STUDIES CONCERNING THE INFLUENCE OF 2.4 D ACID ON THE ASSIMILATORY PIGMENT CONTENT IN *CALENDULA OFFICINALIS* L. LEAVES

Roxana VĂTAVU[1], C. LEONTE[1], B. NECHITA[1], T. ROBU[1], Cătalina PASCAL-SLABU[1]

[1] The University of Agricultural Sciences and Veterinary Medicine Iasi
e-mail:vătavuroxana@yahoo.com

In time all the species, adapted to the different conditions, elaborating a photosynthetic system which permits them to take of the environment the optimal radiances.

In the same time the rapport between the components of the photosynthetic systems is conceived so, that the efficacy of the absorption to by maximum and the pigments to have maximum resistance to different harmful factors.

He is knowed the fact that, at the same species the rapport between absorbance in the wavelength 435 and 663 nm is constant for the chlorophyll ,,a'' and to the chlorophyll ,,b''.

The explanation of the ascertainments on this paper can be puted on the expense of the substance an the different concentration that we have used for the experiment.

Key words: *Calendula, assimilatory pigment , 2,4 D acid, mutagen agent.*

The photosynthesis is one of the most important processes on the earth. This process is specific only to the plant kingdom which has the capacity to transform some inorganic substances in organic substances, and is fevered by the assimilatory pigments which on eukaryotic organisms reside in chloroplasts.

The most important group of the assimilatory pigments are chlorophyll a, b and carotenoids and at diatomee and algae besides this we meet phycobilins.

The chlorophyll a is the only pigment that is present in all the autotrophic organisms, besides bacteria, and the other pigments are present or not, depending on the species. Chlorophyll a is the most important assimilatory pigment involved directly in the conversion of solar energy into chemical energy at the molecular level in the frame of photosynthesis complex phenomena.

For this reason we can say that the chlorophyll a pigment is the one which participate directly on the transfer of energy to the enzymatic centre while the other pigments are accessories components of the assimilatory device [3].

The quantity of the assimilatory pigments present in chloroplasts is influenced by many environmental factors, different species presenting discrepancies regarding the amount and the report among these [4].

Some experiments have shown that, the changes occurring on the assimilatory pigments contents, in plants subdued of treatments of any kind, become evident only after a certain critical period unless the treatment is very strong that leads to plant death [2].

This, critical period amending the content of pigments" decide whether the entire plant catabolism will stop, concomitantly with loss of the assimilatory pigment or the plant will be able to regenerate, gathered with the growth of the pigments content [1].

The chlorophyll a presents an maxim absorption of the radiations in the 672, 683, 700 wavelength respectively 435 nm.

The chlorophyll b presents an maxim absorption of the radiations in the 644 wavelength respectively 453 nm, and the carotenoids pigments presents an maximum absorption on 400-480 nm wavelength.

The absorption spectrums of the assimilatory pigments can be studied on spectrophotometer [5].

MATERIAL AND METOD

For testing was used leaves from *Calendula officinalis L*, which has been collected only since on shiny weather, after 5 hours of sunrise, in the full flowering phase collecting the leaves nearly to flowers. It was sampled material for each variant, following the absorbance on the assimilatory pigments in the cases of four concentrations of 2.4 D acid used for treatment.

The treatments were made on seeds, with two time of action (3 and 6 hours), and on the vegetative peak, when the plants have reached the stage of 2 leaves.

For each sample were measured 0,5 g fresh material which immediately was made powder adding gradually acetone (3 ml acetone 85%) which acts as an solvent for the assimilatory pigments. To facilitate this process was used glass powder. The material was filtered, well washed until remained an white colour. The solution obtained was inserted in a calibrated flask by 50 ml and it has been completed whit acetone up to the sign. From the filtrate obtained we've got samples which were introduced in 10 mm vats and the values were read at the spectrophotometer. As a witness has been used only 85% acetone solution. The results are presented in absorbance's units.

At first was made one determination for the witness solution only with reagents and then three reads for the chlorophyll and the average obtained represent the value for the chlorophyll. The absorbance measurements were made in two wavelength: (629-663 and 432-454). The values obtained represent the absorbance for those assimilatory pigments: chlorophyll a ,b, carotene and xanthophylls.

RESULTS AND DISCUSSION

From the analysis of the table 1 we observed that the absorbance level is high at 0.01% concentration in both wavelength and begin to fall when the concentrations of the substances increases. The wavelength report has approximately the same value, lowest differences signing to 0.03% concentration where we can see a value of 0.89 in the case when the treatment was made on the vegetativ top.

