# REMARKS ABOUT THE CATALASES ACTIVITY IN *CALENDULA OFFICINALIS L.* INFLORESCENCES TREATED WITH CHEMICAL MUTAGEN SUBSTANCES

## APRECIERI PRIVIND ACTIVITATEA CATALAZEI IN INFLORESCENTELE DE *CALENDULA OFICINALIS* L. IN URMA TRATAMENTELOR CU SUBSTANȚE CHIMICE MUTAGENE

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**Abstract.** *The catalase is an endoenzyme present in the chloroplasts and she is involved in the breathing and photosynthesis process. She has the role to decompose the peroxide and it is sensitive to the action of mutagen agents. The catalases activity in Calendula officinalis L. inflorescences can have different values depending on the chemical substances used.*

**Rezumat.** *Catalaza este o endoenzima, prezentă în cloroplaste şi este implicată in procesele de fotosinteză şi respirație. Are rolul de a descompune apa oxigenată şi este sensibilă la acțiunea agenților chimici. Activitatea catalazei în inflorescentele de Calendula officinalis L. poate avea valori diferite în funcție de substanțele chimice utilizate.*

## METHOD AND MATERIAL

Excessive accumulation of substances causes many metabolic disturbances to the plant (Levitt, 1980). There is some evidence that the stress induces the productions of active oxygen species (AOS) (Shalota and Tal., 1998). Active oxygen species include superoxide ($O_2^-$), hydrogen peroxide ($H_2O_2$) and hydroxil radical. Thease AOS can seriously disrupt normal metabolism through oxidative damage of lipids, proteins and nucleic acids. The AOS are controlled by an anti oxidative sistem including antioxidants (ascorbate, glutathione etc.) and enzimes such superoxide dismutase (SOD), ascorbate peroxidase (APx), glutatione reductaze (GR) and catalase (CAT).

Despite the pivotal role of catalases in controlling $H_2O_2$ levels within the cell, little is known of their function during stress condition. In part, this may due to their peroxisomal location, because most studies on oxidative stress in plant are focused an cloroplastic events. Nonetheless the participation of catalase in photorespiration would suggest that catalase activity is a determining factor for the protection of photosynthesizing cell against oxidative stress (Willekens, H., 1995). This is supported by the observations that a barley mutant whit reduced catalase activity is impaired in growth under photorespiratori conditions (Keppler LD.,1987).

The material used in the experiments it was represented by the *Calendula officinalis* L. inflorescences. The chemical substances used in the experiment are: colchicines, 2-4 D acid and ethidium bromide each of them being used in a concentration of 0.01, 0.02, 0.03 and 0.04%. The treatment was made on the top of the vegetation and at the seeds having two different times of action (3 and 6 hours).

The catalases activity in the C*alendula officinalis L.* inflorescences it was determined when the flower was completely opened, and the results were represented in the charts (the readings were made to intervals of a minute for nine minutes). The graphic representations were maked depending on last reading.

For experimentation purpose two grams of vegetable material and 10 milliliters of peroxide were used, each test being done in 3 repetitions, the results being the average of them. The determination of the catalases activity was done through the gasometrical method by means of an appliance of its own modified and improved. The fresh vegetable material has been pestled then it has been placed in the reaction recipient. Some water is poured in the separator funnel and after the liquid is brought into zero position, in the reading device by means of the tap, the pressure unification tap is closed. The separator funnel is closed in a tight way, and the tap is being open in order to put into contact the vegetable material with $H_2O_2$. In this way, the catalases form of the vegetable material decomposes $H_2O_2$, setting the oxygen free that pushes the liquid from the reading device.

## RESULTS AND DISCUSSIONS

The investigations confirm that, in the case of the treatments made on the top of the vegetation, all the variants have an raised activity relative to the witness. In the colchicines case, the greatest catalytic activity is met at 0,03% concentration and slightly lowed at the 0,02% concentration.

The treatments with etidium bromide show that the catalases activity increased at the same time with the concentration. If we observe the catalytic activity in the case of the 2,4 D acid we can easily notice the fact that she has approach values at 0,02% and 0,04% concentration, and the maximum was recorded at the 0,01%.

Analyzing the catalytic activity (figure 1) in the case of the experiment which the treatment was made on the seeds, we can see that the both methods of treatments (3 and 6 hours) registered smaller values than the case of treatments made on the top of the vegetation. Although, we can notice some differences in the case of colchicines, which on 0,01% concentration and 3 hours treatment catalase activity increased relative to the witness, but the process decreased in response to increased concentrations.

In the case of 6 hours treatments, colchicines induces intense activity at the 0,01% concentrations, decreases at 0,02% and then raise again but don't excel the witness and neither the activity observed at 0,01% concentration.

The treatments with etidium bromide registered ascending values at 0,01% and 0,03% overreaching the witness and the treatments made whit colchicines at three hour time of action. If will shall follow the results obtained in the case of 6 hours time of action treatments, we notice that the etidium bromide induces at the same time with the concentration growth an decreasing activity of this enzyme. In the both cases of treatments made on seeds, 2,4 D acid releases an low activity up to 0,02% and after this the values the catalases activity raise in the same time whit the concentrations.

