

## مقارنة بين محتوى التانين في عينات الشاي الموجودة في السوق (مستورد) وعينة الشاي المزروعة في ليبيا (محلي).

أ. الزادمة لامين أحميدة حامد ، أ. محجوبة صالح الطيب منير  
كلية هندسة الطاقة والتعدين/ جامعة سبها.

[Mhj.altieb@sebhau.edu.ly](mailto:Mhj.altieb@sebhau.edu.ly)      [alz.hamed@sebhau.edu.ly](mailto:alz.hamed@sebhau.edu.ly)

د. زمزم علي بشير عبدالرحمن الشريف - كلية تراغن/ جامعة فزان

البريد الإلكتروني: [Zam.alshreef@sebhau.edu.ly](mailto:Zam.alshreef@sebhau.edu.ly)

### الملخص:

التانين هو بوليفينول قابل للذوبان في الماء، ويعرف التانين أيضًا باسم بروانثوسيانيدينز الذي يمتلك خصائص مفيدة مثل مضادات الأكسدة، ومضادات الشيخوخة، ومضادات الالتهابات، بالإضافة إلى مكافحة تصلب الشرايين وحماية القلب والأوعية الدموية. أوراق الشاي الأخضر هي مصادر طبيعية وفيرة لمادة البوليفينول. في هذه الدراسة تم تحليل 6 عينات من الشاي الأخضر (الشاي محلي، شاي الغزالين، شاي الجوهره، شاي زلاف ، شاي الكفيله، شاي لبيتون). وتم تقدير محتوى التانين بطريقة المعايرة ، ومن خلال النتائج وجد أن الشاي المحلي يحتوي على أكبر كمية من التانين ، بينما تحتوي عينات الشاي المستوردة على أقل كمية من التانين.

## **A comparison between the tannin content in tea samples found in the market (imported) and tea samples grown in Libya (local).**

Z.E.Ahmida<sup>1</sup>Z.A.Basher<sup>2</sup> M.S.Munayr<sup>3</sup>

<sup>1</sup>Department of Chemical Engineering, Faculty of E.M. and E, Sebha University, Libya.

<sup>2</sup>Department of chemistry ,Faculty of Tragen,FezzanUniversity,Libya,

<sup>3</sup>Department of Chemical Engineering, Faculty of E.M. and E, Sebha University, Libya.

### **ABSTRACT:**

Tannin is a water-soluble polyphenol, and tannin is also known as proanthocyanidins that possess beneficial properties such as antioxidants, apoptosis, anti-aging, and anti-inflammatory, in addition to fighting atherosclerosis and protecting the heart and blood vessels. Green tea leaves are abundant natural sources of a substance Polyphenols. In this study, 6 green tea samples were analyzed (local tea, Alghazaleen tea, aljawhara tea, Zallaf tea, El Kafila tea and Lipton tea).

And estimating the content of tannin by titration method, through the results it was found that the local tea contains the largest amount of tannin, while the imported tea samples contain the least amount of tannin.

**Key words:**Tannin, Green tea, imported tea, local tea, Polyphenols.

### **INTRODUCTION:**

Tea is the most widely consumed non-alcoholic beverage in the world. The origin of tea as a beverage is so old that it is lost in legend. Tea is derived from terminal leaves of the shoots from the plant *Camellia sinensis* L. (Kuntz (native to Southeast China. *C. sinensis* var. *sinensis* is indigenous to South east China, Darjeeling and Japan. *C. sinensis* var. *assamica* is indigenous to Assam, Thailand and Sri Lanka. Catechin is the most abundant polyphenol in fresh tea leaves. Three main types of tea are black tea, oolong tea and green tea. Black tea is produced by complete fermentation of tea leaves resulting in black or brown color of tea where catechins are

oxidized by polyphenol oxidases. Green tea is produced by inactivating polyphenol oxidase enzymes by steaming or roasting freshly plucked leaves to bypass fermentation step resulting in weaker flavored green color of tea. When any type of tea leaf is steeped in hot water it brews a “tart” (astringent) flavor i.e. dry and pucker feeling characteristic of tannins (1,2)

