Oltisan Action on Some Cultivated Species

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Keywords: Oltisan extra, Vicia faba, Lycopersicum aesculentum, mitotic division, chromosomal aberrations

Abstract: Our study is focused on the effect of a common pesticide – Oltisan, on two cultivated species Vicia faba and Lycopersicum aesculentum.

INTRODUCTION

Oltisan is a common systemic pesticide, very useful in industrial agriculture. It is used as herbicide for annual and perennial dicots and is produced by Olchim S.A. Ramnicu Valcea Romania and Sandoz Agro, Suisse. This pesticide belong to aromatic carboxylic derivatives and is a mixture of 2,4 – D and Dicamba. It is not harmful for cereals (monocots).

THE AIMS OF INVESTIGATION

Our study intends to determine mutagenic effects of Oltisan on Vicia faba and Lycopersicum aesculentum.

MATERIALS AND METHODS

Plants seeds and Oltisan extra: from Podu Iloaiei Seed Center. We used two Vicia cultivars (A and B) and also two Lycopersicum cultivars (Vidra and Dacia). For mutagenic treatments we used Oltisan 50μl/l for both Vicia cultivars and two concentrations (50μl/l – V1, and 10μl/l – V2) for each Lycopersicum cultivars.

Laboratory phase: one of the first investigations concerned the capacity of germination and the mitotic division of these two species seeds embryonic roots. Seeds from every variant (control and mutagenized variants) were germinated in Petri dishes, on distilled water, at 25°C, in the dark. The germination is followed by the Oltisan treatment. Roots of 1 – 1,5 cm were fixed with Battaglia fixator prior to be submitted to cytological investigations. We also investigated the mutagenic effects of Oltisan on biological materials, doing cytogenetic study of chromosomal aberrations in mitosis ana-telophase of embryonic roots mutagenic treatment consequently. All determinations were performed according literature protocols (Tudose et al., 1996; Grama et al., 2003; Grama and Bara, 2003).

RESULTS AND DISCUSSIONS

Investigations on mitotic division in radicular meristems of Vicia faba

One of the first goals of our study is the investigation on the mitotic division in embryonic roots of Vicia faba. As we can observe in Figure 1, 2 the division rate does exhibit a slight decrease in the variants of Oltisan treatment, especially on cultivar B, comparative to the control.

There are of course differences between different mitotic division phases (Figure 3), with a very similar decrease from prophase to telophase pattern in each experimental variants.

Investigations on mitotic division in radicular meristems of Lycopersicum aesculentum

As we can observe in Figure 4, 5 the division rate does exhibit a slight decrease in the variants of Oltisan treatment, especially on high concentration of Oltisan, comparative to the control. Dacia cultivar seems to be more sensitive to Oltisan action.
There are of course differences between different mitotic division phases (Figure 6), with a very high proportion of prophase in each experimental variants.

Investigations on chromosomal aberrations in mitotic anaphase-telophase

The amounts of chromosomal aberrations were increased comparative with control in every experimental variant, as it can be observed in Figure 7 and Figure 8 for *Vicia* and in Figure 9 and 10 for *Lycopersicum*. These results indicate that Oltisan has mutagenic effects on the investigated species.

We found differences between the different sorts of chromosomal aberrations, with a specific high level of micronuclei, probably due to these species characteristic response to Oltisan.

**CONCLUSIONS**

Oltisan, a powerful pesticide agent, exhibit mutagenic capacity on *Vicia* and *Lycopersicum* cultivars.

Oltisan has mutagenic effects in any of the used concentrations, but the cultivar and the high concentrations seem to be critical parameter, that induces specific increase chromosomal aberration proportion.

**BIBLIOGRAPHY**


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INTERPHASE IN Vicia Faba (Oltisan Treatment)

Vicia faba (cultivar A, control) vs. Vicia faba (cultivar B, control) vs. Vicia faba (cultivar A, 50 ul/Oltisan) vs. Vicia faba (cultivar B, 50 ul/Oltisan)

Experimental variants

Figure 1

MITOTIC INDEX IN Vicia Faba (Oltisan Treatment)

Vicia faba (cultivar A, control) vs. Vicia faba (cultivar A, 50 ul/Oltisan) vs. Vicia faba (cultivar B, control) vs. Vicia faba (cultivar B, 50 ul/Oltisan)

Experimental variants

Figure 2
**Figure 3**

MITOTIC DIVISION PHASES PROPORTION IN RADICULAR MERISTEMS OF VIVIA FABA (OLTISAN TREATMENT)

- **Legend:**
  - □ prophase%
  - ■ metaphase%
  - □ anaphase%
  - □ telophase%

<table>
<thead>
<tr>
<th>Variant</th>
<th>Prophase</th>
<th>Metaphase</th>
<th>Anaphase</th>
<th>Telophase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultivar A (control)</td>
<td>2</td>
<td>1.5</td>
<td>1.2</td>
<td>1</td>
</tr>
<tr>
<td>Cultivar A (50ul/Oltisan)</td>
<td>1.8</td>
<td>1.3</td>
<td>1.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Cultivar B (control)</td>
<td>1.5</td>
<td>1</td>
<td>1.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Cultivar B (50ul/Oltisan)</td>
<td>1.2</td>
<td>1.5</td>
<td>1.3</td>
<td>1</td>
</tr>
</tbody>
</table>

**Figure 4**

INTERPHASE PROPORTION ON LYCOPERSICUM AESCULENTUM (OLTISAN TREATMENT)

- **Legend:**
  - ■ Interphase

<table>
<thead>
<tr>
<th>Variety</th>
<th>Interphase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vidra (M)</td>
<td>97</td>
</tr>
<tr>
<td>Vidra (V1)</td>
<td>96</td>
</tr>
<tr>
<td>Vidra (V2)</td>
<td>95</td>
</tr>
<tr>
<td>Dacia (M)</td>
<td>94</td>
</tr>
<tr>
<td>Dacia (V1)</td>
<td>93</td>
</tr>
<tr>
<td>Dacia (V2)</td>
<td>92</td>
</tr>
</tbody>
</table>

**Experimental Variants:**
- M = control
- V1 = 50ul/Oltisan
- V2 = 10ul/Oltisan
MITOTIC INDEX IN LYCOPERSICUM AESCULENTUM (OLTISAN TREATMENT)

![Graph showing mitotic index](image)

**Figure 5**

DIVISION PHASES PROPORTION IN RADICUL MERISTEMS OF LYCOPERSICUM AESCULENTUM (OLTISAN TREATMENT)

![Graph showing division phases proportion](image)

**Figure 6**
Figure 7

ANA-TELOPHASE PROPORTIONS IN RADICULAR MERISTEMS OF VICIA FABA

Figure 8

CHROMOSOMAL ABBERATIONS IN RADICULAR MERISTEMS OF VICIA FABA, OLTISAN TREATMENT CONSEQUENTLY
ANA-TELOPHASE PROPORTIONS IN RADICULAR MERISTEMS
OF LYCOPERSICUM AESCULENTUM

![Graph](image)

Figure 9

CHROMOSOMAL ABBERATIONS IN RADICULAR MERISTEMS
OF LYCOPERSICUM AESCULENTUM, OLTISAN TREATMENT
CONSEQUENTLY

![Graph](image)

Figure 10