

## THE INFLUENCE OF CAFFEINE ON MITOTIC DIVISION AT *CAPSICUM ANNUUM* L.

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**Key words:** caffeine, *Capsicum annuum* L., mitotic division.

**Abstract :** The paper presents, the caffeine effects in mitotic division at *Capsicum annuum* L.. The treatment has determined the lessening of the mitotic index (comparative with the control variant), until mitotic division total inhibition, as well as an growth frequency of division aberation in anaphase and telophase.

### INTRODUCTION

Caffeine (teine, 1,3,7 trimetil xantine), is an alcaloid with purinic nucleus, wich in the specialty literature is describe as a substance which's effect is blocking the cytokinesis and it can be includet in nucleinic acids macromolecules, replacing adenine and guanine (Diaconu,1971). Caffeine it been used like mutagenic substances (Gimenez-Martin,1965, Lopez – Saez,1966, Acatrinci,1998), causing the appearance of binucleated or polinucleated cells, wich nucleuses merge getting birth to polyploid cells.

### MATERIAL AND METHODS

The biological material was represented by seeds of *Capsicum annuum* L., *Export* variety and *Capsicum annuum* L., *Cosmin* variety.

The seeds was puted to germinat in lab conditions in caffeine solutions, wich diferent concentrations (0,025%, 0,05%, 0,1% and 0,25%) and a control variant, in distilled water.

After the germination (six days), the roots were fixed in Bataglia fixing solution for 24 hours, after that the roots were immersed in graine alcohol 70%.

For cytogenetics investigations, the treated and non treated (control) roots, were hydrolised with HCl 1N five minutes, and HCl 50% eight minutes and coloured with the basic colouring Carr.

The radicular meristem was displayed using squash technique and were counted the cells from ten microscopical fields for each slide. The cells with the division aberations were counted an the entired slide.

### REZULTS AND DISCUSSIONS

The analysis of the mitotic index:

For each pepper variety, the mitotic index was low (Fig 1). For *Export* variety, at 0,25% caffeine concentration, all cells were in interphase, most binucleated. Comparativ with the control variant, only the *Cosmin* variety had the mitotic index little higher.

The dynamics of division cells:

For each variety, the higher percentage was represented by the prophase cells and the lowest percentage, the metaphas cells (Fig 2,3).

The proportions of the types of divisions aberations:

The aberant ana-telophases appeared at all variants.

The proportions of the types of aberations induced by caffeine to the root meristem pepper are represented in figure 4 and 5.

From all investigated anaphases and telophases, the higher percentage of anaphases and telophases with aberations was foundet at *Cosmin* variety (58%), wich was treated with 0,1% and 0,25% caffeine solution.

The *Export* variety had the higher percentage (51%), at the variant which was treated with 0,1% and 0,05% caffeine solution.

From the division aberrations the most common, were the anaphases and telophases with chromosomal bridges.

### CONCLUSIONS

The caffeine treatment determined a decrease of the mitotic index, comparative with the control variant, at the both variety, till the total inhibition in the cells division (the variant which was treated with 0,25% caffeine solution, *Export* variety).

Comparative with the control, the division aberrations frequency, it's higher at the both pepper variety.

### BIBLIOGRAPHY

Acatrinei Gh., Ligia Acatrinei, 1998, *Diviziunea celulelor la plante sub influența substanțelor biologice active*, Ed. Cermi, Iași;

Băra I. Ion, Mirela M. Câmpeanu, 2003, *Genetica*, Ed. Corson, Iași

Diaconu P., 1971, *Ereditatea și factorii mutageni*, Ed. Ceres, București

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APPENDIX

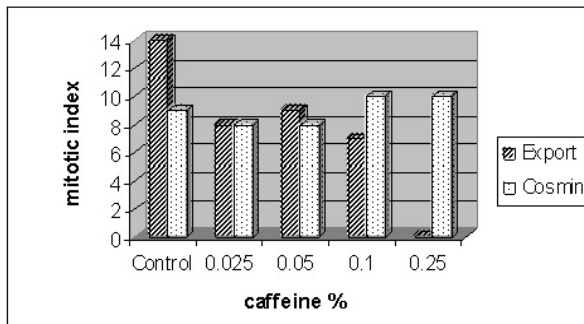
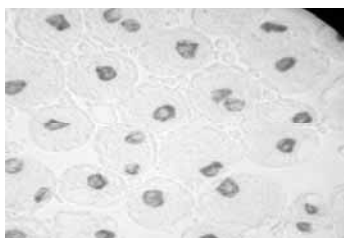


