THE CYTOGENETIC EFECTS INDUCED BY ACETATE OF LEAD UPON THE MITOTIC DIVISION OF *LYCOPERSICUM ESCULENTUM* L.

EFECTE CITOGENETICE INDUSE DE ACETATUL DE PLUMB ASUPRA DIVIZIUNII MITOTICE LA *LYCOPERSICUM ESCULENTUM* L

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Abstract: *The paper presents the influence of acetate of lead on the mitotic division at Lycopersicum esculentum L. The effect of acetate of lead on tomato radicular meristems were expressed by chromosomial mutations, whose rate was differentiated depending on the concentration function and time of action of respective substance. The experiment pointed ont that the lead, wh is known as a polluting agent has a mutagenic potential on the plants.*

The lead is known as un agresive pollution of the medium, with affect equal the plants and the animals (Heggestad, 1969; Pădureanu, 2004). Also, majority pollutigs has the same effect (Fiskesjö, 1969; Pădureanu, 2004).

MATERIAL AND METHODS

The biological material used in the experiment, was represented by seeds of *Lycopersicum esculentum* L., harvested from a local population cultivated at the Experimental Didactic Station "V. Adamachi" from the University of Agricultural Sciences and Veterinary Medicine, Iaşi.

The seeds were put to germination in lab conditions. When the roots reached 15 – 17 mm in length, they were treated with acetate of lead.

Acetate of lead was used in the form of watery solutions in three concentrations: 5%, 1%, 0.1%.

The time of action of the respective solutions on the radicular meristems was differentiated as follows: 5%, 1 % and 0.1% solutions acted for 4 hours and 2 hours.

Taking into account the concentration and the time of action of the solutions 6 variants have resulted.

Besides these eight experimental variants, there was also used a control plot and in this case no treatments were applied to the radicular meristems.

For further cytogenetic investigations, the treated and non/treated roots (control) were fixed in Carnoy fixing solution for 24 hours at 4°C then hydrolised with HCl and coloured with the basic colouring matter Carr.

The radicular meristem was displayed using squash technique.

15 preparations and 10 microscopical fields/preparation were examined for all the variants and control.

The microscopical examination was carried out using the optic microscope Nikon Eclipse 600.

The microphotographies were made with the camera from the endowment of the microscope.

RESULTS AND DISCUSIONS

The analysis of the mitotic index

The inhibitory effect of acetate of lead is expresed by high percentage of the cells in interphase and one adequate diminution those the cells in division, in direct correlation with an increased concentration and time of action of this polluting agent (fig. 1, 2).

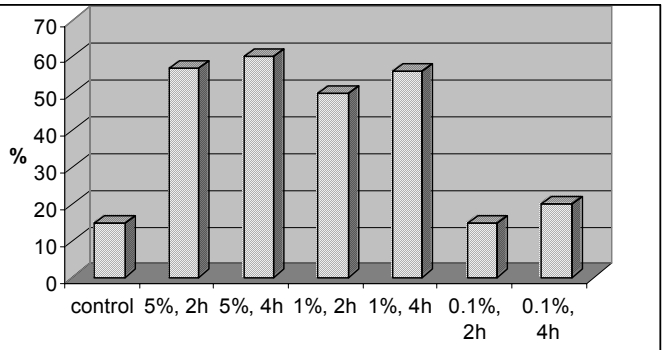

Fig. 1 Proportion of cells in interphase, in root meristem at tomato, treated with acetate of lead

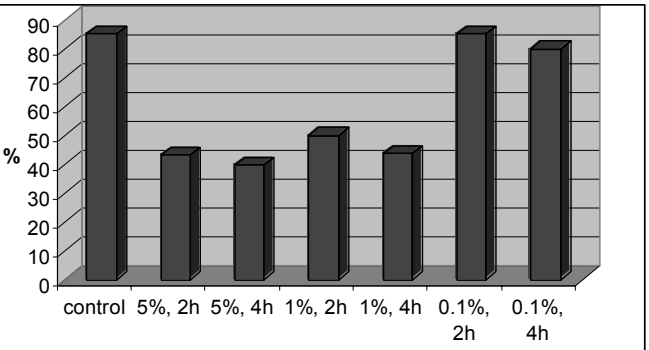

Fig. 2 Proportion of cells in division, in root meristem at tomato, treated with acetate of lead

The percentage of the cells in prophase is low v.s. control, when the concentrations of the polluting agent where 5% and 1%. At the variants with 0.1% concentration, the percentage of the cells in prophase increased v.s. control (fig. 3).

