LEAD ACETATE EFFECT ON SUPEROXIDE DISMUTASE ACTIVITY IN *LACTUCA SATIVA* L., MONA AND SYRENA CULTIVARS

VLAD RUSEN FELICIA MORELA[1*], CĂPRARU GABRIELA[2], ION BĂRA[1], VLAD ARTENIE[1]

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Abstract: Our study is focused on the activity of superoxide dismutase (SOD) in Mona and Syrena cultivars plantlets of *Lactuca sativa* L. obtained from seeds treated with lead acetate. Total activity of SOD in Mona cultivar show an inhibition at all tested concentrations of lead acetate. For Syrena cultivar, the lead acetate shows a slowly stimulative effect of activity SOD only in the first two concentration of the three used.

INTRODUCTION

Lactuca sativa L.- the species that constitutes the object of our study - has a great alimentar and therapeutical value, for this reason being considered a very valuable vegetable, with a large spread in world.

The presence of metal bioelements in plant and animal organisms has different effects depending on their level. Thus, at small and very small quantities, they have a stimulative effect on plant growth, but in excess some of these ions can have toxic effects on plant growth. In this category are included cadmium, copper, lead and other ions which, in the case of their accumulation, affect the biochemical and physiological processes [Fernandes and Henriques,1991], especially the activity of some oxidoreductases like catalase, superoxide dismutase, and some dehydrogenases. It is known the toxic effects of lead ions, as a result of the interactions with proteins and of the appearance of insoluble precipitats. The speciality studies shows that lead ions have a strong inhibitory effect on activity of some oxidureductases enzyme [Artenie et al., 2005].

The objective of this paper was the knowledge of effects induced by lead ion, at different concentrations, on superoxide dismutase activity of plantlets belonging to two cultivars of above cited species. In our experiments, we used a salt of lead, respectively lead acetate.

MATERIALS AND METHODS

The biological material is represented by *Lactuca sativa* L. plantlets, Mona and Syrena cultivars. The plantlets were obtained from seeds treated with lead acetate [$Pb(C_2H_3O_2)_2 \cdot 3H_2O$], in the following manner. They were treated for 24 h in solutions of lead acetate - 0.1, 0.25, and 0.5% concentrations. The dilutions were made in distilled water. For controls, the seeds were maintained in distilled water.

The germination was ensured in Petri boxes, on filter paper moistened with distilled water, at a temperature of 22 ± 2^0C. When the little roots are between 2-3 cm, Petri boxes are placed in specially germinators where was ensured the alternation light –dark till they have 6-7cm in length, size at which they have been harvested.

Superoxide-dismutase activity was determined spectrophotometrically measuring the percent of the superoxide-dismutase-induced inhibition of Nitro Blue Tetrazolium(NBT) reduction by the superoxide radicals resulted in the medium of reaction by riboflavin photoreduction [Iordăchescu and Dumitru, 1988]. The NBT reduction was followed at 560 nm using Metertek SP830 spectrophotometer. The rate of NTB reduction in the enzyme absence was taken as the reference value. One unit of superoxide-dismutase represents the quantity of enzyme which produces 50% inhibition in the standard conditions.

Statistical analysis of the enzyme activities was performed using the Student test [Văleanu, Hâncu, 1990], at the 0.05 level of significance.

RESULTS AND DISCUSSIONS

The superoxide dismutase activity in *Lactuca sativa* L. plantlets, Mona and Syrena cultivars, obtained from lead acetate treated seeds has different values, depending on the cultivar and also depending on lead acetate dilution which was used.

For Mona cultivar, the differences in the comparison with the control variant and the standard error are beginning obviously on figure 1.

The average value of superoxide dismutase activity in control is 151.370%. In variants treated with the 0.1% , 0.25% ; and 0.5% concentrations of lead acetate, the average values were

ranged between 92.18 → 126.45 EU/g/min, aspect that indicates the influence of tested chemical compound on superoxide dismutase activity.

In comparison with the control, in the treated samples, superoxide dismutase activity values decreased, fact confirming the inhibitory effect of lead acetate. The superoxide dismutase activity value in the case of 0.1% lead acetate dilution treated sample is statistically important, while in the case of 0.25% and 0.5% dilutions, the superoxide dismutase activity value is close to that of the control variant.

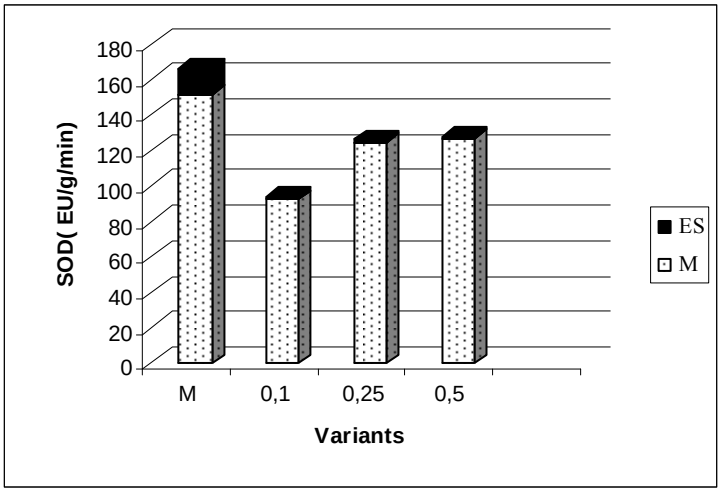

Figure 1 The superoxide dismutase activity variation, in Mona cultivar plantlets of *Lactuca sativa* L.

