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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 respective30.047 mg/L. . Zinc adding leaded to increase chlorophyll content, too. Thus, chlorophyll a was 20.1154 respective 36.5877mg/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 deseases, tusea, some gastrointestinal deseases, allergy.

Is known that the major ways to penetration of xenobiotics in human body are: ingestion (food aditives), inhalation (industrial pollution 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 tegumentar 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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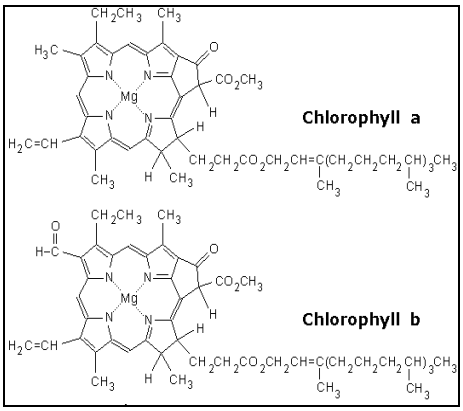

Figure 1. - Chemical structure of two most common chlorophylls.

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

$$CO_2 + H_2O \rightarrow (HCHO) + O_2$$

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 surpinsed 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 cancerigene 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 acelerating (toxin clean the colon), in coagulation blood disorder, in anemia, calciu and magnezium defficiency. Haemophylia 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 excelent 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_2SeO_4). Plants were wetted 3 by 3 days (or rarely) 2 weeks period with Na_2SeO_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 replay with acetone until to obtained an colourless extract. The supernatants was join and then colorimetred at 645, respective, 663 nm by UV-VIS spectrofotometer Perkin Elmer. We used McKinney-Arron (Lichtenthaler and Welburn, 1983) relation to convert absorbance in chlorophyll level:

$$Chla = 12.21 (A663) - 2.81 (A646)$$
$$Chlb = 20.13 (A646) - 5.03 (A663)$$
$$Chl_{total} = 17.32A645 + 7.18A663$$

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

crt no.	Group	Chlorophyll *a* average content	Chlorophyll *b* average content	Total chlorophyll content
1.	C	20.3130	8.6766	28.9897
2.	Zn_{50}	20.1154	7.6691	27.7845
3.	Zn_{100}	36.5877	21.6503	58.2381
4.	Se_{50}	37.1013	21.4501	58.5515
5.	Se_{100}	37.3812	30.0470	67.4282

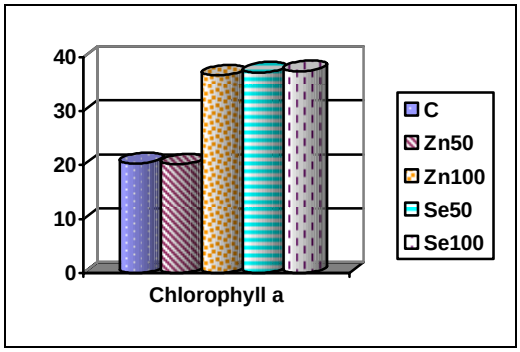

Figure 2. Chlorophyll *a* content

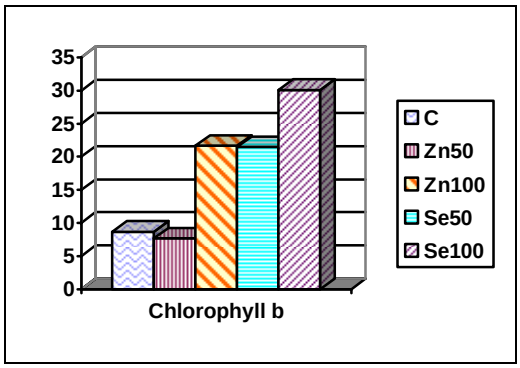

Figure 3. Chlorophyll *b* content

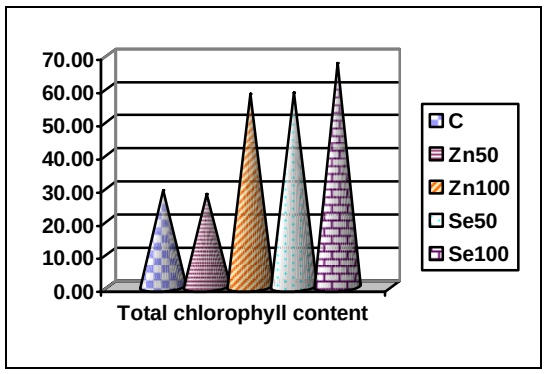

Figure 4. Total chlorophyll content

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_2SeO_3 (Chl a - 37.3812, Chl b - 30.0470, respective Chl total – 67.4282 mg/L).

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

Alongside chlorophyll effects, the supplimentation with selenium amplifies these effects, having a strong antioxidant character – very important fact for conssummers, 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 disagreable smell (Moldovan, 2008) of selenium which can feelt by some consummer is mask by allyl sulphure from onion.

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