In metaphase, anaphase and telophase on constate one lowering of the cells number v.s. control (fig. 4, 5, 6).

The analysis of the cells in aberrant metaphase and aberrant ana-telophase

Acetate of lead induced between 0.15 and 2.5% aberrant metaphases v.s. control, in which only 0.34% cells in aberrant metaphases were recorded (fig.7).

The aberrant metaphase recorded by experimental variants consisted in picnotic chromosomes dispersed in all mixoplasma. At control, the aberrant metaphases presented the retardatary chromosomes.

The proportion of the cells in aberrant ana-telophase registered between 0.4% and 2.51% by experimental variants and 0.61% by control (fig. 8). The

maximum percentage of the cells in aberrant ana-telophase was induced by the variants with 5% concentration and time of action 2 hours.

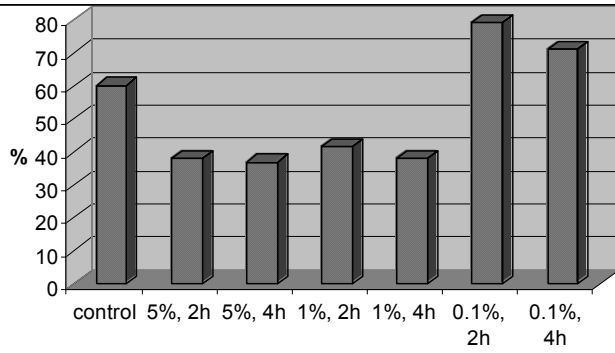

Fig. 3 Proportion of cells in prophase, in root meristem at tomato, treated with acetate of lead

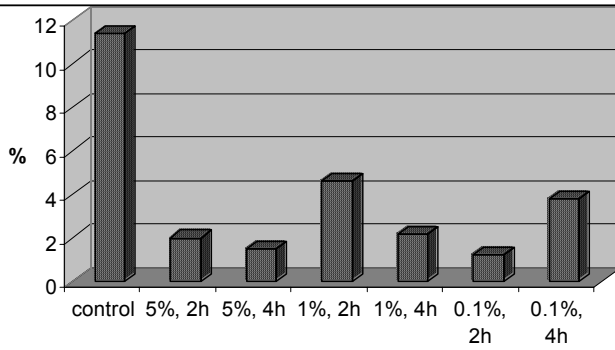

Fig. 4 Proportion of cells in metaphase, in root meristem at tomato, treated with acetate of lead

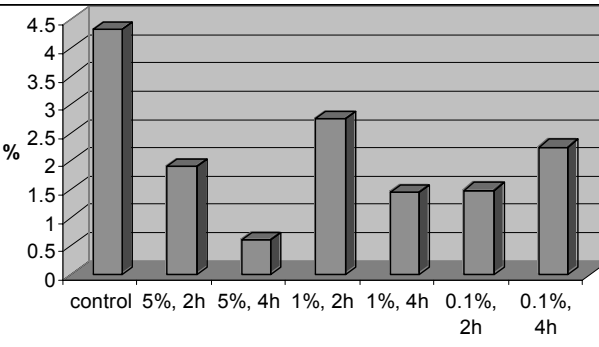

Fig. 5 Proportion of cells in anaphase, in root meristem at tomato, treated with acetate of lead

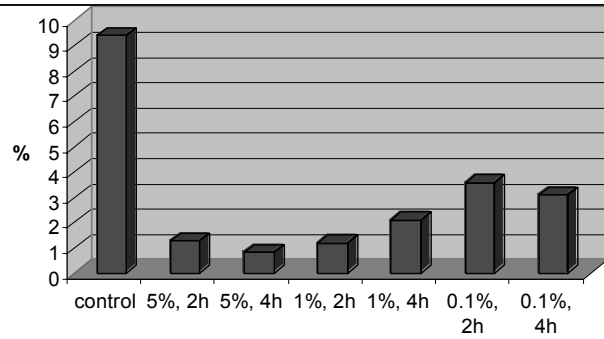

Fig. 6 Proportion of cells in telophase, in root meristem at tomato, treated with acetate of lead

