THE INFLUENCE OF HEXANITROGEN- COBALTIAT III OF SODIU ON MITOTIC DIVISION AT *ALLIUM CEPA* L.

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Key words: hexanitrogen-cobaltiat III of sodiu, *Allium cepa* L., root meristem,, cells in mitotic division, chromosomial aberrations.

Abstract: The paper presents the influence of hexanitrogen-cobaltiat III of sodiu upon the mitotic division of Allium cepa L. The treatment with hexanitrogen-cobaltiat III of sodiu has determined the lessening of the mitotic index and the chromosomial mutations.The experiment prowed that hexanitrogen-cobaltiat III of sodiu, known as a polluting agent has a mutagenic potential on the plants.

INTRODUCTION

The cobalt and he’s salts are known as pollutings (Ciplea, Ciplea,1978; Heggestad,1968; Kihlman,1966)

At plants, action of the pollutings demonstrated on various chromosomial aberrations (Ahmed, Grant, 1972; Ammore,1961; Fiskesjö, 1969; Pădureanu, 2004; Pădureanu, 2004). Our investigations focused the determination of the mitotic index, the determination of the frequency of the types of chromosomial aberrations from metaphases and aberrant ana-telophases.

MATERIAL AND METHODS

The biological material used in the experiment, was represented by seeds of *Allium cepa* 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.

Hexanitrogen-cobaltial III of sodiu 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% solutions acted for 48 hours, 24 hours, 4 hours, 2 hours; 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 8 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 DISCUSSIONS

The analysis of the mitotic index

The inhibitory effect of this polluting agent is strong experienced in case of 5% concentration.

At other variants, the percentage of cells in division is a little high, with values corelated in a contrary direction as against the concentration and the time of action of polluting agent (fig. 1).

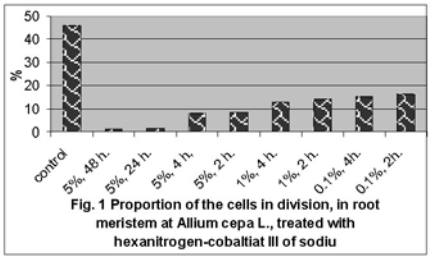

Fig. 1 Proportion of the cells in division, in root meristem at Allium cepa L., treated with hexanitrogen-cobaltiat III of sodiu

The same situation exist in case of each phase of mitotic division (fig. 2, 3, 4, 5).

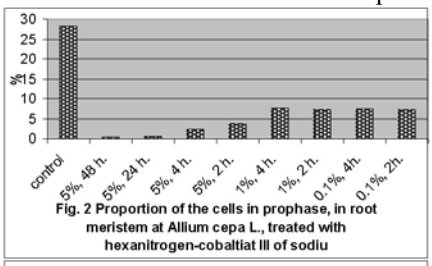

Fig. 2 Proportion of the cells in prophase, in root meristem at Allium cepa L., treated with hexanitrogen-cobaltiat III of sodiu

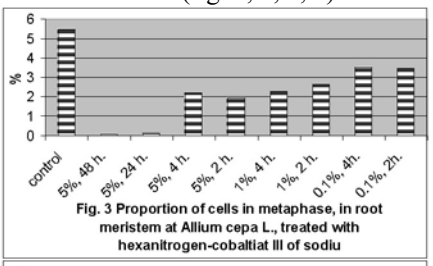

Fig. 3 Proportion of cells in metaphase, in root meristem at Allium cepa L., treated with hexanitrogen-cobaltiat III of sodiu

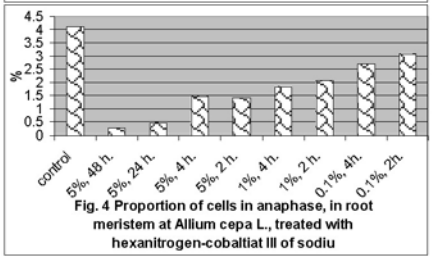

Fig. 4 Proportion of cells in anaphase, in root meristem at Allium cepa L., treated with hexanitrogen-cobaltiat III of sodiu

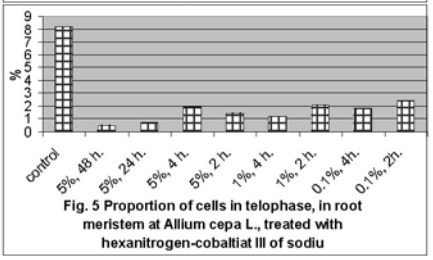

Fig. 5 Proportion of cells in telophase, in root meristem at Allium cepa L., treated with hexanitrogen-cobaltiat III of sodiu

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

The aberrant metaphases appeared in subunitary percentage to majority variant, excepting of the 5%, 48 hours and 24 hours (fig. 6).

