ASPECTS CONCERNING THE EVOLUTION OF THE BEAN PLANTS UNDER THE INFLUENCE OF SOME COMPOSITE STRUCTURES INCORPORATED INTO THE SOIL

ASPECTE PRIVIND EVOLUȚIA PLANTELOR DE FASOLE SUB INFLUENȚA UNOR STRUCTURI COMPOSITE INCORPORATE ÎN SOL

UNGUREANU ELENA[1], DUMITRU MARIANA[2], NEDELCU TEODORESCU GABRIELA[3]

[1] The Technical University „Gh.Asachi" Iaşi

[2] „Miron Costin"Secondary School Iaşi

[3] Elementary School Horleşti, Iaşi

Abstract. *Once introduced in the soil, the natural composite materals treated with chemical agents undergo the effect of microorganisms which gather up differently depending on the concentration of used substance. The composite structures undergo different changes being decomposed into simple organic compounds which modify the metabolism of the plant, this leading to the modification of the plant structure. The quantity of nitrogen from the roots and stalks of the plant varies both according to the type of used product and its addition.*

Key words: *composite structures, soil, bioacids, impregnation, fertility, bean plants.*

Rezumat. *Intervenția compuşilor cu structură aromatică în fiziologia plantelor, cunoaşte un spectru relativ redus de cercetare, deşi literatura de specialitate prezintă o serie de funcții importante ale acestora în metabolismul celular. Din datele obținute se desprinde ideea că prezența ligninei din paie nemodificată, a clorurii de cupru (II), răşinilor furanice şi a soluției cuproamoniacale în structurile compozite încorporate în sol, generează o acțiune stimulatorie a evoluției plantelor. Lignina din paie modificată prin tratare cu aldehidă formică, manifestă o acțiune inhibitorie asupra creşterii şi dezvoltării plantei, dat fiind şi gradul de toxicitate asociat cu efectul cancerigen al acestei substanțe. Folosite în cantități judicios alese, substanțele chimice mai sus menționate, cu excepția ligninei modificate, prezintă un efect pozitiv în creşterea şi dezvoltarea plantelor, contribuind în esență la mărirea fertilității solului şi implicit la bioremedierea acestuia.*

The interference of the aromatic composite structures in the physiology of plants occupies a relatively reduced area of research, through the specialised literature presents a series of their important functions in the cellular metabolism [6].

At the present moment, the notion of „ growth regulator" is becoming more and more familiar, this representing an endogenous ar synthetic substance which regulates most of the processes of growth, development and metabolism at plants. Therefore, the composite structures, either natural, for example the wood, or realsed by main through different methods, in the presence of some chemical agents, can stimulase, inhibit or modify the phisiological processes in plants [3].

Synthesizing the existing knowledge about such regulator substances, they can be classified in:

- Stimulating substances
- Retardatory substances
- Inhibiting substances

Through the intervention of bioregulators, an effort is made to change the hormonic equilibrium and thus a whole chain of physiological phenomena is changed. These complex influences are shown in figure 1 [4].

The fact that the composite structures undergo changes at the level of the cultivated soil can also be emphasized through the analysis of plants resulted on such soil [5].

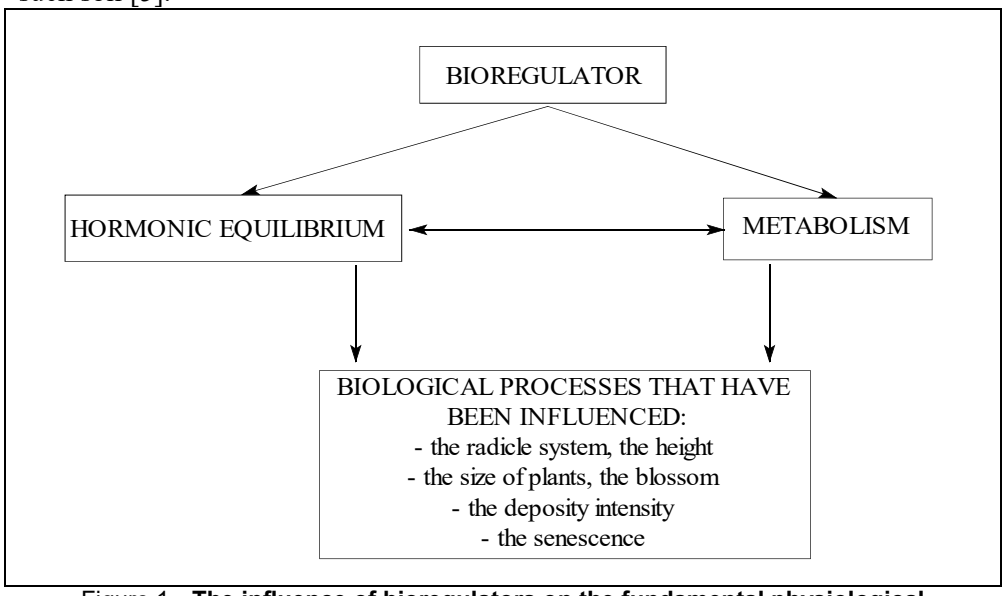


Figure 1 - **The influence of bioregulators on the fundamental physiological processes.**