Tannins (also called tannic acid) molecular formula usually given as  $C_{27}H_{24}O_{18}$  are water soluble astringent, bitter polyphenolic compounds of high molecular weight found occurring naturally in the vacuoles or surface wax of quite a number of parts of many edible and non-edible plants. The presence of tannins in plants and plant products is specifically for the purposes of defense against predation and growth regulation (3,4) Tannins are yellowish to light brown amorphous masses that may be powdery, flaky, or spongy in nature. Tannins are the most abundant antioxidants in human diets. The main dietary sources of tannins include some common fruits, vegetables and green tea [5,6]. Determination of beneficial factors in food crops such as tannin antioxidation and subsequent promotion of their nutritional and health values may enhance their market competitiveness, locally and internationally(7).

Tea is the most widely consumed non-alcoholic beverage in the world. The origin of tea as a beverage is so old that it is lost in legend. Tea is derived from terminal leaves of the shoots from the plant *Camellia sinensis* L(8,9), Tea is a very popular beverage especially due to its therapeutic property. Hot water helps to extract the flavor, pigment and other soluble compounds from the tea leaves. A large portion of dry matter in tea leaves like polyphenol is soluble in hot water.(10,11) the interpretation of the results of their tannin contents may help improve the profitability at the local market and promote health. In the present study, we report the results obtained from the titration analysis of tannin contents in 4 different samples green tea.

### ***Materials and methods:***

#### **Collection of sample:**

The sample of local green tea grows in the farm of the southern Libyan region, The local sample was taken from Zewaila Square No. 1 projects, collected leaves in November 2019 and then washed with distilled water and dried for a week at normal room temperature and used for study

The study covered 6 samples green tea. Randomized five market sampling was applied and one local.



Local sample

Imported sample (1)

Imported sample (2)

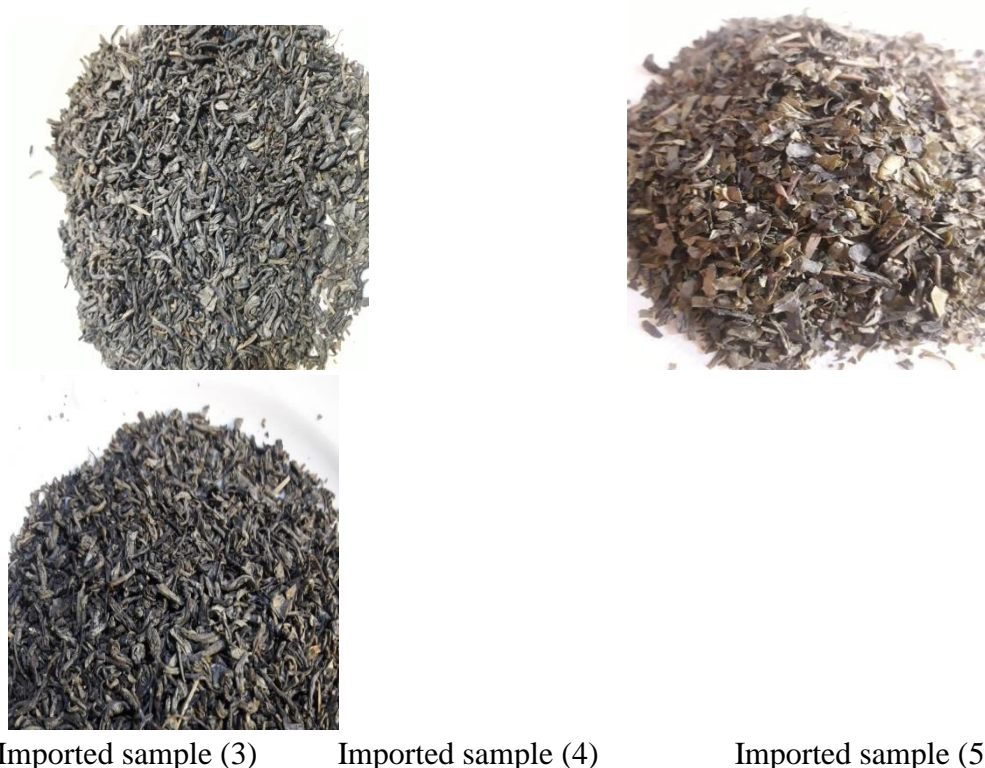


Figure (1) Samples different of green tea leaves

***Chemical and reagent:***

Ferric chloride, potassium permanganate, indigo-carmin, gelatin, sodium chloride, Sulphuric acid, kaolin, burette, conical flasks, beaker, glass rod, distilled water.