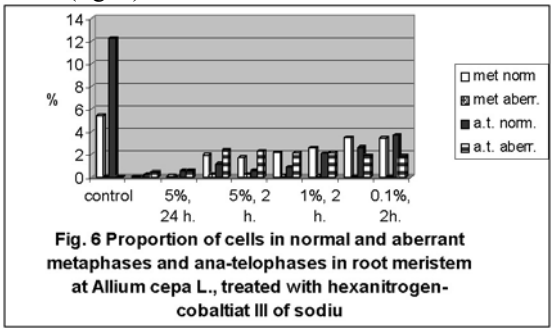

Fig. 6 Proportion of cells in normal and aberrant metaphases and ana-telophases in root meristem at Allium cepa L., treated with hexanitrogen-cobaltiat III of sodiu

The aberrant ana-telophases appeared at all variants (fig. 6).

The analysis of the types of chromosomial aberrations

The proportions of the types of aberrations induced by complex salt of cobalt to the root meristem of onion are represented in figure 7.

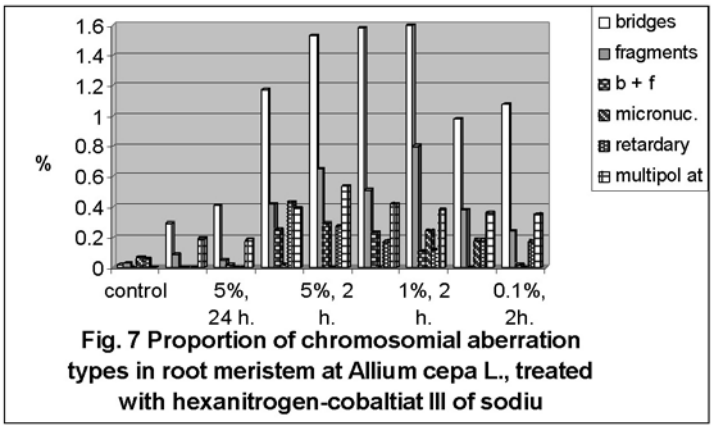

Fig. 7 Proportion of chromosomial aberration types in root meristem at Allium cepa L., treated with hexanitrogen-cobaltiat III of sodiu

The chromosomial bridges appeared at all variants. At 5% concentrations, 48 hours and 24 hours, the bridges are thick, simple or double, as time at 5% concentration, 4 hours and 2 hours, and 1% and 0.1% concentration, the bridges are thin, multiple.

The chromosomial fragments appeared at all variants in subunitary percentage.

The associations between bridges and fragments absent only at the variants with 5% concentration, 48 hours and 0.1% concentration , 4 hours.

Micronuclei appeared only at three variants: 5% concentration, 4 hours, 1% concentration, 2 hours, 0.1%, 4 hours.

Retardatary chromosomes from metaphase and ana-telophase absent at the variants with 5% concentration, 48 hours and 24 hours.

Multipolar ana-telophases registered in all variants.

Beside the presented, respectively polluting induced the forming of the picnotic nuclei, non-functionally, in subunitary proportion, who is varyng directly proportionally with the increase the concentration and the time of action of polluting.

Different aspects of chromosomial aberrations induced by hexanitrogen-cobaltiat III of sodiu are presented in figures 8-11.

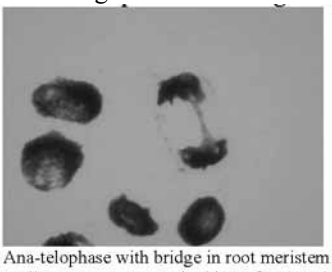

Fig. 8 Ana-telophase with bridge in root meristem at *Allium cepa* L., treated with $Na_3[Co(NO_2)_6]$, 5%, 24 hours (1000X)

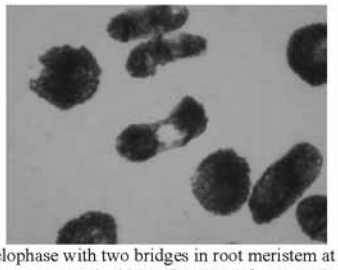

Fig. 9 Telophase with two bridges in root meristem at *Allium cepa* L., treated with $Na_3[Co(NO_2)_6]$, 5%, 24 hours (1000X)

Fig. 10 Multipolar anaphase with multiple bridges in root meristem at *Allium cepa* L., treated with $Na_3[Co(NO_2)_6]$, 1%, 2 hours (1000X)

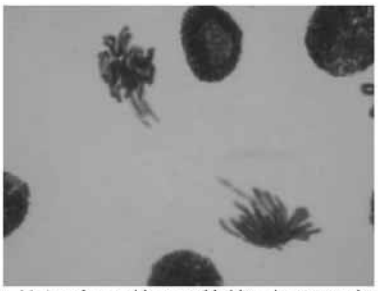

Fig. 11 Anaphase with ragged bridges in root meristem at *Allium cepa* L., treated with $Na_3[Co(NO_2)_6]$, 0.1%, 2 hours (1000X)

CONCLUSIONS

Hexanitrogen-cobaltiat III of sodiu, know as polluting agent has a strong inhibitory effect on mitotic division of *Allium cepa* L.

The cells proportion in division is in opposite direction with the increased of the concentration and the time of action of polluting agent.

Hexanitrogen-cobaltiat III of sodiu has a real mutagenic potential, confirmed by diverse types of chromosomial aberrations induced.

Picnotic nuclei represents a characteristic of the hexanitrogen-cobaltiat III of sodiu effect.

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