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# Electrically Voltage Profile of the Study Samples of an Aqueous Extract of *Syzygium jambolanum*

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**ABSTRACT**- The Jambulor jambolan has been used for many years in traditional Indian medicine as treatment for various diseases for example, diabetes mellitus, as well as bactericide. This study aimed to determine the conductivity in different samples of a freeze-dried aqueous extract of *Syzygium jambolanum*. The readings of the electrical voltages of the samples subjected to different treatment conditions were carried out in a pH meter. Depending on the performed statistical analysis could be noticed a significant difference ($p < 0.001$) among all samples analyzed groups. In view of the results obtained, it can be suggested that the behavior related to changes in the electrical voltage values of the samples of an aqueous extract of *Syzygium jambolum*, is related to the presence of molecules derived from flavonoids with antioxidant properties, which can be molecules anthocyanin, which may be present in the samples of said plant extract Studied.

**Key-words-** *Syzygium jambolanum,* Anthocyanin, Flavonoids, Antioxidant, Natural extract

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## INTRODUCTION

The Jambul or jambolan has been used for many years in traditional Indian medicine as treatment for various diseases such as, for example, diabetes mellitus, as well as bactericide. According to the literature, the plant has hypoglycemic properties, hypotensive, diuretic, cardiotonic, astringent, anti-inflammatory, stimulating the central nervous system, antipyretic, anticonvulsant, anti-hemorrhagic, carminative and antiscorbutic [1].

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These medicinal properties may be conferred due to the presence of various medically important phytochemicals such as tannins, alkaloids, steroids, flavonoids, terpenes and phenolic compounds [2-4]. This plant belongs to the *Myrtaceae* family and has many synonyms such as, *Eugenia jambolana*, *Syzygium cumini*, *Myrtuscumini*, *Eugenia cumini*. It is a tropical evergreen tree 15-30 meters high with smooth, glossy leaves. The leaves are rich in tannins and saponins and are very astringent. The ripe fruit is recognized as a liver stimulant [2, 4-5]. It is popularly known as jambolan or jambul and *jambool* in India [5-6].

These properties operated by folk medicine are directly related to the secondary metabolites produced by plants. The secondary metabolites play an important role in the adaptation of plant defense against microorganisms and parasites, solar radiation protection, herbivorous protection, and may be synthesized by plants during normal development, in response to stress conditions. The source of secondary metabolites are pharmacologically active substances used as medicines, cosmetics, or as

 

nutraceuticals. The development of chronic and degenerative diseases such as cancer, cardiovascular disease, aging, immune system decline has linked free radicals and other oxidants responsible. The free radicals are controlled in living beings by various antioxidants, which may be derived from the diet and other sources. Phenolic compounds have numerous beneficial effects, such as, elimination of free radicals and oxygen species, inhibit cell proliferation, modulate the activity of certain specific enzymes and have potential anti-microbial, anti-inflammatory [7-8]. Phenolic compounds are substances that possess an aromatic ring with one or more hydroxyl groups, including their functional groups. Several classes of phenolic compounds may play important roles in the biology of animals, especially in phytophagous. Phenolic compounds range from simple molecules such as phenolic acids and flavonoids, until molecules with high degree of polymerization as tannins, also known as polyphenol. The antioxidant power of phenolic compounds allows them to neutralize reactive oxygen species. This property provides extensive biological activity, highlighting the decreased risk of cardiovascular disease. Tannins and other phenolic substances are constituents of plants with potential antioxidant activity by acting as kidnappers of oxygen radicals. The antimicrobial activity by plant drugs can be attributed to the presence of flavonoids, tannins, alkaloids, saponins and terpenes [7-9].

Anthocyanins are water-soluble pigments, ubiquitous in higher plants that confer color to plants. Compounds of anthocyanins: cyanidin, petunidin, malvidin, delphinidin and peonidin are occurring predominantly. Several researchers have proposed the positive therapeutic effects of anthocyanins in the treatment of diabetic retinopathy, improving visual acuity [10]. In jambolan leaves were found methyl gallate, kaempferol, ellagic acid, chlorogenic acid, gallic acid, quercetin and nilocitina [1].

This study aimed to determine the conductivity in different samples of a freeze-dried aqueous extract of *Syzygium jambolanum*.