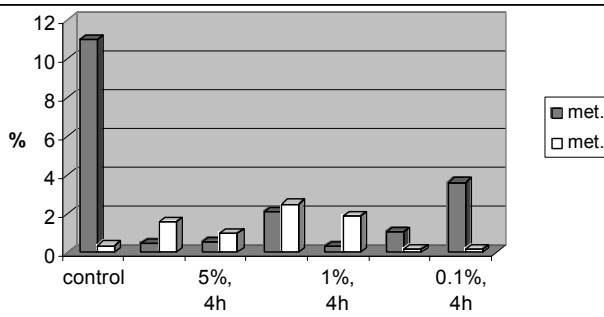

Fig. 7 Proportion of cells in normal and aberrant metaphases in root meristem at tomato treated with acetate of lead

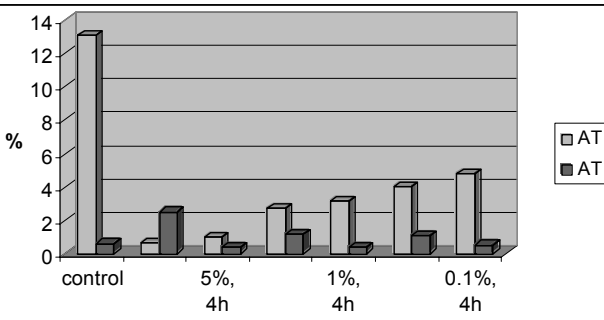

Fig. 8 Proportion of cells in normal and aberrant ana-telophases in root meristem at tomato, treated with acetate of lead

The analysis of the types of chromosomial aberrations

The proportion of the types of chromosomial aberrations induced by acetate of lead on tomato root meristems is graphically represented in figure 9.

The chromosomial bridges has appeard in subunitary percentage in all experimental variants.

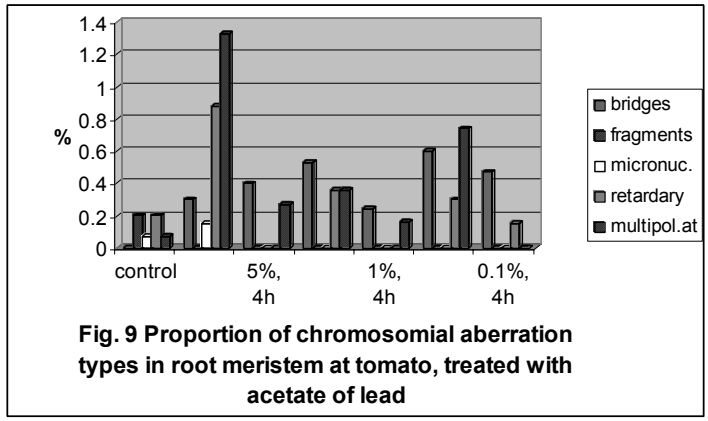

Fig. 9 Proportion of chromosomial aberration types in root meristem at tomato, treated with acetate of lead

Micronuclei is present only at variant with highest concentration (5%) and time of action 2 hours.

Retardatary chromosomes were presents in majority variants.

Multipolar ana-telophase, excepting one variant (0.1%, 4 hours), registered in all variants (0.16%-1.33%).

Chromosomial aberrations spontaneously produced in the control plot were: fragments (0.20%), micronuclei (0.07%), retardary chromosomes (0.20%) and multipolar ana-telophase (0.07%).

Different aspects of chromosomial aberration induced by acetate of lead at tomato are presented in figures 10-17.

