CYTOGENETIC EFFECTS INDUCED BY TREATMENT WITH SIMAZIN ON BARLEY (*HORDEUM VULGARE* L.) CULTIVARS

GABRIELA CĂPRARU, ION I. BĂRA, CSILLA IULIANA BĂRA, MIRELA MIHAELA CÎMPEANU, ELENA MAXIM, MIHAELA FLORINA AXENTE

Key words: *Hordeum vulgare*, cultivars, pesticids, chromosomal aberrations.

Abstract: The treatmet with Simazin has determined the mitotic index decreasing concomitant with pesticid concentration increasing. The situation is the same for three investigated.cultivars, being different for Mădălin. The Simazin induces apparition of chromosomal aberrations. The most sensible cultivar is Adi and the less sensible is Miraj.

INTRODUCTION

The compounds used for plants protection are named pesticids. They prevent plant damages by insects, fungus, weeds etc. during germination or growing processes.

The fight against weeds is realised with the help of herbicide-s, wich represents 40-60% from total of pesticids.

The pozitive effects of pesticids do not prevent some negative ones. Do not exist pesicids with full selective action (against one group of weeds, for example).

AIM OF INVESTIGATIONS

Ţinând cont de importanţa deosebită pe care o ocupă cerealele, atât pentru hrana omului, cât şi pentru furajarea animalelor, precum şi de aspectele negative ale folosirii pesticidelor, în prezenta lucrare ne-am propus evidenţierea unor efecte exercitate de erbicidul Simazin, asupra diviziunii mitotice în celulele din apexul radicular de orz, în cazul a patru soiuri: Adi, Dana, Mădălin şi Miraj.

MATERIAL AND METHODS

Biological material: barley seeds obtained from ICCPT Fundulea (Miraj cultivar, harvest from 2001) and from SCA Podu Iloaie (Adi, Dana and Mădălin cultivars, harvest from 2001).

Germination was realized in Petri dishes covered with filter paper, which was moisturized with distillated water. The Petri dishes were placed in thermostat, at 22°C.

When the little roots have reached a length between 5 and 10 mm, it was applied the following treatment:

- the control dish – the little embryonic roots were kept, for three hours, in distillated water, at room temperature;
- the variants of treatment, in which were used four concentrations of Simazin, (0,1%, 0,2%, 0,5% and 1%), were kept in the same conditions as control.

After that, seeds were washed for two hours in distillated water, at room temperature.

The fixation was assured, for 10 – 20 hours, in absolute ethylic alcohol / glacial acetic acid mixture (3:1), at room temperature. Then, all five variants (including the control) were transferred in ethylic alcohol 70%, in refrigerator.

For hydrolyze it was used 50%HCl, for 20 minutes, and for staining it was used Carr solution.

The slides were prepared in accordance with squash method, then, were observed at 20x at microscope, and photographs were realized with the same microscope, but at 100x objective, with immersion, using a camera Nikon Eclipse 600.

From each variant were analyzed 5 slides. On each slide were observed 10 microscopic areas to determine mitotic index and various mitotic phases of cells.

RESULTS AND DISCUSSIONS

a) Mitotic index (MI)

The treatment with Simazin solutions, in different concentrations, has induced the decrease of the number of cells in mitotic division. This decrease is in accordance with the growing concentration of the Simazin solution. In fig.1 is represented the decrease of mitotic index in same proportions at the four barley cultivars, except Mădălin cultivar, where the upper Simazin concentration induce an increase of the mitotic index; the value of the mitotic index at Mădălin cultivar is bigger that the control. In this case, the division process was stimulated.

b) Frequency of the mitotic phases

At all concentrations (Control, 0.1%, 0.2%, 0.5% and 1%) administered to the four barley cultivars, it can notice that the cells in prophase are more numerous; this phase reveal a descendent curve in accordance with the increase of the Simazin concentration.

The percentage of the metaphase cells is smaller comparatively with prophase ones. This was noticed only at three barley cultivars (Mădălin, Dana, Adi) while at Miraj cultivar the proportion between metaphase and prophase cells was quite alike.

The smallest percents were noticed for anaphase and telophase cells (4.54 – 16.94%).

c) Frequency of cells with aberrations

The treatment with Simazin induced the increase of the cells percent with aberrations, in direct accordance with the increase of the Simazin concentration. The most sensitive barley cultivar is Adi, at witch was present an increase of the aberrant cells percent, from 0.70% (in control) to 21.06% (at 0.5% Simazin).

The main aberrations observed were: bridges, retard chromosomes, expelled chromosomes, fragments, multi-polar anaphases, and few complex aberrations.

