Influence of chlorophyll content from onion (*Allium cepa*) after selenium and zinc adding

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*Motto: „Green blood cleans best the red blood”*

**Abstract**

In The aim of this work we present an original method to increase chlorophyll content in onion plants by supplementation of zinc and selenium in doses 50 respective 100 ppm. Amazing results was observed in case of adding selenium, were total chlorophyll content was increase significant in comparison to control plants. The level of chlorophyll a was 37.1013 respective 37.3812 mg/L and chlorophyll b – 21.4501 respective 30.047 mg/L. Zinc adding leaded to increase chlorophyll content, too. Thus, chlorophyll a was 20.1154 respective 36.5877 mg/L and chlorophyll b 7.6691 respective 21.4501 mg/L.

**Keywords**: chlorophyll, onion, selenium, zinc.

1. Introduction

Action of some chemical xenobiotics biologic active from air, water and foods (PAH, micotoxins, steroid compounds metabolized, etc.), physical xenobiotics (cosmic and terrestrial rays) and even biological origin (viruses, bacteria, parasite) were growth the incidence of some illnesses (cancer, cardiovascular deseases, artrites, allergy, obesity etc.). Another consequence of human body exposure on diverse chemical, physical agents from environment are some symptoms as: migrena, tiredness, mucous membrane desease, tusea, some gastrointestinal diseases, allergy.

Is known that the major ways to penetration of xenobiotics in human body are: ingestion (food aditivies), inhalation (industrial polulation of air), cutanate absorption (chemicals, paints, plastics, pesticides, fertilizer) and irradiation (X ray, mobile telephony, television, PC, microwaves, gamma ray).

Natural reaction of organisms on xenobiotics action is to defence and annihilation of there effects. Nevertheless, avoidance forming of free radicals is not completely, elimination of there by digestive, renal or tegumentary way is partially. To help from external of organism in action of detoxification is remarks a back to naturist remedia. One of this is chlorophyll (chloros – green, phyllos - leaf) – a green pigment involve in plant photosynthese processes both the carotenoids (red, orange or yellow pigments) and anthocians. These pigments are found like chromoproteins.

Chlorophyll is an mixture of liposoluble compounds: chlorophyll a and chlorophyll b. Chlorophyll a is common for all photosyntetic eucariot organisms by which the plants, algae, protozoa and some bacteria convert solar energy in chemical energy.

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Figure 1. - Chemical structure of two most common chlorophylls.

\[ E = h\nu \rightarrow \text{chemical energy} \rightarrow \text{glucides, nitrogen in aminoacids, oxygen} \]

\[ \text{CO}_2 + \text{H}_2\text{O} \rightarrow (\text{HCHO}) + \text{O}_2 \]

Chemical structure discovering of chlorophyll in 1915 by Richard Willstatter, taken Nobel prize for him.

After 15 years (1930), another prize was confered to Hans Fisher for discovering of chemical structure of haemoglobin. He was surprised to remark that Hb have almost identically chemical structure with that of chlorophyll, differences between two compounds being just central metallic ion: Mg\(^{2+}\) - in chlorophyll and Fe\(^{2+}\) - in Hb.

Chlorophyll discovery was revolutionized biology, being partial decrypted the way which solar ray give life to Terra by photosynthesis. The chlorophyll molecules (amazing similar with Hb – red blood cell) are the base of life. They mentain the life both plant and animal organisms. Is known the carnivorous animal reflex to pasture green plants. This fact have an logical explanation by chlorophyll benefic effects: detoxification, intestinal tract adjusting, healing and compensation of lesion, slowing the antiage processes, protection against cancerogene radiation, annihilation effects of some nocive xenobiotics.

It seems that human organism is set to intense interact with this green elixir which adjust the major of vital processes. The strong action of chlorophyll is exercise on human blood, adjustment in diverses mineral deficiencies and helping to toxic eliminating.

The biology researchers was trying to mystery elucidation of this interaction between „plant blood” and „animal blood”, being intens sustained „chlorophyll cure” in intestinal transit accelerating (toxin clean the colon), in coagulation blood disorder, in anemia, calcui and magnezium deficiciency. Haemophilia and even some forms of leukaemia replaying positive on chlorophyll cure. It was observed that this cure lead to clean the skin, desensitizing on different allergens and infectious agents.

Chlorophyll have benefic effects on gastrite and spring ulcer, combats spring astenia, action excellent on the persons which work in toxic or radiation environment, protects the blood vessels against sclerosis, bronchia astma, chronic hepatitis, chronic and degenerative reuma, guta, hormonal disorders and antibacterial effects.

Chlorophyll are one of strong antioxidant substances known until present. So, chlorophyll adding by food ratio lead on significant decrease of oxidative effects induced by carcinogens.

An important property of chlorophyll is able to form molecular compact complexes with some chemical substances which are incrimination to produce cancer (PAH, heterocyclic amines, aflatoxin B etc.) reducing these concentration from organism.

