccharides made up of rhamnose, arabinose, and galactose, glucuronic and 4-o-methoxylglucuronic acid, and the salts of calcium, magnesium, potassium, and sodium of the two acids (Gabb, 1997). The Sudanese, major gums of economic importance are gum Arabic, gum talha and *Acacia polyacantha* gum. The source of gum Arabic is *Acacia senegal* var *senegal*. *A. polyacantha* exudates are closely related to, and can hardly be distinguished from *Acacia senegal* exudates unless recognized by acknowledged gum expert or by studying the physico-chemical characteristics. The two species, *Acacia senegal* and *Acacia polyacantha* belong to the same group known as *Acacia senegal* complex. All gum exudates, from this group of *Acacia* species, have a laevorotatory (-ve) specific rotation in contrast to the *Acacia seyal* complex which produce gum exudates, that have a dextrorotary (+ve) specific rotation, other structural, botanical characteristics are noticeable even within the same species. Most of the research work is directed towards gum Arabic and to a lesser extent towards gum talha. Regrettably the *A.polyacantha* gum and all other gum resource from Acacia species received very little attention.

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Materials and Methods

From Kadogli and Eldamazine areas in Sudan, fourty samples of gum nodules were collected from *A. polyacantha* trees (season 2005/2006). The moisture and ash contents were determined according to AOAC (1990).While protein content by Anderson (1986).The specific rotation was determined 1 % w/v according to FAO (1991). Viscosity was measured using U- tube viscometer (type Volac /BS.UC, serial No.1094) with the time for 1% aqueous solution of sample at room temperature (25^{o}C). The molecular weight was calculated from the intrinsic viscosity using Mark-Houwink equation. (Mark, 1938; Howink, 1940). The pH value was determined for 1% aqueous solution at room temperature, using a microprocessor pH meter, HANNA, (ROMANIA) Type 211. Apparent equivalent weight was determined according to (Encyclopedia, 1966). Minerals determined using UNICAM 8625 UV/VIS spectrophotometer. Emulsifying stability according to the method reported by Eltayeb (1999), a concentrated solution of gum sample 20% w/v in distilled water. Lastly the water holding capacity (W.H.C) measured according to Elamin (2001).

Results and Discussion

The specific rotation of Kadogli samples was -19.6, while that of Eldmazine was -14. Intrinsic viscosities were 9.9 and 10.2 ml/g for Kadogli and Eldamazine samples, respectively. Refractive indices of all samples from the two different locations showed the same value of 1.3354. The two samples gave approximately the same moisture (10.5 %) and ash (3.4 %) contents. Nitrogen content of Kadogli samples ranged from 0.30 to 0.42% (1.88 to 2.63% protein content), while that of Eldamazine samples varied from 0.36 to 0.48% (2.30 to 2.90% protein content). The pH value for Kadogli samples and Eldamazine samples was 4.96 and 5.23, respectively. The concentration of reducing sugars was 0.23 and 0.16% for Kadogli and Eldamazine samples, respectively. Uronic acid contents of Kadogli samples ranged from 12.02% to 17.30% and that of Eldamazine samples ranged from 12.10% to 19.48% and significantly (P0.05) affected by location.

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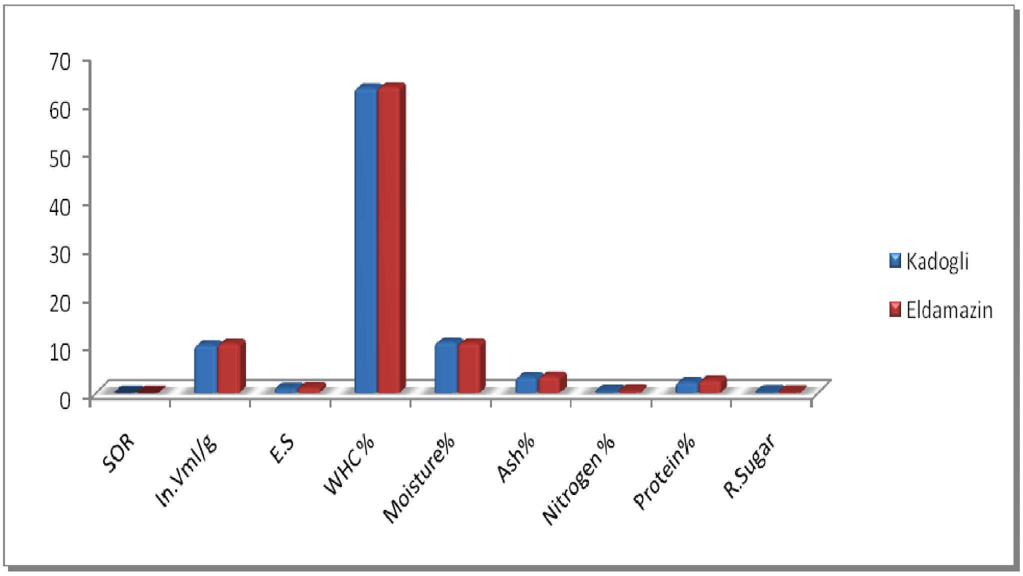

Figure 1: Effect of Locations in the physicochemical properties of *Acacia Polyacantha* gum.

Where:

SOR:	Specific optical rotation.
In. Vml /g:	Intrinsic viscosity ml/g.
E.S:	Emulsifying Stability
WHO(%):	Water Holding Capacity.
R.Sugar:	Reducing Sugar.

Conclusion

Due to the remarkable similarity in the physiochemical properties of gum exudates from *Acacia senegal* trees and *Acacia polyacantha* trees more investigations are needed to study the functional properties of *A.polyacantha* gum so as to be considered as one of the main substitutes of gum produced by *Acacia senegal* trees. On the basis of results obtained, it could be concluded that; *A.polyacantha* gum samples from the two locations showed similar refractive index value and the same moisture, and ash levels. Kadogli samples were found to have insignificantly ($P\leq0.05$) higher specific optical rotation, molecular weight, reducing and sugars compared to Eldamazine gum samples. Eldamazine samples showed insignificantly ($P\leq 0.05$) higher intrinsic viscosity, emulsifying stability, water holding capacity compared to Kadogli gum samples. Lastly gum samples obtained from Eldamazine showed significantly ($P\leq0.05$) higher nitrogen, uronic acid and pH levels, whereas that from Kadogli showed significantly ($p \leq 0.05$) higher equivalent weight.

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