

Influences of Short Term Storability on Gum Arabic Properties

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Abstract

Gum Arabic is valuable commodity. It could be affected by the different ways and conditions of handling such as extracting, cleaning and storing. So, this study aimed to explore the effect of storing on some gum Arabic properties (moisture content, ash, crude protein, polysaccharides, fibers, fats, viscosity and pH). The results showed there is no differences between the *A. senegal* and *A. seyal* gum properties during the different normal storage periods. There are further studies need in the effect of long term under different storage conditions and other properties.

Keywords: Gum Arabic; Properties; Quality; Storage

Introduction

Gum Arabic is a dried, gummy exudates obtained from trees belonging to various species of the genus *Acacia* found in various tropical and semitropical areas of the world [1-3]. The most commercially important gum comes from a single species, *Acacia senegal* [4]. The gum has a wide range of uses in all types of industry but its most important use is in the food industry. It is used as binding, clarifying, flocculating, and gelling agents. The physical and chemical properties of gum Arabic make it unique from other natural gums and that is why it has very important uses in the food industry [5]. Gum arabic is also used in non-food industries for instance in modern pharmacy where it is commonly employed as a demulcent, emulsifier, binder, or for film-forming [6]. In addition, gum arabic is used in partial destruction of many alkaloids including atropine, hyoscyamine, scopolamine, homatropine, morphine, apomorphine, cocaine, and physostigmine [6]. Gum Arabic is mostly produced by small-scale farmers in traditional rain fed farming areas [7]. The handling until the end point takes a long time, so the gum quality will be degraded and accordingly its commercial value. The Post-harvesting handling procedures such as cleaning, drying and storage is important to improve the quality of gum Arabic because Quality aspects are often associated with a cost and a price. The cost of quality means the cost undertaken in the process of improvement including efforts that would not have

been expended if quality were perfect [8]. The physical and chemical properties of gum Arabic are affected by a number of factors such as: age of the parent tree, the amount of rainfall, the time of exudation, and the type of storage conditions [9]. There almost no studies about the shelf life of gum Arabic in the normal storage conditions (room temperature), so this study will determine the effect of storage periods on *A. senegal* and *A. seyal* gum properties.

Material and Methods

Gum arabic sample of gum nodules were collected from Kordoufan state in Sudan during the dry seasons (2013 - 2014 - 2015 - 2016) from the two varieties of *Acacia* trees *A. senegal*, *A. seyal* and in addition season 2017 for *A. senegal*. The samples were air dried in room temperature and ground using a blender and kept in plastic containers for analysis of moisture content, ash, crude protein, polysaccharides, fibers, fats, viscosity and pH. The moisture determined by air oven and ash contents was determined by gravimetric method. While crude protein content determined by kjeldahl method, total fat determined by manual extraction. All methods found in ASEAN manual of food analysis (2011). Polysaccharides determined according to Balaban (2003). Viscosity were measured using Brookfield viscometer (MYR viscometer-version L spindle 3, speed 200 rpm). The pH value was determined for 10% aqueous solution at room temperature, using pH meter.

Statistical analysis of data was carried out using Microsoft Excel (2007) computer software.

Results and Discussion

It is clear from the results of the experiment there is very similarities in the properties of *Acacia senegal* gum and there is no differences between its properties during the different storage periods, where the moisture content between (9.2 - 9.5%), the percentage of ash (2.6 - 4.1%) (Figure 1). The results showed that the

percentage of protein in the gum ranged from 1.5 to 2.1 and the percentage of fat (0.5 - 0.1), while the percentage of fiber range from 0.02 to 0.7 (Figure 2) and this corresponds to the results of [10] who said that moisture content of gum is 9.76 and the percentage of ash is 3.4 and protein percentage is 2.15, while [11] results of protein and ash are in the range of the reported results 3.4 and 2.77 respectively but the moisture content is 13.4 %, which it may due to the differences in handling process such as drying or storing the gum during the different experiments.

Figure 1: The effect of storage periods on ash and moisture percentage of *A. senegal* gum.

Figure 2: The effect of storage periods on protein, fat and fiber percentage of *A. senegal* gum.

In the analysis of some sugars found in the gum, the results showed that the percentage of Rhamnose (1.2 - 1.4), percentage of the Arabinose (1.1 - 2.2) and Galactose (2.04 - 3.36) (Figure 3). These results do not correspond with the results of the [12], he said gum arabic come from *Acacia senegal* contain Rhamnose 14%, Arabinose 29%, Galactose 36%. Such differences may be attributed to the difference in *Acacia senegal* genetic characteristics which may

influence the tree ability of producing certain sugars or any other chemical substances or its ability of uptake nutrients from the soil which its reported by [13] that *Acacia senegal* variety *senegal* tends to absorb high levels of copper, iron and manganese while *Acacia senegal* variety *kerensis* tends to absorb high levels of zinc from the soils than other nutrients.

Figure 3: The effect of storage periods on some sugars of *A. senegal* gum.

The viscosity values of Acacia senegal gum samples in different years are range between (70 - 80 csp) (Figure 4). pH measurement shows that all Acacia senegal gum samples were slightly acidic (pH

5.0-5.3) (Figure 4). The viscosity and pH values are in good agreement with reported viscosity and pH values for gum arabic and other Acacia gums by several authors.

Figure 4: The effect of storage periods on viscosity and pH of *A. senegal* gum.

From the results of the experiment properties of Acacia seyal gum there is no differences between its properties during the different storage periods, where the moisture content between (9.3 - 9.9%), the percentage of ash (3.3 - 3.6%) (Figure 5). The results showed that the percentage of protein in the gum ranged from (0.78 to 9.6) and the percentage of fat (0.15 - 0.69), while the per-

centage of fiber range from (0.06 to 0.09) (Figure 6) and this corresponds to the opinion of [10] he said moisture content of gum is 8.35, the percentage of ash 3.13 and protein percentage 1.61 and the result agree with [14], who said the moisture content is 10.4%, percentage of ash is 3.5.

Figure 5: The effect of storage periods on ash and moisture percentage of *A. seyal* gum.

Figure 6: The effect of storage periods on protein, fat and fiber percentage of *A. seyal* gum.

In the analysis of some sugars found in the Acacia seyal gum, the results showed that the percentage of Rhamnose (0.29 - 0.92), percentage of the Arabinose (1.27 - 2.34) and Galactose (1.73 - 2.91) (Figure 7). These results do not correspond with the results of the [12], he said gum arabic come from acacia seyal contain Rhamnose 3%, Arabinose 41%, Galactose 32% and this also could be attributed to genetic variation among *A. seyal* trees.

Figure 7: The effect of storage periods on some sugars of *A. seyal* gum.

The viscosity and pH measurement of Acacia seyal gum samples in different years are range between (60 - 90 csp) and (pH 4.6-5.2) (Figure 8). The viscosity and pH values are in good agreement with reported by several authors.

Figure 8: The effect of storage periods on viscosity and pH of *A. seyal* gum.

Conclusion

Gum Arabic quality is the main factors that control its price in the market and its quality is related to the handling process from the tree to the end of the chain. Storing in good conditions is affected its quality but in the short term of storing there is no differences between the *A. senegal* and *A. seyal* gum properties during the different tested storage periods. So, a further study is need in the effect of long term under different storage conditions and other handling process on gum Arabic quality.

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