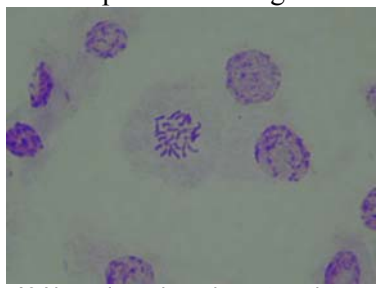

Fig. 10 Normal prophase in root meristem at tomato (100 X)

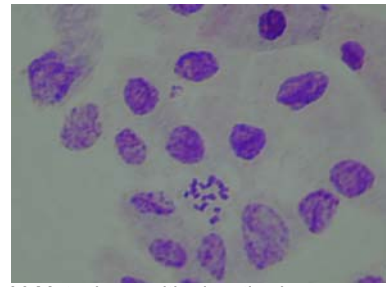

Fig. 11 Metaphase with picnotic chromosomes in root meristem at tomato, treated with acetate of lead, 1%, 2 hours (100 X)

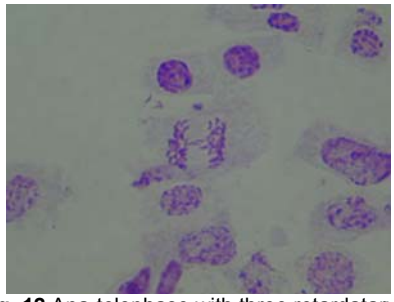

Fig. 12 Ana-telophase with three retardatary chromosomes in root meristem at tomato, treated with acetate of lead, 5%, 2 hours (100 X)

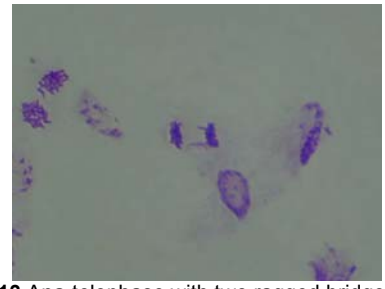

Fig. 13 Ana-telophase with two ragged bridges in root meristem at tomato, treated with acetate of lead, 5%, 4 hours (100 X)

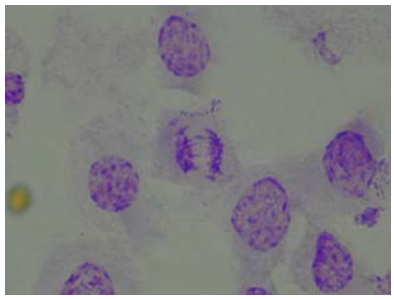

Fig. 14 Anaphase with two bridges in root meristem at tomato, treated with acetate of lead, 1%, 2 hours (100 X)

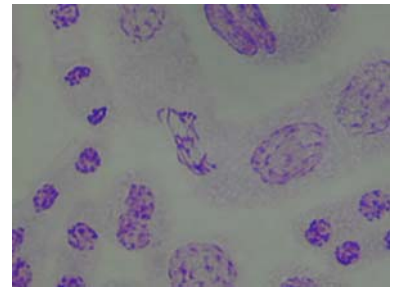

Fig. 15 Multipolar anaphase in root meristem at tomato, treated with acetate of lead, 1%, 4 hours

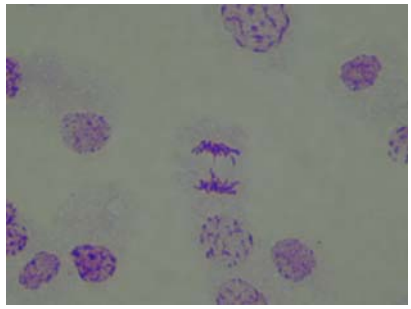

Fig. 16 Anaphase with bridge and retardatary chromosome in root meristem at tomato, treated with acetate of lead, 0.1%, 2 hours (100 X)

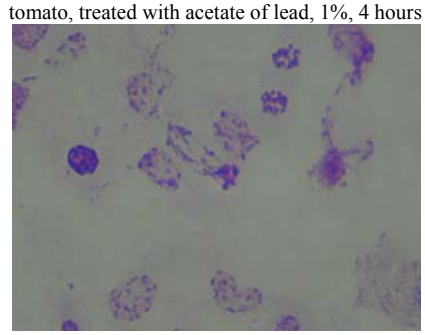

Fig. 17 Multipolar anaphase in root meristem at tomato, treated with acetate of lead, 1%, 4 hours (100 X)

CONCLUSIONS

1. Acetate of lead, known as a polluting agent has a strong inhibitory effect on mitotic division of *Lycopersicum esculentum* L.

2. The cells reacted differently in each phase of mitotic division to the action of the polluting agent.

3. Acetate of lead has a real mutagenic potential, confirmed by diversity chromosomial aberrations induced.

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