Tabelul 1

The absorbance of the assimilatory pigments on leaves of *Calendula officinalis* L.

Sample	Abs.	Treatments					
		Vegetativ peak	R	seeds			
				3 hours	R	6 hours	R
Whitness	663	0.4149	0,52	0.4149	0,52	0.4149	0,52
	432	0.7887		0.7887		0.7887	
2,4 D acid 0,01%	663	0,9197	0,88	0.8310	0,92	0,9426	0,53
	432	1,0417		0.8942		1.7526	
2,4 D acid 0,02%	663	0,7159	0,88	1.0711	0,54	1.0554	0,53
	432	0,8044		1.9537		1.9804	
2,4 D acid 0,03%	663	0,6571	0,89	0.9810	0,53	0.9095	0,54
	432	0,7379		1.8314		1.6775	
2,4 D acid 0,04%	663	0,5747	0,85	0.7613	0,53	0.8182	0,51
	432	0,6707		1.4288		1.5775	

We may find that in both wavelengths the absorbance values fall in the same time that we are increasing the concentration. This may happens because applied on the vegetativ top, 2,4 D acid is acting like a herbicide causing an imbalance when the concentration is increased. On the other hand the report between the absorbance's values recorded a growth until the 0.03% concentration and then falls sharply at the 0.04%. We can appreciate that decreased report is caused by the fact that although the quantity of chlorophylian pigment is increased, the carotenoids pigments remain at constant values or even increase because under stress conditions they have the function to protect the assimilatory pigments or to partially supply them

In the table below we can see that, if the treatment were made on seeds with 3 hours time of action, the report among the adsorbent band increased to 0.02% concentration and after that begin to fall at 0.04% where it has the value of 0.53.

This effect is characteristic to the 2.4 D acid which is known that used in small concentrations seems that it had an stimulating effect, and in higher concentrations caused an imbalance in photosynthesis and breathing. The same situation can be observed if the treatment was performed on seeds whit 6 hours time of action. The increased values of the assimilatory pigments obtained when the treatment was made on seeds comparative with those obtained when the treatment was made on the vegetative top can be explained by the time difference which they were made.

We can say that treatments with chemicals at seeds could affect the early stages of plant ontogenesis and up to the moment that we applied treatment on the top of the vegetation the metabolic equilibrium of the plant to be returned to normal parameters.

CONCLUSIONS

From the table below is relevant that the assimilatory pigments are gathered in a different way in plants depending on the substance used, the concentrations, how apply the treatment and by the time of action of those substances although they were grown in similar conditions. It can be seen an increase quantity of pigments so at 0.01% we have values of 0.9807 in the case of treatments made on the vegetativ top, recede at 0.8626, in the case of seed treatments with 3 hours time of action and increase again on treatments made on seeds with 6 hours time of action. At the 0.02% concentration the pigments level has a linear growth starting with the treatments made on top of the vegetation and ending with 6 hour treatments made on the seeds. Variations may be established in the case of 0.03 and 0.04% concentrations where the pigments values are high at the treatment made on the vegetativ top relative to the witness, decrease at the 3 hours treatment and increase again on 6 hours treatments. So it may be established that the treatments applied on seeds with 3 hour time of actions, intermediate the values obtained in the case of treatment made on the vegetative top and 6 hours time of action treatments made on the seeds. May be a correlation between the manner the treatment was applied, the substances concentrations, and the time of action of those substances.

It may be established if, increasing the concentrations the photosynthetic activity is inhibited, and at this may be added the influence of the third factor also with inhibitor effect which may be the time of action of the substances on the biological material under the study. The results of these observations let us to say that the substances used for the experiment influence the assimilatory pigments synthesis and also the photosynthetic activity, when they are used in different concentrations.

BIBLIOGRAPHY

1. Haspel-Horvatovic, E., Horiscova, B., 1974 – *Changes of the assimilatory pigment indicating the degree of damaging plant,* Phytopath Z. 80, 224- 232.
2. Horičkova, B., 1973 – *Changes of the leaf pigment son barley infected by powdery mildew after the spray with a pesticid agent,* Diss. Techn. Univ. Bratislava, Depart. Chem.
3. Sălăgeanu, N., 1972 - *Fotosinteza,* Ed. Academiei Republicii Socialiste România, Bucureşti.
4. Smith, H.C. James, 1963 – *The major and accesory pigments in photosyntesis,* Annual Review of Plant Physiology, vol. 14, p. 181-224.
5. Toma Liana Doina, Robu, T., 2000 - *Fiziologie vegetală*, Ed ,,Ion Ionescu de la Brad".