In the agricultural soil, the chemical substances respond to the cultivated plants in the rhiyosphere zone which is characterized by a larger biomass and microbial activity, a higher level of oxygen and organic carbon than the nerisospheric soil [2].

MATERIAL AND METHOD

- Composite materials represented by wooden test-samples with the size 7x3x1 cm;
- Unmodified and modified straw lignin ;
- Hidrophilic furan resin (36% water);
- Copper chloride (II);
- Ammonia solution 0,1 N;
- Copperammonia solution 5%;
- Distilled water;
- *Phaseolus vulgaris sp.*, *Vera* breed from the Reseach Station Podu Iloaie [1];
- Soil.

The wooden test-samples were impregnated through painting with modified and unmodified straw lignin, rendered soluble in ammonia solution with the concentration 0,1N, copper chloride (II) and hydrophilic furan resin, disolved in distilled water and with copperammonia solution and they were incorporated into soil.

Around each composite structure there were soron five bean seed from each of the mentioned breeds.

RESULTS AND DISCUSSIONS

During the growing of the culture there was monitored the evolution of the height of the plants, in the absence and in the presence of the used biocids, also taking into account the three types of concentration in which they were used, 1, 3 and 5% foreach type respectively.

Chart 1 shows the evolution of the plants, 15 days after they have been sown, in the absence of the bocid (the reference plant) and in its presence depending on the type and the concentration used.

Table 1

The average height of the plants according to the concentration and the type of the bocid

The average height of the plant, (cm)						
Biocid type	Concentration (%)	Time span since the sowing				
		15	20	25	30	35
Reference plant	-	21	26	28	29	30
Unmodified lignin solution	1	22	27	29	31	31
	3	23	28	30	33	34
	5	24	28	31	34	34
Modified lignin solution	1	22	23	24	27	28
	3	21	22	23	25	26
	5	18	21	21	24	24
Furan resin solution	1	26	27	29	32	32
	3	28	30	32	34	35
	5	29	31	33	35	35
Copper chloride solution (II)	1	21	26	29	31	31
	3	24	31	33	34	34
	5	26	33	34	35	35
Copperammonia solution	1	21	27	29	32	33
	3	24	29	31	33	34
	5	25	31	33	35	35

From the analysis of the experimental data, there can be noticed the fact that the presence of the chemical agents modifies the growing and the development of the plants.

Having as reference point the evolution of the reference plants, there can be noticed that the used chemical agents have a different effect on plants, namely: some of them stimulate the growth and the development of the plant while some

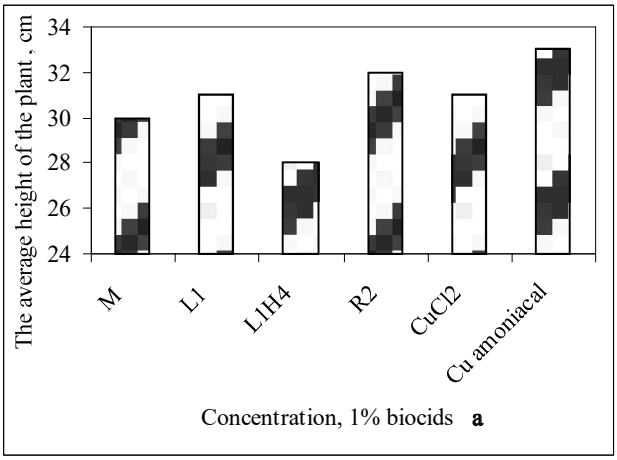
others inhibit their evolution.

