

Qualitative Analysis of Chemical Compounds of Gums Collected from Plants of Ajantha Forest

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Manuscript Details

Available online on <http://www.irjse.in>
ISSN: 2322-0015

Editor: Dr. Arvind Chavhan

Cite this article as:

Badar KV, Pawar BT and Chavan AM. Qualitative Analysis of Chemical Compounds of Gums Collected from Plants of Ajantha Forest, *Int. Res. Journal of Science & Engineering*, 2018; Special Issue A6: 39-42.

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ABSTRACT

Gum is naturally occurring chemical substance in the plant. Gums are natural exudates of stem or from the wounds of the plant. Physical and chemical properties of gum changes as per the eco-climatic condition of the plant. Gums are colloidal in nature soluble in water but completely insoluble in alcohol and ether. They are noncrystalline in nature and contains large amount of sugar. Chemically it is polysaccharide. Gums are hygroscopic which absorb moisture and become soft in a humid atmosphere. During the present investigation qualitative analysis of gums for Phenols, Alkaloids and Tannins was undertaken. Phenols were recorded in all the samples of gums collected from study area. Tannins were absent in the gum collected from *Azadirachta indica*, *Butea monosperma* and *Mangifera indica*. Presence of alkaloids was recorded in *Acacia Arabica*, *Acacia chundra*, *Azadirachta indica* and *Moringa oleofera*. Qualitative analysis of the gum samples will be the data bank for further research work in this area.

Key Words: Gums, Phenols, Alkaloids, Tannins, Ajantha

INTRODUCTION

Gum is a group of plant products resembling carbohydrates. Gums are characterized by ability to dissolve in water forming viscid solution by absorbing water to form gelatinous paste. In some cases the production of gum has been attributed to fungi attacking the plant, these fungi being responsible for enzymes that penetrate the tissues and transform the celluloses and hemicelluloses of the cell wall into gum. Malcolm [1] concluded that the production of gum in Sudan gum arabic trees is due to bacterial agency. The real cause of production of gum in many trees is uncertain. The best use of gum is to prepare sticky substance for pasting the paper and other things. Viscosity or the 'thickness' of a solution that a gum forms with water is of paramount importance in determining the quality or value of a gum. The higher the viscosity the better the gum. The viscous solutions of gums in water are colloidal in nature. In chemical properties of gum estimation of moisture, ash, total sugar, reducing sugar, nitrogen, dry matter, crude fibre, fat, phenols and alkaloids was carried out. The gum yielded from *Terminalia arjuna* showed less crude fibre content while gum of *Azadirachta indica*, *Acacia chundra* and *Boswellia serrata* showed maximum crude fibre content. Fat content in gum yielded from *Acacia chundra*, *Terminalia arjuna* and *Acacia arabica* showed maximum fat content. Gum arabic in natural source of complex mixture of hydrophilic carbohydrate hydrophobic protein components [2]. During the present investigation, qualitative analysis of gums for Phenols, Alkaloids and Tannins was undertaken.

MATERIAL AND METHODS

Plant gums were regularly collected in all the seasons. It was done by using axe, sterilized blade. Fine cut was made at different parts of the plant, like root, stem, leaves, flower and fruits. Later on at 30, 45 and 60 days exudates gums were collected in presterilized plastic bags, kept in laboratory condition until it was used.

A) Preparation of fine powder of Gum: The powder was prepared from collected dry gums and kept in clean glass pots. It was used for the further study of qualitative analysis of gums for Phenols, Alkaloids and Tannins. This qualitative analysis of chemical compounds was studied by using following methods:

B) Qualitative analysis of Phenols: Estimation of phenols [3] was done by using ethanol extract (0.5 gm of samples was grinded with pestle and mortar in 10-times volume of 80% ethanol). The homogenate was centrifuge at 10,000 rpm for 20 min. The extraction was done twice. The pooled supernatant was then evaporated to dryness. The residue was dissolved in 5 ml of distilled water. Out of that 2ml was taken in different tubes. The volume was made final to 3ml with water. 0.5 ml of Folin – Ciocalteu reagent was added. After 3 min., 2ml of 20% Na_2CO_3 solution was added to each tubes. It was mixed thoroughly and then placed in boiling water for exactly one min. It was cooled and absorbance measured at 650 nm against a blank reagent. A standard curve was prepared using different concentrations (10-100 μg) of catechol.