## MATERIALS AND METHODS

Aerial parts of a jambolan tree were obtained from the campus of the State University Center Foundation of the West Zone (UEZO), in January 2013 at 07:00. Leaves were washed in water and allowed to soak in distilled water for 10 minutes then were perforated. 400g leaves were used for 1L of water at 100° C to produce an extract by effusion. The extract was lyophilized (Lyophilizer Liotop, Model: L202 - Liobras) and stored at -28° C in a freezer Vertical Electrolux FE18 145 Liters.

The aqueous extract was prepared jambolan with 10mg of lyophilized extract diluted in 10 mL of distilled water. 10mL of this solution was added to six tubes which were subjected to six different conditions and stored at room temperature over 24 hours. The conditions were as follows: 1- exposed to light extract in sealed tube, 2- extract exposed to light in the open pipe; 3- housed extract light in a closed tube; 4- heated extract to 100° C, 5- extract the vacuum; 6- extracts vacuum and pipe sheltered from the light. The readings of the electrical voltages of these samples were performed using a pH meter (MS Tecnopon, model mPA210) after 24 hours to determine the conductivity. This procedure was performed in triplicate. The figures relating to the average of the measurements of eletrovoltagem (mV) for the measurement at the time the statement was prepared and after 24 hours under different conditions of conditioning, were treated from the analysis performed in a statistical program (GraphPad InStat). The experimneto was carried out in the Analysis Laboratory Chemical and Biological (LAQB) in UEZO.

## RESULTS

Based on the analysis of the results from the analysis of variance (ANOVA) was observed that p <0.0001. From the analysis of multiple comparison (Tukey-Kramer), it can be seen that p <0.001.

One-way Analysis of Variance (ANOVA)

The P value is < 0.0001, considered extremely significant.
Variation among column means is significantly greater than expected by chance.

Tukey-Kramer Multiple Comparisons Test

If the value of q is greater than 4.829 then the P value is less than 0.05.

Depending on the performed statistical analysis it could be seen that there was a significant difference (p <0.001) among all samples analyzed groups (Fig. 1).

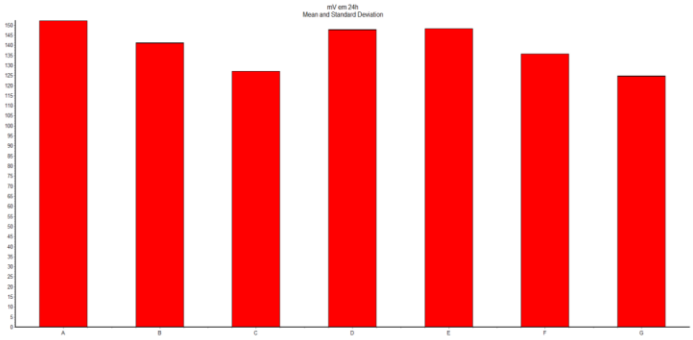

**Fig. 1:** Analysis of the variation of electric voltage for different samples of an aqueous extract of *Syzygium. jambolanum*

In the graphic above we can see on the x-axis samples of an aqueous extract of *Syzygium jambolanum*, which were submitted to different treatment conditions over 24 hours.

The conditions were as follows: Column A (control), Column B- extract exposed to light in a closed tube, Column C exposed to light extract open tube; Column D

 

housed extract light in a closed tube, Column E-heated extract at 100° C in sealed tube; Column F vacuo and extract the extract column G- vacuum and sheltered from light. In the Y- axis is observed values relating to electro voltage variations (millivolt values/ mV).

## DISCUSSION

Compounds O-heterocyclic (flavonoids) are part of a huge and diverse group. Among them the most colorful are the anthocyanins, which contribute to thecolor of flowers, fruit and leaves, are often linked to sugar molecules with one or more hydroxyl groups attached at the benzene ring. The anthocyanidins have no glycoside groups and most have hydroxyl groups at positions 3, 5 and 7. Since the anthocyanins, one or more of the hydroxyls are linked sugars, the most common being Glucose, xylose, arabinose, rhamnose, galactose, or disaccharides consisting of these sugars, which may be linked phenolic acids, such as p-coumaric, caffeic, vanillic and phenyl. The sugar present in the anthocyanin molecules confers greater solubility and stability of these pigments compared to the anthocyanidins [11].