CONCLUSIONS

The increase of Simazin concentrations induce a decrease of mitotic index at barley (*Hordeum vulgare* L.) cultivars Miraj, Mădălin, Dana and Adi.

The percent of prophase is more significant than the percent of metaphase, anaphase and telophase.

The Simazin treatment induced apparition of cells with chromosomal aberrations, in direct accordance with the concentration applied.

Barley cultivar Adi was proved to be most sensitive at treatment with Simazin, because the percent of the aberrant cells is almost 20 times increased comparatively with control.

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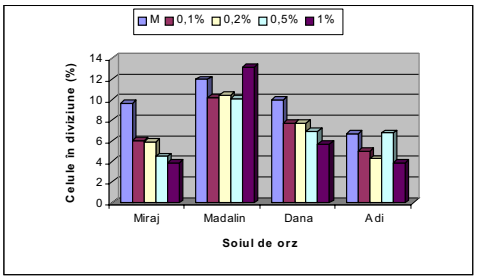

Fig. 1. The mitotic index at barley (*Hordeum vulgare* L.) after treatment with Simazin

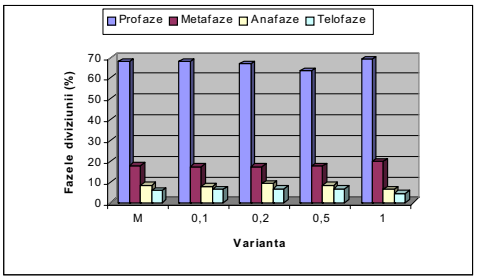

Fig. 2. The frequency of mitotic phasesin barley cultivar Miraj,after treatment with Simazin

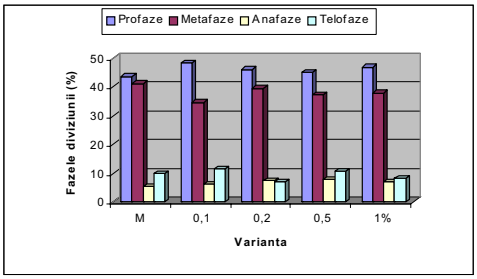

Fig. 3. The frequency of the mitotic phases in barley cultivar Mădălin, after treatment with Simazin

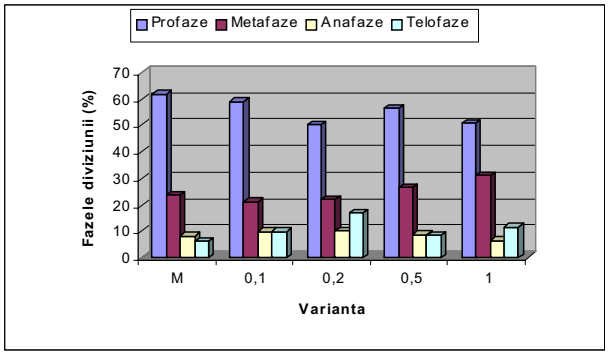

Fig. 4. The frequency of the mitotic phases in barley cultivar Dana, after treatment with Simazin

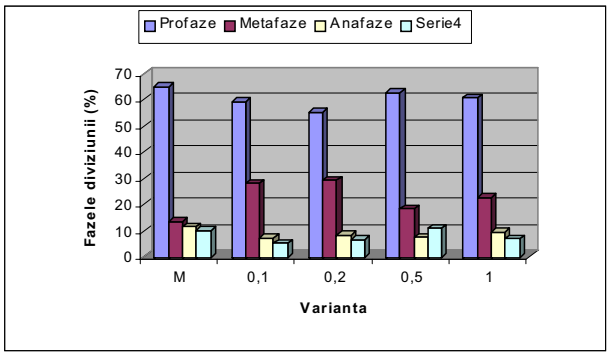

Fig. 5. The frequency of the mitotic phases in barley cultivar Adi, after treatment with Simazin

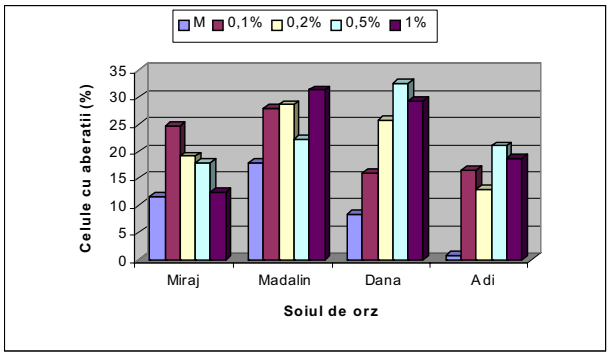

Fig. 6.The frequency of the cells with aberrations in barley, after treatment with Simazin