C) Qualitative analysis of Alkaloids: Five grams of plant gum was extracted with 50 ml of 5% ammonical ethanol for 48 hrs. The extract was concentrated by distillation and the residue was treated with 10 ml of 0.1 N H_2SO_4 . The acid soluble fraction was tested with Mayer's, Wagner's, and Dragendorff's reagents. A white/coloured precipitate denoted the presence of alkaloids. The preparation of the reagents are as follows:

Mayer's reagent: 1.36 g of HgCl_2 was dissolved in 60 ml of distilled water and 5 g of KI in 10 ml of water. The two solutions were mixed and diluted to 100 ml with distilled water. A few drops of this reagent were added, as precipitates of some alkaloids are soluble when the reagent is used in excess.

Wagner's reagent: (Potassium Iodide) 1.27 g of I_2 and 2 gm of KI were dissolved in 5 ml of water and the solution diluted to 100 ml. It gave brown flocculent precipitates with most of the alkaloids.

Dragendroff's reagent: (Potassium bismuth iodide) 8 g of $\text{Bi}(\text{NO}_3)_3 \cdot 5\text{H}_2\text{O}$ were dissolved in 20 ml of HNO_3 (sp. gr. 1.18) and 27.2 g of KI in 50 ml of water. The two solutions were mixed and allowed to stand when KNO_3 crystallised out. The supernatant was decanted off and made up to 100 ml with distilled water.

D) Qualitative analysis of Tannins: Tannins was extracted in water and tested by treating them with protein solution when leather precipitates. To the water extract was prepared by boiling 5 g gum in about 50 ml water, then 2% freshly prepared gelatin solution was added. The formation of a white (or milky) precipitate showed the presence of tannins in the gum.

RESULTS AND DISCUSSION

The gum were collected from Ajantha forest of Maharashtra from various angiospermic plants *viz.* *Acacia Arabica*, *Acacia chundra*, *Azadirachta indica*, *Boswellia serrata*, *Butea monosperma*, *Cassine Albans*, *Mangifera indica*, *Moringa oleofera*, *Sterculia urens* and *Terminalia arjuna*. These gum samples were tested for qualitative analysis of plant gum was carried out for the important chemical compounds like phenols, alkaloids,

tannins and the results of experiments are summarised in Table 01.

A) Phenols: It is clear from Table 01 that the gum of selected plants showed the presence of phenols. Phenols were recorded in all the samples of gums collected from study area. Due to the presence of phenolic compounds, gums have its antimicrobial properties. Similar results were recorded by Badgujar [4]. They reported that the larvicidal properties and phytochemical constituents of *Calotropis procera* (Ait) R.Br, latex. They studied the larvicidal properties against *Anophillus stephensi* by using aqueous solution of latex. They recorded highest activity at the 0.8, 0.9 and 1% concentration of latex. Phyto-chemical analysis of latex revealed that the larvicidal activity was mainly due to the presence of phenolic compounds especially alkaloids and cynogenic glycoside.

B) Alkaloids: The alkaloids were present in the gum collected from *Acacia chundra*, *Acacia arabica*, *Azadirachta indica* and *Moringa oleifera* whereas gum of plant like *Boswellia serrata*, *Butea monosperma*, *Cassine albans*, *Mangifera indica*, *Sterculia urens* and *Terminalia arjuna* were found to be devoid of alkaloids.

Table 1: Qualitative analysis of gums collected from plants of Ajantha Forest.

SN	Name of plants(Gum sample)	Phenols	Alkaloids	Tannins
1	<i>Acacia arabica</i>	+	+	+
2	<i>Acacia chundra</i>	+	+	+
3	<i>Azadirachta indica</i>	+	+	-
4	<i>Boswellia serrata</i>	+	-	+
5	<i>Butea monosperma</i>	+	-	-
6	<i>Cassine albans</i>	+	-	+
7	<i>Mangifera indica</i>	+	-	-
8	<i>Moringa oleofera</i>	+	+	+
9	<i>Sterculia urens</i>	+	-	+
10	<i>Terminalia arjuna</i>	+	-	+

C) Tannins: Tannins were absent in the gum collected from *Azadirachta indica*, *Butea monosperma* and *Mangifera indica*. Presence of alkaloids was recorded in *Acacia Arabica*, *Acacia chundra*, *Azadirachta indica* and *Moringa oleofera*. Kumar sing [5] found there is absence of Alkaloids glucosides and tannins in mango tree gum while Gyedu-Akofo [6] reported that in cashew tree gum there is presence of protein sugar and the phenols in higher concentration as compared to young trees.

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