

## Monitoring the lycopene content in some fruits and vegetables

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**Abstract** Lycopene, a carotenoid phytonutrient, is the most potent antioxidant naturally present in many fruits and vegetables. The goal of this paper is to evaluate the lycopene content in some fruits and vegetables. Fruit and vegetable samples (Watermelon, Guavas, Tomatoes, Papaya, Grapefruits, Red cabbage, Asparagus) were taken from Timisoara supermarkets. Lycopene in fruits and vegetables samples was extracted using hexane: ethanol: acetone (2:1:1)(v:v:v) mixture and determinations were made by using Spectrophotometer UV-VIS SPECORD 205 by Analytik Jena. The results are similar with results obtained by other researchers and show that recommended daily level of intake (5-10mg lycopene) can easily be achieved by ingesting the fruits and vegetables taken in our study.

### Key words

lycopene, fruits, vegetables, daily intake

Phytonutrients, also known as phytochemicals, are the nutrients often concentrated in the skins of many fruits and vegetables, and are responsible for their color, hue, scent, and flavor. Plant-based foods are extremely beneficial to consume, and phytonutrients may be the reason why. There are literally thousands of them in our food. The best known phytonutrients are the carotenoids, flavonoids, polyphenols, indoles, lignans and isoflavones. Carotenoids include yellow, orange, and red pigment in fruits and vegetables[13].

Lycopene is found in tomatoes and other red fruits, like watermelon, papaya, pink grapefruit and pink guava. Its name is derived from the tomato's species classification, *Solanum lycopersicum* [12].

However, tomatoes and processed tomato products constitute the major source of dietary lycopene accounting for up to 85% of the daily intake [5,6].

Lycopene is currently the most powerful antioxidant which has been measured in food and is thought to play a role in preventing cancer and heart disease. How large a protective role lycopene plays is a controversial issue which is still under scientific study. Unlike other carotenes, lycopene does not get converted into vitamin A. There are no known symptoms of a lycopene deficiency, and no daily value (DV) for lycopene [11], but there's evidence that phytonutrients like lycopene are an important part of diseases prevention. Based on the results of a recent study where absorption of lycopene from tomato ketchup and

supplement at the intake levels of 5, 10 and 20 mg daily for one week were evaluated, the suggested daily intake of lycopene was modified to 5-10 mg [5,6].

Lycopene, in contrast to other carotenoids which are provable in a high number of different fruits and vegetables, is found mainly in few red varieties of fruits and vegetables, in which it is responsible for their typical color. High concentrations of lycopene contain tomatoes and tomato products, but also water melons and pink grapefruits, as well as carrots. Ripe tomatoes especially have high lycopene content [8,10]. Sunlight influenced the lycopene assimilation in tomatoes fruits[4]. The lycopene content of tomatoes remained raised during the multistep processing operations for the production of juice or paste[1]. Lycopene levels in papaya fruit are close to that of tomatoes. Thus it can also be considered as a good source of this carotenoid [2].

Lycopene is used in the food and pharmaceutical industries. Commercially available lycopene is of natural origin or is produced by chemical synthesis. Natural lycopene produced e.g. as an extract from tomato is nutritionally advantageous to humans. The presence of other phytochemicals, such as  $\beta$ -carotene, phytoene, phytofluene, improves utilization of lycopene and carotenoids [3, 9].

The studied fruits and vegetables in this research paper are: Watermelon (*Citrullus lanatus*), Guavas (*Psidium guajava*), Tomatoes(*Solanum lycopersicum*), Papaya

(*Carica papaya*), Grapefruits (*Citrus paradisi*), Red cabbage (*Brassica oleracea*) and Asparagus (*Asparagus officinalis*) [16].

## Material and Methods

Fruit and vegetable samples (Watermelon, Guavas, Tomatoes, Papaya, Grapefruits, Red cabbage, Asparagus) were taken from Timisoara supermarkets.

Lycopene in fruits and vegetables samples was extracted using hexane:ethanol:acetone (2:1:1)(v:v:v) mixture following the method of Sharma and Le Maguer (1996). One gram of the homogenized samples and 25 mL of extraction mixture were placed on the rotary mixer for 30 min., and after that was added 10 mL distilled water and was continued agitation for another 2 min. The solution was then left to separate into distinct polar and non-polar layers.

Lycopene content determinations were made by using Spectrophotometer UV-VIS SPECORD 205 by Analytik

Jena. The absorbance was measured using hexane as a blank.

All determination was repeated for three times.

## Results and Discussions

The total lycopene contents( $\mu\text{g}/100\text{g}$  fresh matter) in some fruits and vegetables taken in our study is presented in Figure 1.