Anthocyanins are molecules belonging to a subclass of flavonoids, the polyphenols. They are responsible for the red attractive colors, purple and blue colors of many flowers, fruits and leaves. Anthocyanins have the typical C6-C3-C6 skeleton. Flavonoids are generally glycosylated molecules flavylium cation.

Anthocyanins may have different structural forms, which can take different colors. These forms may be influenced by several factors, foremost among these temperature, pH value and possible links with other chemicals. The pH is the factor that most influences the color of anthocyanins, since, due to its acidity or alkalinity, these may appear different. The aglycone differ by the number of hydroxyl groups and methoxyl in the B ring flavylium cation. They are known around 22 anthocyanidins, but only 6 (cyanidin, delphinidin, malvidin, pelargonidin, peonidin and petunidin) are important in food [12].

In our study, we observed that the aqueous extract of *Syzygium* expressed initially, immediately after preparation a value of 152 mV relative to its characteristic voltage. When we compared with the readings performed voltage after 24 hours we found a significant variation, which allowed us to infer that the pigments display bioelectric changes in function of time, due to the extreme sensitivity to the presence of oxygen. When compared with the control tube, the tubes in which the extract was exposed to light in contact conditions and absence with oxygen, we observed that the extract components are photosensitive, as well as sensitive to oxygen content. These results may explain the antioxidant effect of the extract reported by [13].

Analyzing the tube in which the extract has been conditioned in the dark in a closed tube, it might be noted that possibly the extract has in its composition phenolic compounds sensitive to light and oxygen content.

The heating is a factor that accelerates the degradation of anthocyanins than pH, light is another factor of importance in change of color of anthocyanins. The transformation is most intense when the light factor is combined with the effect of oxygen. Anthocyanins may also be combined with $HSO_3^-$ present in many foods form colorless products from this connection to the 4-carbon of anthocyanin [11]. In our experiments we observed photosensitivity, sensitivity to oxygen, as well as the thermosensitivity possibly of anthocyanins present in the extract, due to changes in the voltages measured in extracts conditioners in tubes where samples of the said extract were sheltered from light in tubes kept opened and closed, beyond the tube where a sample extract was heated to 100°C in a sealed tube conditioned.

The main biological employment attributed to anthocyanins is the antioxidant activity. This activity is due to their chemical structure consisting of three rings that have conjugated double bonds and also hydroxyl distributed along the frame to allow sequestration of free radicals, causing cell damage and degenerative diseases. Several trials are being developed for the evaluation of this activity in different plants, mainly in fruits and flowers. According to [14], in addition to antioxidant activity, anthocyanins have significant anticarcinogenic and anti-angiogenic activity. From the analysis of the results we can see that the statement expresses an antioxidant behavior.

When a liquid is placed in a closed container under vacuum, the molecules escape the liquid phase to the gas phase until it reaches equilibrium at a given temperature. This balance is dynamic, with molecules passing from the vapor state to the liquid state and vice- versa. The vapor pressure is defined as the pressure exerted by the steam in equilibrium with the liquid at that given temperature [15]. In this work, the tube where a sample of the extract was conditioned to vacuum and another tube where a sample of the extract was subject to vacuum and protected from light, it was observed that there was a low electrical voltage measured in the sample extract tubes in which the samples were conditioned vacuum, which could be explained by a change in the behavior of molecular components in relation to the phase differences possibly the anthocyanin molecules present in the extract under study could switch. The steam pressure and temperature are directly proportional so that with increasing temperature, there is more energy available for breaking forces that hold together the molecules in the liquid state. As a result, there is greater amount of steam in the container, which results in higher vapor pressure and possibly with a lower activity resonance in relation to the putative conformational changes of anthocynins, besides the removal of which together molecules are complex phyto or phyto compounds with significant antioxidant activity.

## CONCLUSIONS

In view of the results obtained, it can be suggested that the behavior related to changes in the electrical voltage values of the samples of an aqueous extract of *Syzygium jambolum*, is related to the presence of molecules derived

 

from flavonoids with antioxidant properties which can be molecules anthocyanin which may be present in the samples of said plant extract studied.

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