The superoxide dismutase activity in Syrena cultivar plantlets of *Lactuca sativa* L., after the treatment with the lead acetate, is presented in the figure 2.

In this cultivar, the average value of superoxide dismutase activity of control is 118.69%. For the 0.1%; 0.25%; and 0.5% variants, the activity of superoxide dismutase registered average values comprised between 97.46 → 136.11 interval, as a result of effect of lead acetate treatment.

In comparison with the control variant, in the samples treated with 0.1% and 0.25% lead acetate, the values of superoxide dismutase activity increased. This increase indicates the stimulatory effect of lead acetate on activity of this enzyme, in comparison with the sample treated with 0.5% lead acetate where the superoxide dismutase activity value registered a decrease.

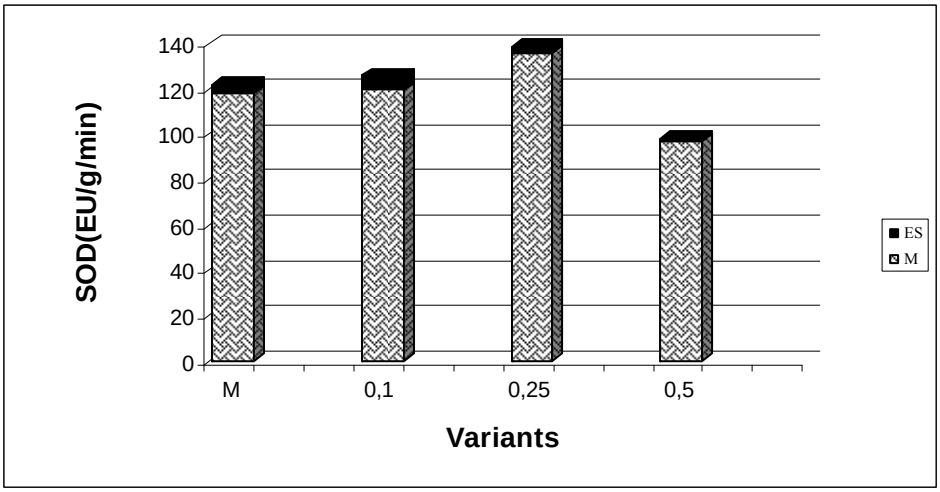

Figure 2. The superoxide dismutase activity variation in Syrena cultivar plantlets of *Lactuca sativa* L.

For the sample treated with 0.1% lead acetate, the result is not relevant, due to the closed values with the control, but for the values obtained for 0.25% and 0.5% concentrations the variation is significant, the results being different for those of the control.

The comparative analyse of superoxide dismutase activity at this two cultivars of *Lactuca sativa* L. evidences different values of the treated variants in comparison with control, as well as between the two studied cultivars. The differences, in the sense of increase or decrease of values in comparison with control, depend on cultivar and on tested concentration of lead acetate.

For example, for Mona cultivar the superoxide dismutase activity for all the treated variants is decreasing. The lowest value is for 0.1% lead acetate dilution.

At Syrena cultivar, the superoxide dismutase activity values increased at two treated variants, respectively 0.1% and 0.25%, while for 0.5% lead acetate dilution this value decreased comparatively to control.

The lead acetate inhibits the SOD activity for the Mona cultivar, in all concentration variants, but at Syrena cultivar, this substance stimulates the SOD activity, excepting the 0.5% lead acetate dilution, where the SOD activity registered a decrease in comparison with the control and also with the other treated variants.

The similar studies but with physical agents are presented in the speciality literature on the *Hypericum perforatum* L. and *Echinaeea purpurea* L. Moench. species [Artenie et al., 2006].

We consider that the different behaviour of the two cultivars at the lead acetate treatment is due to the genetic particularities of cultivars.

CONCLUSIONS

At Mona cultivar, the treatment with lead acetate had an inhibitory effect on activity of superoxide dismutase, the lowest value of the SOD activity being recorded at 0.1% lead acetate concentration.

For Syrena cultivar, the 0.1% and 0.25% lead acetate concentration had a stimulative effect on SOD activity, while the maximum tested concentration (0.5%) was inhibitory.

The differences registered by the two cultivars, in the conditions of the same treatment, are the expression of their genotypes.

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1 University "Alexandru Ioan Cuza", Iaşi, Faculty of Biology, Department of Molecular and Experimental Biology
2 Biological Research Institute Iaşi

* - rusenvlad@yahoo.com