CONTRIBUTION REGARDING THE INFLUENCE OF SIMAZIN TREATMENT ON SOME PHYSIOLOGICAL INDICES TO BARLEY PLANTLETS (*Hordeum vulgare* L.)

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Abstract: The use of Simazin herbicide to Miraj and to Dana cultivars, in concentration of 0.1%, 0.2%, 0.5% and 1% determined the variation of some physiological indices. The energy and the faculty of germination decreased to both cultivars, proportionally to the increase of the pesticide concentration. The process of photosynthesis was intensified at the high doses of herbicide also producing the accumulation of total mineral elements.

Key words: barley cultivars, pesticides, Simazin, physiological parameters.

Introduction

Both genetically but most of all physiologically speaking, the study of the pesticides effects on plants emphasize their polluting nature, because many of these pesticides that are used today have a long period of the remanence. As for example, the herbicides used against weeds, have some disadvantages: the resistance to decay, cancerigenic properties, the accumulation in animal body, the concentration in trophic chains, being found also to man [Ionescu, 1974].

This study presents the effect of Simazin herbicide on some physiological indices to barley plantlets of Miraj and Dana cultivars.

Material and methods

The biological material was represented by barley plantlets of 14 days old from the seeds of I.C.C.P.T Fundulea (Miraj cultivar) and S.C.A. Podu Iloaiei (Dana cultivar) of 2001 harvest. The Simazin herbicide was used as a treatment substance in concentration of 0.1; 0.2; 0.5 and 1%. There were obtained four variants of treatment and one of control. The seeds were soaked for germination in Petri dishes, on filter paper and they were moistured in Simazin solutions (the variants of treatment) and in distilled water (the control variant).

The physiological analyses are about: the energy and the faculty of germination that are determined by the control of the percentage of the germination seeds in the fourth and respectively the tenth day; the content in assimilatory pigments (the spectro-photometric method); the intensity of the photosynthesis and respiration (Ivanov-Kossovici’s method);

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the content of water and dry substance (the gravimetrical method); the intensity of transpiration (L. A. Ivanov’s method).

Results and discussions

a) The energy and the faculty of germination. Both cultivars presented differences of the energy and the faculty of germination even to control. These parameters were between 92 and 93% to Miraj cultivar and only 51 and 65% respectively to Dana’s.

There was a decrease of the energy and the faculty of germination after the treatment with Simazin, proportionally to the increase of the concentration of the herbicide used (fig.1), the lowest value being recorded to the maximum dose of pesticide (1%), at both cultivars.

According to theoretical studies (Dhelor, 1971, quoted by Şarpe, 1973), the inhibition of germination was correlated with the block of the mitotic division, a fact that we also noticed in our researches [Căpraru, 2004].

b) The content of assimilatory pigments. The treatment with Simazin induced the decrease of the content of assimilatory pigments to Dana cultivar, proportionally to the increase of herbicide concentration.

The quantity of assimilatory pigments decreased only at the maximum concentration of herbicide (1%) to Miraj cultivar, while this parameter had been higher than to control at all the other variants, the maximum value being recorded at 0.2% variant of Simazin (fig.2).

c) The intensity of photosynthesis and respiration. The photosynthesis process was intensified to Miraj cultivar with the increase of herbicide concentration, the highest value being recorded to the 1% variant of Simazin. This fact showed a direct correlation between the photosynthesis and the content of assimilatory pigments.

The photosynthesis and the respiration diminished to Dana cultivar, at all the variant of treatment, excepted 0.2% variant, where these indices exceeded the control (fig.3).

One noticed in the theoretical studies that the subletal doses of triazinic herbicides (to which Simazin belongs) determinate the stimulation of the photosynthetic and respiration activity, having a hormonal action similar to that of cytokines [Zeri, 1985].

d) The intensity of transpiration. Treatment with Simazin intensified the process of transpiration to Dana cultivar proportionally to the increase of herbicide concentration, reaching to double it at the maximum variant of treatment, comparatively to control (from 0.16 to 0.36 mg water/g fresh matter/hour).

The intensity of transpiration was to Miraj cultivar only at the minimum concentration of pesticide (0.1% Simazin), while this index had values close to those of the control (fig. 4).

e) The water and dry substance content. The doses of herbicide used did not induce important modification of the quantity of dry substance in leaves (fig.5).

The content of water increased as the result of the Simazin treatment, maximum value being at the maximum of herbicide (1%) to both cultivars studied.
Fig. 1. The energy and the faculty of germination to Miraj (left) and Dana (right) cultivars.

Fig. 2. The quantity of assimilatory pigments to Miraj (left) and Dana (right) cultivars.

Fig. 3. The intensity of the photosynthesis and respiration to Miraj (left) and Dana (right) cultivars.
f) **The total of mineral elements.** The use of the Simazin treatment induced an increase of the content of total mineral elements, this increase being proportional to the pesticide concentration, the situation being similar to both cultivars studied (fig.7).

**Conclusions**

The treatment with Simazin herbicide determined both a process of stimulation and one of inhibition of the metabolism depending on the concentration. The process of stimulation can be noticed at low concentration (0.1%) in transpiration and water content (Miraj cultivar). The inhibition was produced at higher concentrations (0.5 - 1% herbicide) in photosynthesis, respiration and assimilatory pigment content (Dana cultivar).

The herbicides of triazinic group stimulated the photosynthesis, the respiration and the absorption of mineral elements, to Miraj cultivar, a fact that gave a higher existence to Simazin’s action comparatively to Dana’s.

The minimum quantity of assimilatory pigments recorded to Miraj cultivar at 1% of Simazin was correlated the intensification of the photosynthesis within the same variant.
The treatment used to Dana cultivar determined the decrease of the content of assimilatory pigments proportionally to the increase of herbicide concentration. The mineral element content increased to both cultivars studied, proportionally to the dose of herbicide.

References