2. Materials and Method

The experiments consist to planting onion (chive) in mash with 1000 ml, in mold. Were constituted 9 lots: C – control, Zn\(_{50}\), Zn\(_{100}\) – add 50 respective 100 ppm zinc (as ZnSO\(_4\)), Se\(_{50}\), Se\(_{100}\) – add 50 respective 100 ppm selenium (as Na\(_2\)SeO\(_4\)). Plants were wetted 3 by 3 days (or rarely) 2 weeks period with Na\(_2\)SeO\(_4\) and ZnSO\(_4\) aquarious solutions, in same environment conditions (humidity, luminosity, temperature). In this period we were observed any plants behaviour or changes.

In final we determined chlorophyll level from green part of plants. A weight of 2.5 g sample was triturated with sand quartz in presence of acetone 80%. The homogenate obtained, was centrifuged at 3000 rot./min.
and the supernatant was collected in a glass bottle. The precipitate was re-added with acetone until to obtained an colourless extract. The supernatants was joined and then colorimetred at 645, respective, 663 nm by UV-VIS spectrophotometer Perkin Elmer. We used McKinney-Arron (Lichtenthaler and Welburn, 1983) relation to convert absorbance in chlorophyll level:

\[
\text{Chla} = 12.21 \times (A_{663}) - 2.81 \times (A_{646}) \\
\text{Chlb} = 20.13 \times (A_{646}) - 5.03 \times (A_{663}) \\
\text{Chl}_{\text{total}} = 17.32 \times A_{645} + 7.18 \times A_{663}
\]

where: 
Chla – chlorophyll a, in mg/L
Chlb – chlorophyll b, in mg/L
Chl_{total} – total content of chlorophyll
A_{645} – sample absorbance at 645 nm
A_{663} – sample absorbance at 645 nm

3. Results and discussions

First notable observation was that plants wetted with zinc and selenium at 100 ppm had onion bulb slow develop.

The longer of onion plant was not significant values neither in control group, neither experimental group.

The level of chlorophyll a and b can be observed in table 1 and fig. 2-4.

### Table 1. Chlorophyll level from onion consecutive selenium and zinc administration (mg/L)

<table>
<thead>
<tr>
<th>No.</th>
<th>Group</th>
<th>Chlorophyl a average content</th>
<th>Chlorophyl b average content</th>
<th>Total chlorophyll content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>C</td>
<td>20.3130</td>
<td>8.6766</td>
<td>28.9897</td>
</tr>
<tr>
<td>2.</td>
<td>Zn_{50}</td>
<td>20.1154</td>
<td>7.6691</td>
<td>27.7845</td>
</tr>
<tr>
<td>3.</td>
<td>Zn_{100}</td>
<td>36.5877</td>
<td>21.6503</td>
<td>58.2381</td>
</tr>
<tr>
<td>4.</td>
<td>Se_{50}</td>
<td>37.1013</td>
<td>21.4501</td>
<td>58.5515</td>
</tr>
<tr>
<td>5.</td>
<td>Se_{100}</td>
<td>37.3812</td>
<td>30.0470</td>
<td>67.4282</td>
</tr>
</tbody>
</table>

Figure 2. Chlorophyll a content

Figure 3. Chlorophyll b content

Figure 4. Total chlorophyll content
4. Conclusion

Zinc and selenium supplementing in growth and development of onion plants lead to significant increased the chlorophyll content in experimental group comparison control group, except group Zn$_{50}$ where chlorophyll level was appropriate to the control level. Remarks that adding 50 ppm zinc as ZnSO$_4$, both chlorophyll a (20.1154 mg/L) and b (7.6691 mg/L) content had lower toward control group plants (Chl a - 20.313 mg/L, respective Chl b – 8.6766 mg/L).

In dose of 100 ppm zinc, the experimental plants have bigger chlorophyll content (Chl a - 36.5877, Chl b - 21.6503, respective Chl total – 58.2381 mg/L) in contrast with control group plants (Chl a - 20.3130, Chl b - 8.6766, respective Chl total – 28.9897 mg/L). Selenium content in experimental groups was biggest in dose at 100 ppm as Na$_2$SeO$_3$ (Chl a - 37.3812, Chl b - 30.0470, respective Chl total – 67.4282 mg/L).

Great chlorophyll level gives experimental plants benefit effects enhancement toward control plants. Being known benefit actions of chlorophyll on human organism, the great level of this can reduce on half the onion consumption – considered a miraculous natural drug – but which can not tolerate by everybody.

Alongside chlorophyll effects, the supplementation with selenium amplifies these effects, having a strong antioxidant character – very important fact for consummers, in condition which free radicals from body have more and more support in forming of these by numerous pro-oxidant agents intake.

Association of selenium with chlorophyll in onion, confere this vegetable amazing medical properties both these of his. The disagreeable smell (Moldovan, 2008) of selenium which can feelt by some consmmer is mask by allyl sulphure from onion.

References