**Apparatus:** magnetic stirrer, Device Centrifugation.

***Preparation of tea extract:***

1g of tea sample was added to 25 ml of distilled water and heated in a magnetic stirrer at 70°C for 5 minutes. The decoction was cooled and filtered through Whatman No.1 filter paper. The filtrate was then centrifuged at 10000rpm for 15 minutes. The supernatant was collected in a sterile clean screw capped tube and stored at 4°C for future analysis.

### **Qualitative estimation of tannin:**

2-3 drops of 5% (w/v) aqueous solution of ferric chloride was added to 1 ml of extract to observe formation of greenish precipitate indicating the presence of tannins in the sample.

### **Quantitative estimation of tannin:**

Quantitative estimation of tannin was performed by titrating the extract with standard potassium permanganate solution 0.1N following the method of AOAC [12]. Briefly 5ml aliquot of the extract was mixed with 12.5 ml of indigo-carmin solution and 375 ml of distilled water. This mixture was titrated against  $\text{KMnO}_4$  solution ("Y" mL).

As titration proceeded the blue color of the indigo-carmin passes through many shades to a final yellow with a faint pink tint at the rim. It was taken as the end-point. This volume of  $\text{KMnO}_4$  was used to titrate total tannin plus all other related compounds. To determine the volume of  $\text{KMnO}_4$  ("X" mL) used to titrate non tannin (related) compound, another aliquot of 50 ml extract was mixed with 25 ml of gelatin solution (25 g. gelatin was soaked for 1hr. in saturated NaCl solution. The mixture was then warmed until the gelatin has dissolved and after cooling the solution was made up to 1 liter with saturated NaCl), 50ml of the acidic NaCl solution (25 ml of concentrated  $\text{H}_2\text{SO}_4$  was added to 975 ml of saturated NaCl solution.) and 5 g powdered kaolin. The mixture was shaken for 15 minutes and filtered through Whatman No. 1 filter paper. 12.5 ml of the filtrate was mixed with same volume of indigo changed to faint pink as earlier. The volume of  $\text{KMnO}_4$  used to titrate true tannin was calculated by the values of Y and X. The concentration of tannin was estimated using the following relationship:

1 ml of standard  $\text{KMnO}_4$  solution = 0.595 ml of 0.1N Oxalic acid

1 ml of 0.1 N Oxalic acid = 0.0042 g of tannin

## RESULTS AND DISCUSSION:

The results of tannin content in different samples green tea are presented in Table 1. Almost all analyzed sample contains tannin in the range of 0.001247 % to 0.002499% and the graph representation are shown in Figure 2.

Table 1: Tannin content in different samples green tea leaves.

samples of tea	Local tea	Alghazaleen tea	aljawahara tea	Zallaf tea	El Kafila tea	Lipton tea
Tannins content	0.002499	0.001749	0.001653	0.001247	0.001584	0.001874