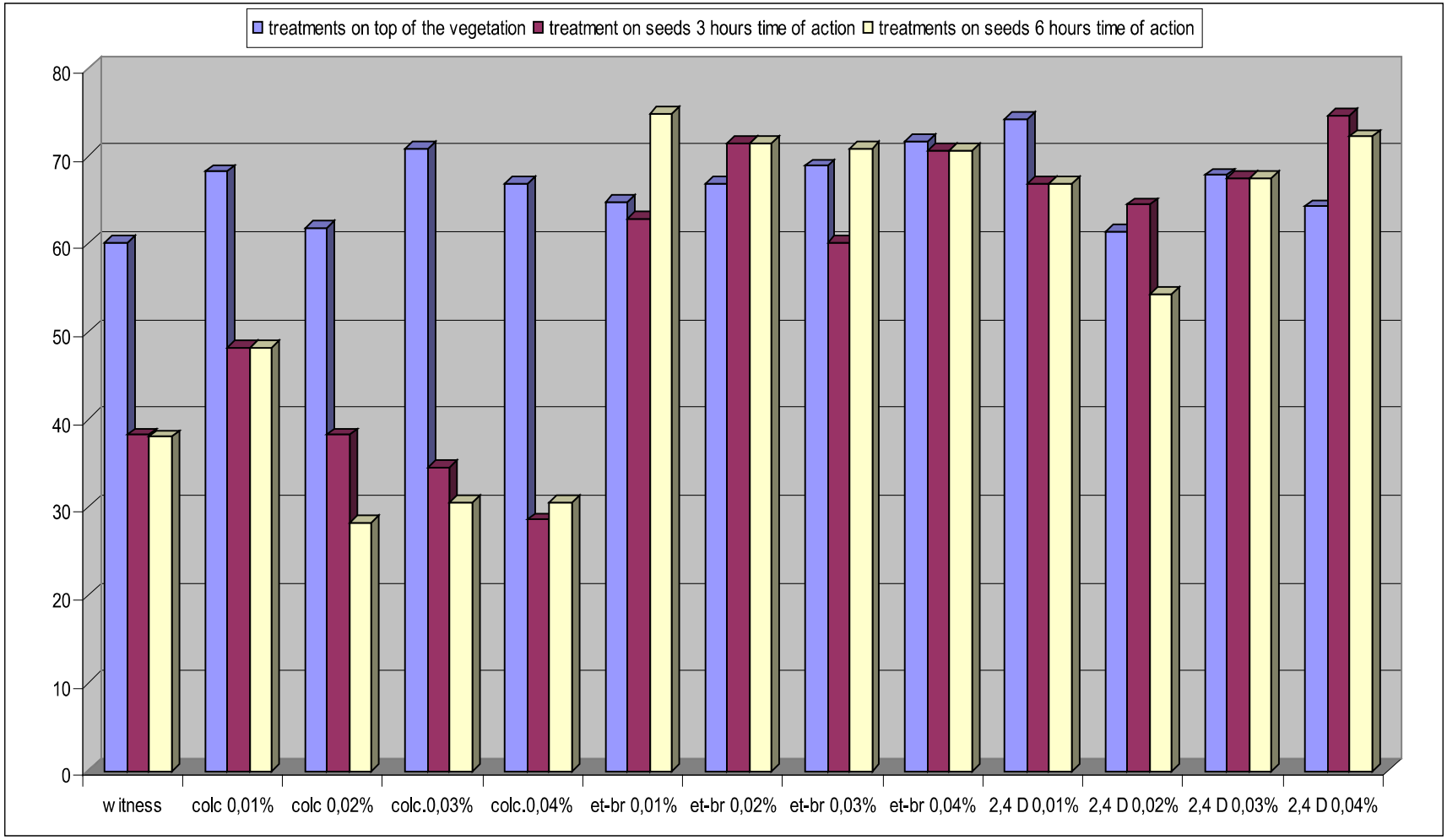


**Fig.1 - Catalases activity in *Calendula officinalis L.* inflorescences treated with chemical mutagen substances.**

## CONCLUSIONS

The catalysis is an enzyme that intensifies in photosynthesis and breathing processes.

This enzyme is also extremely sensitive at the agent chemical action.

Available evidence indicates that the ability to control $H_20_2$ levels is one of the factor that contribute to resistance against various biotic and abiotic stresses in plants.

Detailed analyses of catalases expression in several plant species have clearly demonstrated that catalase activity are affected by stress conditions.

The investigations confirm that, in the case of the treatments made on the top of the vegetation, all the variants have an raised activity relative to the witness.

In the case of colchicines, which on 0,01% concentration and 3 hours treatment catalase activity increased relative to the witness, but the process decreased in response to increased concentrations.

In the case of 6 hours treatments, colchicines induces intense activity at the 0,01% concentrations, decreases at 0,02% and then raise again but don't excel the witness and neither the activity observed at 0,01% concentration.

Analyzing the catalytic activity in the case of the experiment which the treatment was made on the seeds, we can see that the both methods of treatments (3 and 6 hours) registered smaller values than the case of treatments made on the top of the vegetation.

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