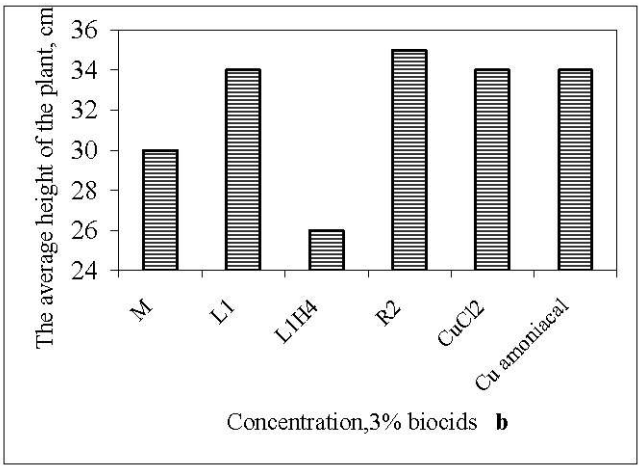
Therefore, there can be noticed that the modified traw lignin, obtained as a result of the reaction of hydroxymetilation of the unmodified straw lignin which took place in the presence of the formic aldehyde, triggers a stagnation in the evolution of the plant. This fact is in agreement with the information in the specialiyed literature, being known the fact that the formic aldehyde is a cancerigenic substance, with a high level of toxicity and consequently it has a harmful effect on the living body.

On the other hand, there has been found that the evolution of plants reaches the highest level in the case of the composite structure treated with copperammonia solution, thing that strengthens even more the fact that nitrogen and some of the nitrogen composite structures are above all elements of the growth, having in fact the specific function of stimulating the growth and development of the plant.

Another contribution to the evolution of plants is also brought by furan resins, copper chloride (II), followed by the unmodified lignin solution which, coming into contact with the surface of the composite structure incorporated into soil and under the action of microorganisms, undergoes a process of decay, in other words, it is initiated the biodegradation of the composite structure, there coming out organic substances. These organic substances provide a „harmonious stability" both between soil and plants and between these and the other components of the biosphere as a livng mcroorganism, they practically contribute to the achievement of the fertility, which represents the overall characteristic of soil, that of providing the growing and the development of the plant.

There also has to be mentioned the fact that a very important role in the evolution of plants is represented by the concentration of the used substance.





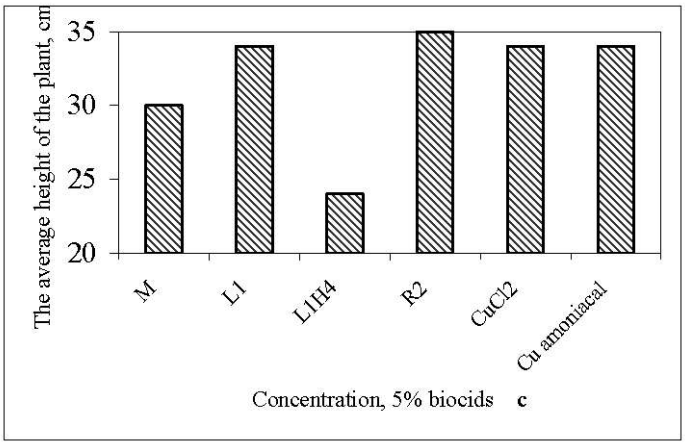


Figure 2 - **The role of some chemical agents on the evolution of the plant**
(the influence of the concentration on the average height of the plant)

Thus, in the case of stimulating chemical substances (unmodified lignin, furan resin, copper chloride (II) and copperammonia solution), there can be noticed that, the higher the concentration of substance is, the quicker the growing and the development of the plant is, whereas in the case of the chemical substances which inhibit the development of the plant, in the given case the solution of modified lignin, the effect is opposed, namely, the higher, the concentration of substance is, the slower the growing and the development of the plant is (figure 2 – a, b, c).

It can be estimated that the mentioned composite structures, excepting the one treated with modified lignin in quantities judiciously chosen, pozitively influence the growing and the development of plants, this way encouraging the fertilization of the soil and implicitly its bioremedy.

CONCLUSIONS

It is known the fact that bean plants grow well on a neutral to basic soil, and the presence of some chemical substances can influence them either in a positive or negative way.

From the obtained information it results that the presence of unmodified straw lignin, of copper chloride (II), of furan resins and of the copperammonia solution in the composite structures incorporated into soil generates a stimulating action of the evolution of plants.

The straw lignin modified through treatment with formic aldehyde inhibits the growing and the development of the plant, also considering the level of toxicity associated with the cancerigenic effect of this substance.

The concentration of the chemical substances influence significantly the evolution of plants in the following way:

- the substances stimulating the growing, used in high concentration accelerate the growing and the development of the plant;
- the substances inhibiting the evolution of the plant, used in high concentration stagnate the process of growing and development of the vegetal organism.

Used in judiciously chosen quantities, the chemical substances mentioned above, excepting the modified lignin, show a positive effect in the growing and the development of plants, essentially contributing to the increase of the fertilization of soil and implicitly to its bioremedy.

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