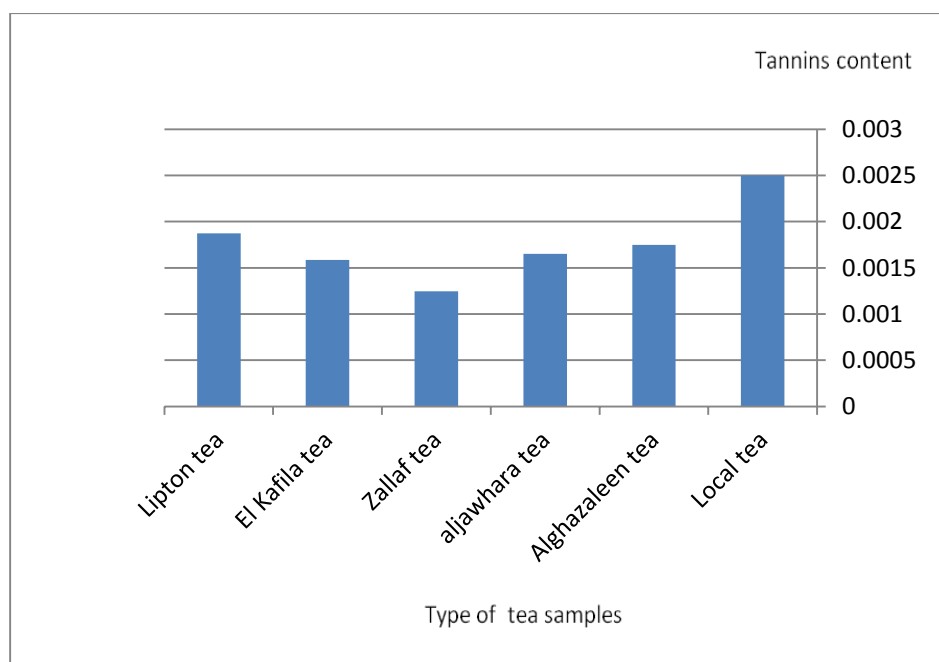


Figure 2: Tannin content in different samples of green tea

These results appear The sample local of green tea contains higher value of content tannin in the event that the imported tea samples contain low values. These differences in tannin contents between different tea samples may be due to the difference in the process of manufacture, aging of tea leaves or the differences in climate and soil.



### **CONCLUSIONS:**

The study showed that the tannin composition was relatively high in local green tea. It was found in lesser quantities in imported tea samples. This may be due to the methods of treating imported tea. These results provide the scientific rationale for exploiting domestic products rather than imported products. However, consumption of tannins in the diet may sometimes be necessary for optimal health but much caution must be taken into account due to the conflicting nutritional and physiological effects of medicine.

Through the conducted study, we recommend conducted many future studies on local green tea to benefit from local tea as a product that future factories may be planted.

### **References:-**

- 1- Akiyama, H., Fujii, K., Yamasaki, O., Oono, T., &Iwatsuki, K. (2001). Antibacterial action of several tannins against *Staphylococcus aureus*, *Journal of Antimicrobial Chemotherapy*, 48 (4), 487–491.
- 2- Ames, B. M. (1983). Dietary carcinogens and anticarcinogenes: oxygen radicals and degenerative diseases. *Science*, 221, 1256 – 1263.
- 3- Ferrell, K. E., &Thorington Jr., W. R. (2006). *Squirrels: the animal answer guide*. Baltimore, MD: Johns Hopkins University Press. ISBN 0-8018-8402-0, pp. 91.
- 4- Fleck, D. C., & Layne, J. N. (1990, October). Variation in tannin activity of acorns of seven species of central florida oaks. *Journal of Chemical Ecology*, 16 (10), 2925-2934.
- 5- R. Masella, R. Di Benedetto, R.Vari, C. Filesi, C.Giovannini, Novel mechanisms of natural antioxi-dant compounds in biological systems: involvementof glutathione and glutathione-related enzymes, *J.Nutr. Biochem.*, 16, 2005, 577-586.
- 6- X. Han, T. Shen, H. Lou, Dietary polyphenols andtheir biological significance, *International Journal ofMolecular Sciences*, 8, 2007, 950-988.
- 7- MI Mohammed; MA Sulaiman, *Bayero Journal of Pure and Applied Sciences*, 2009, 2(2), 19-21.
- 8- Atanassova, M., &Christova-Bagdassarian, V. (2009). Determination of tannins content by titrimetric method for comparison of different plant



species. Journal of the University of Chemical Technology and Metallurgy, 44 (4), 413-415.

9- L Mao; H Peng, International Journal of Bioscience, Biochemistry and Bioinformatics, 2012, 2(6), 433-437.

10-R Cooper; DJ Morr ; DM Morr , The Journal of Alternative and Complementary Medicine, 2005, 11(3), 521–

11- JM Hamilton-Miller, Journal of Medical Microbiology, 2001, 50, 299-302.

12- AOAC. Official Methods of Analysis. Association of Analytical Chemists, Arlington, USA, 1980.

13- Journal of Chemical and Pharmaceutical Research, 2015, 7(6):238-241  
ISSN : 0975-7384 CODEN(USA) : JCPRC5