Regarding the lycopene content of 100g fresh matter of fruits and vegetables taken in our study, we conclude that Watermelon registered highest content of this phytonutrient (4868  $\mu\text{g}$ ) followed by Tomatoes (3205 $\mu\text{g}$ ), Papaya (1900 $\mu\text{g}$ ), Guavas (1520 $\mu\text{g}$ ) and Grapefruits (1300  $\mu\text{g}$ ).

Significant quantities of lycopene registered also Red cabbage (25  $\mu\text{g}/100\text{ g}$  fresh matter) and Asparagus (20  $\mu\text{g}/100\text{ g}$  fresh matter).

These results are similar with results obtained by other researchers worldwide [11].

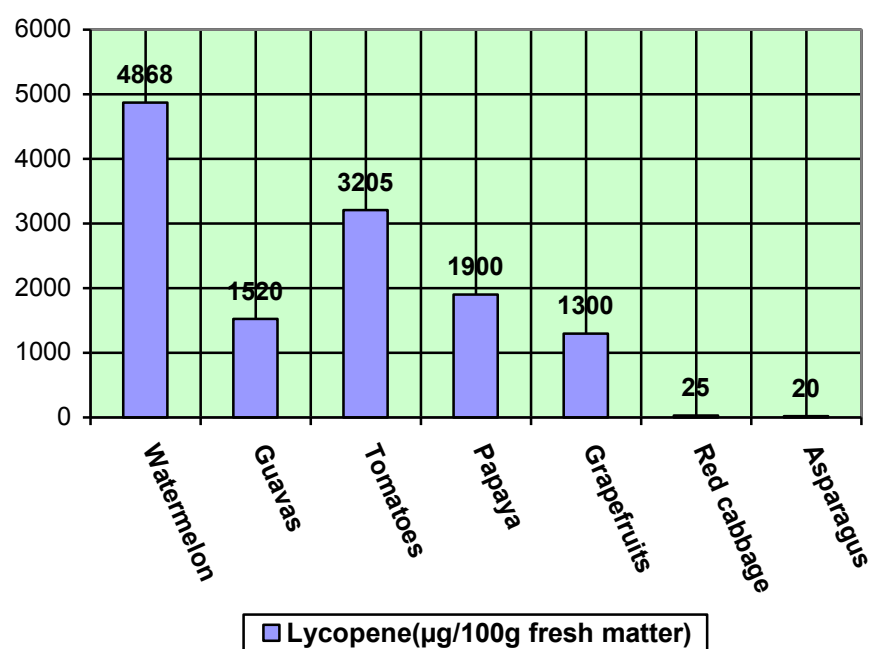


Fig.1. Total lycopene contents ( $\mu\text{g}/100\text{g}$  fresh matter) in some fruits and vegetables

In order to calculate the supply (contribution, %) of studied fruits and vegetables to the daily lycopene intake,

in Table 1 is presented the lycopene contents in 250 g fresh matter.

Table 1

<b>Lycopene contents(mg) in 250 g fresh matter</b>	
<b>Description</b>	<b>Lycopene content (mg/250g fresh matter)</b>
Watermelon	12.17
Guavas	3.80
Tomatoes	8.01
Papaya	4.75
Grapefruits	3.25
Red cabbage	0.06
Asparagus	0.05

Thus, if we take into account the suggested daily intake of lycopene recommended by the international specialised organisations (the average daily dietary

intake–10mg)[14], we can calculate the supply (contribution, %) of studied fruits and vegetables to the daily lycopene intake (Table 2).

Table 2

<b>Contribution of fruits and vegetables (fresh matter) to the lycopene recommended daily intake(10 mg)</b>	
<b>Fruits and vegetables (250 g)</b>	<b>Lycopene (%)</b>
Watermelon	121.7
Guavas	38.0
Tomatoes	80.1
Papaya	47.5
Grapefruits	32.5
Red cabbage	0.6
Asparagus	0.5

Analysing the Table 2 we observe that a consume of 250g Watermelon exceeds with 21.7% the daily recommended quantity of lycopene and also, the Tomatoes' contribution is 80.1%, followed by Papaya with 47.5% .

## Conclusions

According to the literature, phytonutrients like lycopene are an important part of diseases prevention. Regarding the lycopene content of 100g fresh matter of fruits and vegetables taken in our study, we conclude that Watermelon registered highest content(4868 µg) followed by Tomatoes(3205µg), Papaya(1900µg), Guavas(1520µg) and Grapefruits (1300 µg). Significant quantities of lycopene registered also Red cabbage (25 µg/100 g fresh matter) and Asparagus (20 µg/100 g fresh matter). The recommended daily level of intake (5-10mg lycopene) can easily be achieved by ingesting several dietary sources of lycopene (Watermelon, Guavas, Tomatoes, Papaya and Grapefruits).

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