Fig 1 Mitotic index, after the treatment with caffeine solution



Binucleated cells at *Export* variety, treated with 0,25% caffeine solution

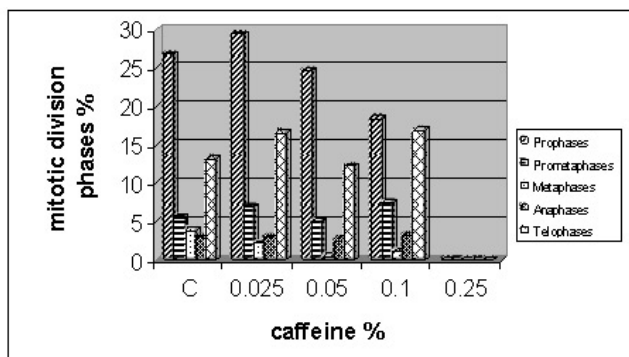


Fig 2 Mitotic division phases, at *Export* variety

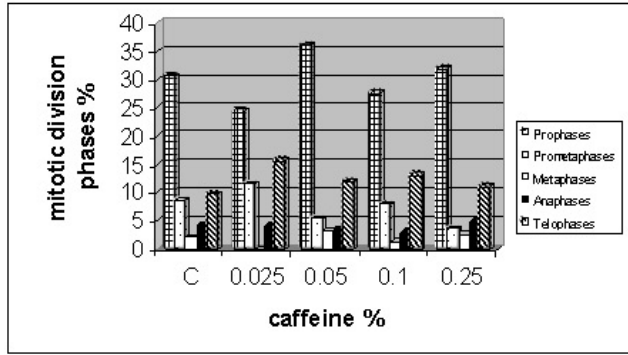


Fig 3 Mitotic division phases, at *Cosmin* variety

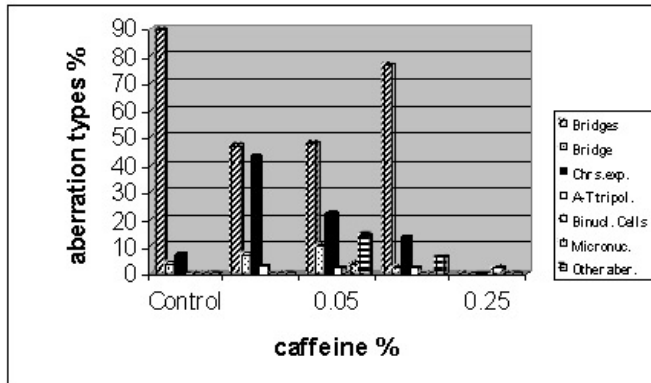


Fig 4 Proportion of division aberration types at *Export* variety

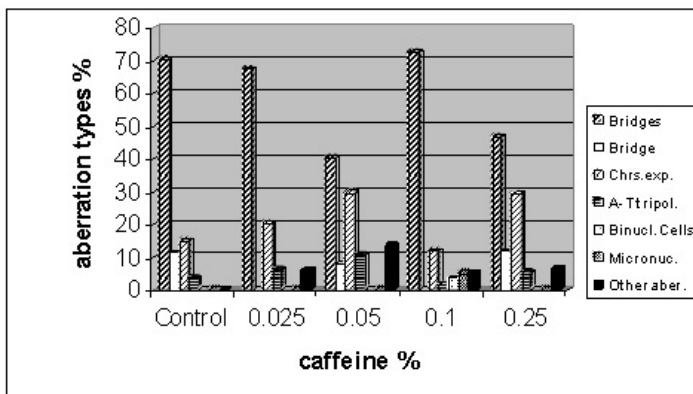


Fig 5 Proportion of division aberration types at *Cosmin* variety

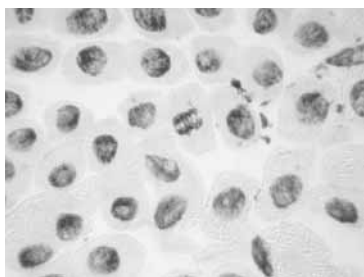


Fig 6 Chromosomal bridges, at *Cosmin* variety, treated with caffeine 0,1%

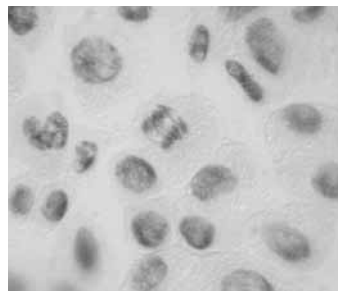


Fig7 Chromosomal bridges, at *Export* variety, treated with caffeine 0,1%



Fig 8 Chromosomal bridge, at *Cosmin* variety, treated with caffeine 0,05%

